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# Coping with health shocks in Ethiopia: A multivariate probit analysis of household strategies

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## Abstract

In contexts like Ethiopia, where formal health insurance and financial markets are underdeveloped, households face significant challenges in managing the economic consequences of health shocks. This study analyzes household coping strategies in response to illness and death shocks using two rounds of nationally representative Ethiopian Socioeconomic Survey data. A multivariate probit model is employed to capture the interdependent nature of five active coping strategies. The findings reveal that coping responses vary across household characteristics, including poverty status, gender of the household head, and rural-urban location. Death shocks commonly trigger increased labor participation, particularly among rural and female-headed households, while urban households often combine labor responses with asset sales or informal help. In contrast, illness shocks are primarily addressed through savings, with urban and male-headed households supplementing savings by selling assets, and rural households relying on a mix of savings and credit. Vulnerable groups – especially poor and female-headed households – tend to depend on coping mechanisms, such as asset liquidation and informal borrowing, which pose long-term risks to their economic stability. These results underscore the need for integrated policy interventions. Expanding community-based and social health insurance, providing accessible microfinance, strengthening preventive health programs, and enhancing targeted social protection are critical steps to mitigate the welfare losses associated with health shocks. Strengthening household resilience is essential not only for public health but also for advancing sustainable development and poverty reduction in Ethiopia and similar low-income settings.

***Keywords:*** Health shocks; Coping strategies; Ethiopia; Households; Multivariate probit

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## 1. Introduction

Ethiopian households, such as many in developing countries, are frequently exposed to death and illness shocks, which can have serious economic repercussions (Dercon & Krishnan, 2000; Dercon, 2004; Asfaw & Braun, 2004; Dercon *et al.*, 2005). These idiosyncratic shocks often result in significant declines in household welfare, not only through direct health deterioration but also through reduced leisure time and lower consumption of non-health goods and services (World Health Organization, 2009). The impact is particularly pronounced in low-income settings where access to credit and formal

health insurance is limited or nonexistent (Dabla- Norris & Bal Gündüz, 2014). This is especially true in Ethiopia, where financial constraints and underdeveloped health and life insurance systems leave households highly vulnerable. The adverse effects of such shocks can persist in both the short and long term, depending on the household's capacity to cope. A comprehensive understanding of these welfare implications thus requires an examination of the coping strategies employed in their aftermath (Khan *et al*., 2015). Importantly, while some coping strategies may alleviate immediate hardship, they can undermine long-term welfare – particularly when they involve selling productive assets or incurring high-interest debt (Dabla-Norris & Bal Gündüz, 2014).

In low-income countries – particularly in Sub-Saharan Africa (SSA) – the absence of formal risk protection mechanisms forces households to depend heavily on informal networks and self-insurance strategies to manage economic shocks (European Report on Development, 2010). In Ethiopia, households typically rely on informal social support systems, including assistance from relatives, friends, and neighbors, as well as self-insurance mechanisms, such as asset sales and child labor, to mitigate the adverse impacts of health shocks (Woldemichael & Gurmu, 2018). However, these informal coping strategies often provide limited protection and can lead to long-term welfare losses by undermining the accumulation of physical and human capital (Carter *et al*., 2007; Dabla-Norris & Bal Gündüz, 2014). Stressing the importance of coping mechanisms, Yilma *et al.* (2014) and Khan *et al.* (2015) claim that current consumption insurability without analyzing the underlying protection can be misleading. Against this backdrop, this study has three interrelated objectives. First, it provides a comprehensive analysis of how Ethiopian households respond to health shocks, particularly those related to death and illness. Second, the study investigates the range and effectiveness of coping strategies employed in the absence of formal insurance systems and well-functioning credit markets. Third, it assesses the short- and long-term implications of these coping strategies on household welfare, with a particular focus on the trade-offs between immediate relief and future economic vulnerability.

This study holds important implications for policymakers in Ethiopia and SSA. Understanding how households in Ethiopia cope with health shocks is not only academically relevant but also essential for evidence-based policymaking. In the absence of robust health insurance systems and inclusive financial services, many households are forced to adopt coping strategies – such as asset sales and informal borrowing – that may alleviate short-term hardship but undermine long-term economic security. As such, insights from this study can inform evidence-based policymaking aimed at enhancing household resilience. The relevance of this research extends beyond Ethiopia, offering valuable lessons for other SSA countries facing similar structural constraints. By highlighting the coping strategies and their consequences on welfare, the study provides actionable evidence for designing integrated health financing systems, targeted social protection programs, and inclusive financial instruments. These policy recommendations are essential for reducing vulnerability, promoting economic sustainability, and advancing broader development goals in low-income settings.

## 2. Literature review

### 2.1. General literature

In developing countries where formal insurance and credit markets are weak or absent, health shocks can have profound implications for household welfare. These shocks often reduce labor supply and income, raise out-of-pocket healthcare expenditures, and disrupt overall consumption patterns (Dercon & Krishnan, 2000; Dercon, 2004; Asfaw & Braun, 2004; Dercon *et al.*, 2005; Genoni, 2012; Islam & Maitra, 2012). In response, households adopt a variety of coping strategies to preserve their consumption levels. These mechanisms can be categorized as internal – such as drawing down savings, selling assets, adjusting household labor supply, or reducing consumption – and external, including borrowing, receiving remittances or gifts, or accessing community-based or government assistance (Morduch, 1995; Yilma *et al.*, 2014).

Empirical literature on consumption smoothing often tests the full consumption insurance hypothesis, which assumes that households can entirely shield their consumption from idiosyncratic shocks through a mix of market-based, informal, or self-insurance mechanisms (Dercon, 2002; Mu, 2006; Sawada, 2017). However, these tests do not differentiate between specific mechanisms or assess their long-term consequences. A nuanced understanding of these coping responses is essential to distinguish between strategies that offer short-term protection and those that potentially undermine long-term welfare – an analytical gap this study seeks to address in the Ethiopian context.

In theory, well-functioning insurance and financial markets enable households to manage health-related risks more effectively. Insurance – whether formal or informal – allows for risk-sharing, either ex-ante through health coverage or ex-post through government transfers, community networks, or informal remittances. Financial institutions can also help by facilitating savings or providing

access to credit during times of need. However, these mechanisms are often inaccessible to poor households due to barriers, such as cost, lack of information, or geographic isolation (Morduch, 1995).

In many developing countries, including Ethiopia, formal health insurance markets remain underdeveloped and cover only a small segment of the population (Dercon, 2002; Heltberg *et al*., 2015; Woldemichael & Gurmu, 2018).[1] In addition, tax-based public insurance systems and social protection programs are not accessible to the majority, leaving households to absorb health shocks themselves.[2] In such contexts, families typically rely on informal risk-sharing strategies – such as unconditional help, low- or high-interest credit relatives, friends, neighbors, and members of informal savings, credit, or funeral associations (Dercon, 2002; Heltberg *et al.*, 2015; Woldemichael & Gurmu, 2018). While these informal mechanisms are vital, they are often insufficient to fully offset the economic risks associated with health shocks.

Households rarely rely on a single strategy; instead, they employ multiple and often overlapping approaches that can serve complementary or substitutive roles depending on the type of shock, household composition, and institutional context (Skoufias, 2003). Understanding these patterns of strategy selection is crucial for designing effective, targeted interventions to strengthen household resilience.

Levy (2002) outlines a range of coping mechanisms employed in response to health shocks, including informal insurance, formal contracts, and self-insurance through asset accumulation or labor adjustments. Due to gaps in coverage and benefits, even insured households may remain vulnerable to the financial consequences of illness. In many cases, the income loss far exceeds the compensation provided by insurance, underscoring the insufficiency of relying solely on formal insurance mechanisms.

Moreover, coping mechanisms themselves can impose significant long-term costs. Even when short-term consumption is maintained, strategies, such as asset sales, high-interest borrowing, or withdrawing children from school can lead to deeper and more persistent vulnerability (Carter *et al.*, 2007; Flores *et al.*, 2008; Dabla-Norris & Bal Gündüz, 2014). Households lacking access to informal networks or formal markets may be forced to reduce current consumption or increase child labor (Quintussi *et al.*, 2015; Dhanaraj, 2016; Mitra *et al.*, 2016).

Evidence from India, Vietnam, and Bangladesh reveals that households often adopt "vulnerability-enhancing" coping strategies, such as borrowing from informal lenders, selling productive assets, or cutting back on education expenditures (Quintussi *et al.*, 2015; Mitra *et al.*, 2016; Dhanaraj, 2016; Islam & Maitra, 2012). For instance, Senne (2014) finds that adult mortality in Madagascar significantly reduces children's educational attainment, particularly among poor and female-headed households, thus perpetuating long-run income inequality. In Cambodia, households responding to a dengue outbreak relied on asset liquidation and informal borrowing; many were unable to repay their debts even a year later (Damme *et al.*, 2004).

Islam & Maitra (2012) highlight the mitigating role of microcredit in Bangladesh, showing that access to microfinance reduces the need for households to sell productive assets. Similarly, Mirelman *et al.* (2018) report that rural Bangladesh households experiencing adult deaths from non-communicable diseases frequently resort to high-interest loans and reductions in basic expenditures, increasing their vulnerability to future shocks.

Earlier research emphasized the dominance of informal over formal mechanisms in managing risk. Morduch (1995) argues that informal arrangements between individuals and communities often form the cornerstone of coping strategies in developing countries. These include gift exchanges, community labor, asset liquidation, and income diversification. While such mechanisms can offer short-term protection, they may impede long-term economic mobility.

The choice of coping strategies depends on various factors, including household demographics, the nature of the shock, and its duration (Gertler & Gruber, 2002; De Weerdt & Dercon, 2006; Islam & Maitra, 2012; Mirelman *et al.*, 2018). Poor households, female-headed households, and those with elderly or disabled members are especially vulnerable (Dhanaraj, 2016). In rural Bangladesh, for example, Mirelman *et al.* (2018) find that poor households are more likely to resort to high-interest loans following non-communicable disease deaths. Similarly, studies from the U.S. context (Kim & Lee, 2005; Kim, 2006; Kim *et al.*, 2012) show that health shocks significantly increase debt and deplete wealth, particularly among African Americans, unmarried women, and middle-aged adults, underscoring the universality of these challenges.

Coping strategies that involve sacrificing human capital or productive assets can perpetuate poverty and increase

[1] In Ethiopia, community-based health insurance for people in rural areas and urban people working in the informal sector is a recent initiative.

[2] The reallocation of households' resources such as depleting own savings, selling durable and productive assets, using child labour and intra-household labour adjustments are termed self-insurance strategies (Nguyen, Nguyen, and Grote 2020).

future vulnerability (Heltberg *et al.*, 2015; Leonard *et al.*, 2017; Semyonov *et al.*, 2013). Higher-income households may rely on savings and insurance, while lower-income households are often forced to pursue more harmful responses.

From a policy standpoint, understanding the coping strategies households employ is essential for designing interventions that enhance resilience. When evidence shows widespread reliance on costly or vulnerability-enhancing strategies, targeted policies – such as expanding access to microcredit, introducing universal health insurance, and strengthening social safety nets – become imperative (Dhanaraj, 2016; Islam & Maitra, 2012). Chetty & Looney (2006) argue that even modest insurance coverage can generate substantial welfare gains for risk-averse households in developing countries, especially in low-income settings where consumption declines must be averted at high cost. International institutions, including the World Health Organization, the World Bank, the International Monetary Fund, and the International Labor Office, have advocated for the development of formal health insurance and microcredit programs. Early pilot initiatives were launched in developing countries to help mitigate the welfare loss caused by illness-related shocks (International Labour Office, 2001; International Monetary Fund, 1993; Measham, 1986; Normand *et al.*, 1994).

### 2.2. The evidence for Ethiopia

Despite the growing literature on household vulnerability and coping strategies in low-income settings, empirical studies specifically examining responses to health shocks in Ethiopia remain limited. Existing research has explored household responses to various types of shocks, including multi-shock scenarios (Yilma *et al.*, 2014), idiosyncratic income shocks (Alvi & Dendir, 2009), covariate and idiosyncratic income shocks (Pan, 2009), and idiosyncratic health shocks (Woldemichael & Gurmu, 2018).[3] While these studies offer important insights, they tend to focus on narrow dimensions of shock response and often rely on limited datasets or specific geographic contexts.

Yilma *et al.* (2014) investigate rural household responses to both covariate and idiosyncratic multi-shocks using cross-sectional data from the Ethiopian Rural Household Survey and complementary event history interviews. They find that households affected by covariate shocks, such as natural disasters or economic downturns, often reduce food consumption and deplete savings. In contrast, households facing idiosyncratic health shocks – such as illness, disability, or death – are more likely to rely on savings, asset liquidation, and informal borrowing. Interestingly, the study reports that while informal transfers from family and friends provide limited insurance for health shocks, they offer virtually no protection against other types of shocks. This finding challenges the canonical risk-sharing hypothesis and suggests that rural Ethiopian households largely absorb health-related risks internally.

Alvi & Dendir (2009) explore the extent of informal risk-sharing in urban Ethiopia using three rounds of Urban Socioeconomic Survey data. Specifically, they examine whether private transfers and informal loans function as instruments for income smoothing in urban contexts. Their result show that only private transfers respond to proxies for income risk and serve a risk-sharing function, while informal loans do not.[4] Although both private transfers and informal loans augment low and uncertain incomes, these authors find that informal loans are largely dictated by household demand (proxied by household size) and household resources (proxied by household income). They argue that informal loans are better understood as instruments for meeting consumption needs under tight budget and liquidity constraints, rather than as mechanisms for risk-sharing.

Similarly, Pan (2009) uses panel data from the Ethiopian Rural Household Survey to investigate the risk-sharing role of two types of transfers – those from government and non-governmental organizations (NGOs), and those from relatives, friends, and funeral associations – against covariate and idiosyncratic income shocks.[5] The study finds that while government and NGO transfers offer limited protection against covariate income shocks, they do not cover idiosyncratic shocks. Transfers from relatives, friends, and funeral associations are also found to be ineffective in insuring against both types of shocks. Nevertheless, both types of transfers exhibit some degree of income redistribution, highlighting their broader social support function.

Using four rounds of Ethiopian Rural Household survey data, Woldemichael & Gurmu (2018) investigate informal risk-sharing against the health shocks in the presence of multiple social networks. They find no evidence of insurance from transfers provided by networks, such as

[3] Depending on how large the area coverage is; shocks can be classified as covariate or idiosyncratic. Idiosyncratic shocks affect only an isolated number of households while covariate shocks hit the whole community at once. In this paper, death and illness shocks are classified as idiosyncratic.

[4] Alvi and Dendir (2009) consider unemployment and illness of household heads as proxies of household income shock.

[5] In the study of Pan (2009), idiosyncratic health shocks are not explicitly discussed but implicitly included as components of idiosyncratic shocks that cause idiosyncratic income loss.

friends, neighbors, and members of informal associations against either short-term or long-term health shocks. However, transfers from kin-based networks – such as extended family – do provide some risk-sharing support against long-term health shocks such as disabilities, though not against transitory shocks, such as illnesses.[6]

### 2.3. Contribution of the paper

Despite the valuable insights offered by a few existing studies on household coping mechanisms in Ethiopia, a significant gap remains in understanding how households respond specifically to distinct types of health shocks – particularly those involving death and illness. This study seeks to fill this gap and advances the existing literature in several important ways.

First, while most previous studies treat health shocks as a single, undifferentiated category, this study distinguishes between two distinct types: death and illness. This distinction is crucial, as these shocks differ not only in severity and duration but also in the coping mechanisms they trigger. By analyzing coping responses separately for death and illness shocks, the study provides a more nuanced understanding of household resilience to different forms of health-related adversity.

Second, this study broadens the scope of analysis by exploring coping strategies across multiple population subgroups. Specifically, it compares strategies among rural and urban households, female- and male-headed households, and poor versus non-poor households. Previous Ethiopian studies – except for Alvi & Dendir (2009), which focus solely on urban households – are largely limited to rural contexts. This study's inclusive approach enables a more comprehensive assessment of heterogeneity in household responses across socioeconomic and demographic divides.

Third, this study considers a broader and more comprehensive set of coping strategies than those typically analyzed in the Ethiopian literature. Most earlier works tend to focus narrowly on transfers and informal insurance as the main risk-sharing tools. This study, by contrast, evaluates a wider range of both internal and external strategies – including labor reallocation, savings, asset sales, borrowing, and transfers – capturing the multifaceted nature of household responses. In doing so, it responds to Pan's (2009) call for more detailed examinations of comprehensive coping strategies against both covariate and idiosyncratic shocks, particularly in the context of health-related events.

[6] Woldemichael & Gurmu (2018) define the number of physical disabilities of household heads as long-term health shock, and the number of days the household head was unable to work due to illness as short-term health shock.

Finally, from a methodological perspective, this study makes an important advancement by employing a multivariate probit (MVP) model. Unlike the univariate probit or logit models used in most previous studies (for example, Yilma *et al.*, 2014), the MVP approach accounts for potential correlations and interdependencies among different coping strategies. This allows for a more accurate depiction of the complex, simultaneous decision-making processes that households undertake in response to health shocks.

## 3. Data and methodology

### 3.1. Data

This study utilizes data from the second and third rounds of the Ethiopian Socioeconomic Survey (ESS), a collaborative initiative between the Ethiopian Central Statistical Agency and the World Bank's Living Standards Measurement Study-Integrated Surveys on Agriculture. The ESS is a nationally representative, multi-topic panel survey designed to collect comprehensive household and individual-level data, particularly suited for understanding welfare dynamics in agriculture-based economies.

Although three waves of ESS data are currently available, the first wave (ESS1) is excluded from this analysis as it only covers rural areas and small towns (populations under 10,000), omitting medium and large urban centers. Since this study aims to examine coping strategies across both rural and urban settings, only the second (ESS2) and third (ESS3) waves are used. These rounds include an expanded sampling frame that captures rural, small-town, and urban households, aligning with the study's objectives. ESS2 was conducted between September 2013 and April 2014 in three rounds, while ESS3 was administered between September 2015 and April 2016 in two rounds.

Both surveys employed a two-stage stratified random sampling design. In the first stage, 433 enumeration areas were selected using probability proportional to size sampling, including 290 rural, 43 small-town, and 100 urban enumeration areas, drawn from the Agricultural Sample Survey's sampling frame. In the second stage, 12 households were randomly selected from each rural and small-town enumeration area, and 15 households from each urban enumeration area, yielding a target sample of 5,496 households per wave. ESS2 successfully interviewed 5,262 households, while ESS3 re-interviewed 4,954 households, resulting in a panel attrition rate of <6%, which is considered low by panel data standards.

The ESS provides comprehensive and high-quality data at the individual, household, and community levels, encompassing a wide range of socioeconomic and

demographic indicators. For the purpose of this study, the most relevant modules include detailed information on household and household head characteristics; the incidence of death and illness shocks affecting any household member within the 12 months preceding each survey round; and the coping strategies adopted in response to these shocks. Notably, households report up to three coping strategies per shock, ranked in order of priority (first, second, and third choices). The definitions of all variables used in the analysis are presented in Table 1.

Table 2 presents a summary of key household and household head characteristics, as well as the prevalence of death and illness shocks, based on pooled data from the second and third waves of the ESS.

Approximately 52% of the households in the pooled sample fall below the societal poverty line.[7] Disaggregation by the gender of the household head reveals that 49% of female-headed households and 53% of male-headed households are classified as poor. When disaggregated by residence, 38% of urban households and 59% of rural households are identified as poor, highlighting stark rural-urban disparities in household welfare.

In terms of exposure to health shocks, 4.4% of households reported experiencing the death of at least one member, while 16.3% reported illness affecting at least one member in the 12 months preceding each survey. The prevalence of death and illness shocks is broadly consistent across urban and rural subsamples.

Regarding demographic characteristics, the average household size exceeds five members, with a male-to-female ratio of 46.3%. Approximately 34.6% of households reside in urban areas. Household mobility is also notable: 10% of households experienced a member leaving due to marriage, employment, or to follow other relatives, while 7.4% and 13.2% reported departures for schooling and other reasons, respectively.

About 30% of the households are headed by women, and 68.5% of household heads are currently married. Across both survey waves, the average age of household heads is just over 45 years, and they have received an average of 3.6 years of formal education.

[7] The level of poverty is measured using the societal poverty line, which is defined as one USD plus half of the median value of per capita expenditure in the country. This constitutes a relative poverty measure. The Rural Livelihoods Information System (RuLIS) team of the Food and Agriculture Organization (FAO) derived poverty status for household in both ESS2 and ESS3 based on this threshold. This study uses RuLIS poverty classification for the pooled sample.

Urban households are generally characterized by smaller family sizes, lower dependency ratios, and are more likely to be headed by younger, unmarried, and better-educated females compared to rural households. In contrast, female-headed households tend to be more urban, have smaller household sizes, and are typically headed by older, less educated, and predominantly unmarried individuals than male-headed households. Poor households are more likely to reside in rural areas, have larger household sizes and dependency ratios, and are generally headed by older, less educated, and more frequently married individuals than their non-poor counterparts.

Both ESS2 and ESS3 provide valuable information on how households respond to health shocks. Respondents who experienced a death or illness shock were asked to report up to three coping mechanisms in order of priority, selected from a predefined list of twenty options. For analytical clarity, these twenty strategies are grouped into twelve broad categories. A summary of these coping strategies is presented in Table 3.

The summary in Table 3 includes only households that reported experiencing either death or illness shocks. A notable proportion of these households responded by either taking no active coping action or relying primarily on spiritual or religious practices. Among active coping mechanisms, the most commonly reported strategies include drawing on personal savings, selling assets, receiving help from various sources, engaging in additional labor, and borrowing.

Less frequently used strategies include migration, sending children to live elsewhere, altering eating patterns, and reducing health or education expenditures. Across all household categories, use of personal savings emerged as the most frequently employed coping mechanism in response to both death and illness shocks. While all groups reported seeking help from others, female-headed households were more likely to do so. Asset sales were reported as the second most frequent coping mechanism, particularly among rural, male-headed, and poor households.

For the multivariate empirical analysis, five of the twelve coping strategies with the highest frequencies were selected: use of own savings, asset sales, unconditional help, credit, and additional labor.

In the Ethiopian context, credit is predominantly sourced from an informal channel. According to ESS3, approximately 23% of surveyed households accessed credit in the year preceding the survey. Among these, about 43% borrowed from relatives, 27% from microfinance institutions, and 9.5% from neighbors. Smaller proportions obtained credit from local merchants (5%)

**Table 1. Definition of variables used in the analysis**

| Category | Variable name | Definition |
|---|---|---|
| Self-reported health shocks | Death | Equals 1 if the household experienced the death of at least one member within the year preceding the survey. |
| | Illness | Equals 1 if the household experienced illness of at least one member within the year preceding the survey. |
| | Death_ill | Equals 1 if the household experienced both death and illness of at least one member within the year preceding the survey. |
| Household characteristics | Poor_dev | Equals 1 if the household is classified as poor based on the societal poverty line. |
| | Hhsize | Total number of individuals residing in the household. |
| | Depend | Dependency ratio within the household. |
| | Maleratio | Proportion of male members in the household. |
| | Urban | Equals 1 if the household is located in an urban area (small, medium, or large city). |
| | Left_marr | Equals 1 if a household member left due to marriage. |
| | Left_foll | Equals 1 if a member left to follow relatives. |
| | Left_work | Equals 1 if a member left the household for employment. |
| | Left_sch | Equals 1 if a member left for educational purposes. |
| | Left_other | Equals 1 if a member left for other reasons not specified above. |
| Household head characteristics | Female_h | Equals 1 if the household head is female. |
| | Age_h | Age of the household head (in years). |
| | Educ_h | Years of formal education completed by the household head. |
| | Married | Equals 1 if the household head is currently married. |
| Coping strategies for health shocks | Help | Received unconditional assistance from relatives, friends, government, NGOs, or religious institutions. |
| | Credit | Obtained loans or credit from any source. |
| | Asset_sale | Sold household assets (agricultural tools, livestock, land, buildings, or durable goods). |
| | Saving | Used household savings to cope with the shock. |
| | Labor | Increased labor participation by employed or previously non-working adults. |
| | Educhealth | Reduced spending on health care and/or education. |
| | Eatingpat | Changed eating patterns or reduced food consumption. |
| | Migrate | Household member (s) migrated in response to the shock. |
| | Child_l | Sent children to live elsewhere. |
| | Other_c | Engaged in other strategies, such as intensified fishing or non-traditional activities. |
| | Spiritual | Sought spiritual interventions, including prayers, sacrifices, or divination. |
| | Nothing | Took no action in response to the shock. |

Abbreviation: NGOs: Non-governmental organizations.

and moneylenders (3%). Only a few households reported borrowing from commercial banks, religious institutions, or employers. Informal credit sources are typically costly, while microfinance institutions – though slightly more accessible – also impose relatively high interest rates due to the risk profile of their clientele.

Additional labor is typically provided by household members who were already employed but took on extra work, as well as by non-working adults who entered the labor force. The following section presents the empirical methodology used to estimate the probability of choosing each coping strategy.

### 3.2. Methodology

Households' decisions to adopt coping strategies in response to death and illness shocks are likely interdependent, as multiple strategies may be employed simultaneously. This study focuses on five frequently adopted active coping strategies: (1) using own savings, (2) selling assets, (3) receiving unconditional help, (4) borrowing, and (5) engaging in additional labor. Modeling

**Table 2. Summary of household and household head characteristics, health shocks, and coping strategies**

| Variable name* | Whole | Urban | Rural | Female | Male | Poor | Non-poor |
|---|---|---|---|---|---|---|---|
| Poor_dev | 0.520 (0.500) | 0.380 (0.486) | 0.593 (0.491) | 0.490 (0.500) | 0.532 (0.499) | - | - |
| Death | 0.044 (0.206) | 0.046 (0.209) | 0.044 (0.204) | 0.062 (0.241) | 0.037 (0.188) | 0.045 (0.207) | 0.043 (0.204) |
| Illness | 0.163 (0.369) | 0.168 (0.374) | 0.160 (0.367) | 0.161 (0.367) | 0.164 (0.370) | 0.167 (0.373) | 0.158 (0.365) |
| Death_ill | 0.012 (0.109) | 0.013 (0.114) | 0.012 (0.107) | 0.014 (0.117) | 0.011 (0.106) | 0.012 (0.107) | 0.013 (0.112) |
| Hhsize | 5.327 (2.658) | 4.216 (2.457) | 5.916 (2.571) | 4.053 (2.336) | 5.882 (2.599) | 5.858 (2.548) | 4.753 (2.655) |
| Female_h | 0.303 (0.460) | 0.405 (0.491) | 0.249 (0.433) | - | - | 0.286 (0.452) | 0.322 (0.467) |
| Age_h | 45.214 (15.609) | 41.917 (15.434) | 46.960 (15.419) | 47.264 (16.773) | 44.321 (14.988) | 46.379 (15.300) | 43.953 (15.841) |
| Educ_h | 3.608 (4.831) | 7.072 (5.459) | 1.773 (3.192) | 2.875 (4.587) | 3.927 (4.900) | 2.261 (3.663) | 5.064 (5.476) |
| Married | 0.685 (0.464) | 0.560 (0.496) | 0.751 (0.432) | 0.221 (0.415) | 0.887 (0.316) | 0.719 (0.450) | 0.649 (0.477) |
| Depend | 0.463 (0.256) | 0.336 (0.264) | 0.531 (0.223) | 0.444 (0.306) | 0.472 (0.230) | 0.514 (0.225) | 0.408 (0.274) |
| Maleratio | 0.463 (0.236) | 0.453 (0.275) | 0.468 (0.212) | 0.314 (0.246) | 0.528 (0.198) | 0.466 (0.214) | 0.460 (0.257) |
| Urban | 0.346 (0.476) | - | - | 0.462 (0.499) | 0.296 (0.456) | 0.253 (0.435) | 0.447 (0.497) |
| Left_marr | 0.104 (0.306) | 0.049 (0.216) | 0.133 (0.340) | 0.097 (0.296) | 0.108 (0.310) | 0.104 (0.305) | 0.104 (0.306) |
| Left_foll | 0.099 (0.299) | 0.067 (0.250) | 0.116 (0.320) | 0.093 (0.291) | 0.101 (0.302) | 0.096 (0.294) | 0.102 (0.303) |
| Left_work | 0.097 (0.296) | 0.070 (0.255) | 0.111 (0.314) | 0.107 (0.309) | 0.092 (0.290) | 0.101 (0.301) | 0.093 (0.290) |
| Left_sch | 0.074 (0.263) | 0.055 (0.228) | 0.085 (0.279) | 0.065 (0.246) | 0.079 (0.269) | 0.070 (0.255) | 0.080 (0.271) |
| Left_other | 0.132 (0.338) | 0.076 (0.265) | 0.161 (0.368) | 0.147 (0.354) | 0.125 (0.331) | 0.139 (0.346) | 0.124 (0.329) |

Notes: Data are presented as mean (standard deviation). *Refer to Table 1 for variable definitions.

these coping choices separately using univariate probit regressions would ignore potential correlations among the error terms – arising from unobserved factors influencing multiple strategies simultaneously. As Greene (2003) notes, univariate models in such contexts can yield biased and inefficient estimates. Correlated errors arise when the choice of one strategy depends on the choice of the other – an expected outcome in household-level responses to health shocks. To address this issue, we adopt a seemingly unrelated MVP model, which accounts for interdependence among coping decisions by allowing the error terms to be correlated across equations (Goshu, 2013; Mehar *et al*., 2016; Nguyen *et al*., 2020).

The MVP model for J coping strategies (j = 1,…, J = 5) is specified as a system of latent variable model (Equations I and II).

$$Y_j^* = \propto_j + \theta_j' H_j + \beta_j' X_j + \varepsilon_j \quad \text{(I)}$$

$$Y_j = 1 \text{ if } Y_j^* > 0 \text{ and 0 otherwise} \quad \text{(II)}$$

Where $Y_j$ is the binary indicator of whether coping strategy j is employed by household to cope with death and illness shocks; j is an index for the coping strategy corresponding to the order of importance: 1 = own savings, 2 = asset sales, 3 = unconditional help, 4 = credit, and 5 = additional labor; $H_j$ is a vector of indicators for whether any household member experienced death or illness shock; $X_j$ is the household head- and household-level covariates; $\propto_j$, $\theta_j$ and $\beta_j$ are, respectively, the constants, coefficients for death and illness shocks, and coefficients for the household- and household head-level characteristics for each coping strategy; $\varepsilon_j$ is the error term, assumed to be multivariate normally distributed with mean zero, unit variance, and correlation permitted across alternative coping strategies.

Evaluating the cumulative multivariate normal probability function is analytically intractable due to the high dimensionality of integration. Hence, the model is estimated using a Simulated Maximum Likelihood approach, following Cappellari & Jenkins (2003) and Roodman (2011). The Geweke-Hajivassiliou-Keane smooth recursive conditioning simulator is employed, using 100 Halton sequence draws. Robustness checks are conducted using alternative draw sizes (square root and twice the square root of the number of observations), and the results remain consistent across simulations.

The estimation is restricted to the subsample of households that reported experiencing either a death or an illness shock. To account for heteroscedasticity and within-cluster correlation, standard errors are clustered at the community level. The suitability of the MVP model is further assessed by testing the joint significance of the error term correlations. Rejection of the null hypothesis – that all pairwise correlations are zero – indicates that the MVP model is superior to univariate or multinomial probit

**Table 3. Summary of coping strategies conditional on death and illness shock experience**

| Variable name* | Total | Urban | Rural | Female | Male | Poor | Non-poor |
|---|---|---|---|---|---|---|---|
| Coping strategies for death shock | | | | | | | |
| Help | 0.175 (0.381) | 0.146 (0.355) | 0.191 (0.394) | 0.231 (0.423) | 0.134 (0.342) | 0.155 (0.363) | 0.198 (0.400) |
| Credit | 0.027 (0.163) | 0.025 (0.158) | 0.028 (0.166) | 0.022 (0.145) | 0.032 (0.175) | 0.026 (0.159) | 0.029 (0.168) |
| Asset_sale | 0.198 (0.399) | 0.076 (0.267) | 0.266 (0.442) | 0.204 (0.404) | 0.194 (0.396) | 0.224 (0.418) | 0.169 (0.376) |
| Saving | 0.262 (0.440) | 0.217 (0.413) | 0.287 (0.453) | 0.215 (0.412) | 0.296 (0.458) | 0.250 (0.434) | 0.275 (0.448) |
| Labor | 0.082 (0.275) | 0.089 (0.286) | 0.078 (0.269) | 0.102 (0.304) | 0.067 (0.251) | 0.091 (0.288) | 0.072 (0.260) |
| Educhealth | 0.018 (0.134) | 0.006 (0.080) | 0.025 (0.156) | 0.027 (0.162) | 0.012 (0.108) | 0.017 (0.130) | 0.019 (0.138) |
| Eatingpat | 0.021 (0.142) | 0.019 (0.137) | 0.021 (0.145) | 0.027 (0.162) | 0.016 (0.125) | 0.026 (0.159) | 0.014 (0.120) |
| Migrate | 0.016 (0.125) | 0.019 (0.137) | 0.014 (0.118) | 0.022 (0.145) | 0.012 (0.108) | 0.026 (0.159) | 0.005 (0.070) |
| Child_l | 0.032 (0.176) | 0.025 (0.158) | 0.035 (0.185) | 0.032 (0.177) | 0.032 (0.175) | 0.034 (0.183) | 0.029 (0.168) |
| Other_c | 0.048 (0.214) | 0.057 (0.233) | 0.043 (0.202) | 0.054 (0.226) | 0.043 (0.204) | 0.043 (0.204) | 0.053 (0.225) |
| Spiritual | 0.282 (0.451) | 0.280 (0.451) | 0.284 (0.452) | 0.296 (0.458) | 0.273 (0.446) | 0.276 (0.448) | 0.290 (0.455) |
| Nothing | 0.367 (0.482) | 0.471 (0.501) | 0.309 (0.463) | 0.387 (0.488) | 0.352 (0.478) | 0.375 (0.485) | 0.357 (0.480) |
| Coping strategies for illness shock | | | | | | | |
| Help | 0.173 (0.379) | 0.135 (0.342) | 0.195 (0.396) | 0.240 (0.428) | 0.145 (0.352) | 0.185 (0.388) | 0.160 (0.367) |
| Credit | 0.067 (0.250) | 0.045 (0.208) | 0.079 (0.270) | 0.056 (0.230) | 0.072 (0.258) | 0.080 (0.272) | 0.052 (0.222) |
| Asset_sale | 0.212 (.409) | 0.080 (0.271) | 0.285 (0.452) | 0.145 (0.352) | 0.240 (0.427) | 0.251 (0.434) | 0.167 (0.373) |
| Saving | 0.389 (0.488) | 0.445 (0.497) | 0.358 (0.480) | 0.340 (0.474) | 0.411 (0.492) | 0.336 (0.472) | 0.451 (0.498) |
| Labor | 0.058 (0.234) | 0.061 (0.239) | 0.057 (0.232) | 0.052 (0.222) | 0.061 (0.239) | 0.063 (0.243) | 0.053 (0.224) |
| Educhealth | 0.028 (0.165) | 0.029 (0.169) | 0.027 (0.162) | 0.023 (0.149) | 0.030 (0.171) | 0.030 (0.171) | 0.025 (0.157) |
| Eatingpat | 0.015 (0.121) | 0.012 (0.110) | 0.016 (0.127) | 0.019 (0.135) | 0.013 (0.114) | 0.015 (0.122) | 0.015 (0.120) |
| Migrate | 0.006 (0.074) | 0.007 (0.083) | 0.005 (0.069) | 0.004 (0.064) | 0.006 (0.078) | 0.005 (0.068) | 0.007 (0.081) |
| Child_l | 0.006 (0.074) | 0.002 (0.042) | 0.008 (0.087) | 0.004 (0.064) | 0.006 (0.078) | 0.005 (0.068) | 0.007 (.0081) |
| Other_c | 0.055 (0.228) | 0.062 (0.242) | 0.051 (0.220) | 0.060 (0.238) | 0.053 (0.224) | 0.056 (0.230) | 0.054 (0.227) |
| Spiritual | 0.316 (0.465) | 0.347 (0.476) | 0.299 (0.458) | 0.352 (0.478) | 0.300 (0.459) | 0.337 (0.473) | 0.292 (0.455) |
| Nothing | 0.195 (0.396) | 0.192 (0.395) | 0.197 (0.398) | 0.215 (0.411) | 0.186 (0.390) | 0.210 (0.408) | 0.178 (0.383) |

Notes: Data are presented as mean (standard deviation). *Refer to Table 1 for variable definitions.

models. Finally, multicollinearity among explanatory variables is assessed using the condition index. Following Belsley (1980), the condition index values falling below the threshold of 30 indicate no serious multicollinearity concerns.

## 4. Results and discussion

### 4.1. Coping strategies for the whole sample

Following the experience of health shocks, households may resort to one or more coping strategies to mitigate their negative effects. The choice of strategy – and its potential effectiveness – largely depends on a household's resource endowments, including human and physical capital (Gertler & Gruber, 2002), access to financial markets (Islam & Maitra, 2012), and social capital or informal networks, such as family and community ties (De Weerdt & Dercon, 2006). These coping choices, in turn, can have profound implications for households' long-term welfare and resilience.

Table 4 presents the estimated likelihood of households simultaneously adopting five active coping strategies in response to death and illness shocks, along with the influence of household and household head characteristics on those choices. The results show that two coping strategies are predominantly activated by households following the death of a member: (1) seeking unconditional help and (2) mobilizing additional labor from existing members. Specifically, households that experienced a death are 6% points more likely to receive help from others. The probability of employing extra labor – either by increasing the work hours of employed members or involving previously inactive adults – rises by 4% points.

Help is a relatively welfare-neutral coping mechanism, as it typically involves unconditional support from informal

**Table 4. Marginal effects of death and illness shocks on the choice of coping strategies (whole sample)**

| Health shock | Coping strategies | | | | |
|---|---|---|---|---|---|
| | Saving | Asset sale | Help | Credit | Labor |
| Death | −0.000 (0.051) | 0.049 (0.039) | 0.059* (0.035) | −0.020 (0.023) | 0.040** (0.018) |
| Illness | 0.125** (0.058) | 0.076* (0.044) | 0.074* (0.040) | 0.031 (0.029) | 0.025 (0.022) |
| Sample size | 1934 | | | | |
| *p*-value | 0.0000 | | | | |

Notes: The effects are calculated for each observation in the data and then averaged. Data are presented as mean (standard error). *** Significant at 1%; ** significant at 5%; * significant at 10%.

and formal sources, such as relatives, friends, government programs, NGOs, or religious organizations. Unlike loans or asset sales, such assistance does not require repayment, which protects long-term consumption and asset bases.

Similarly, labor-based coping – if it does not displace productive household tasks or children's schooling – can be considered relatively less damaging in the long run (Heltberg & Lund, 2009). However, its effectiveness is conditioned on the availability of labor opportunities and the working capacity of household members.

In contrast, three coping strategies are significantly associated with illness shocks: savings, sale of assets, and unconditional help. The use of savings is the most prevalent, with illness increasing the likelihood of this strategy by 12.5% points. Households are also 7.6% points more likely to sell assets and 7.4% points more likely to seek help in response to illness.

Among these, savings and help are again viewed as less detrimental to long-term welfare. Binnendijk *et al.* (2012) emphasize that savings and social assistance represent effective ex-post mechanisms, particularly when they prevent households from resorting to more harmful strategies. However, asset liquidation, while providing immediate financial relief, may undermine future resilience, especially when productive assets are sold. This can reduce a household's ability to earn income, recover from shocks, and maintain consumption levels over time. These findings are consistent with the literature, including studies by Heltberg *et al.* (2015), Islam & Maitra (2012), and Dhanaraj (2016), which highlight the potential long-term costs of asset-based coping.

Households tend to employ multiple coping strategies simultaneously in response to illness shocks, as a single strategy is often insufficient to fully mitigate the economic burden. While precautionary savings are the most frequently used strategy, many households in Ethiopia face liquidity constraints and possess limited savings. Consequently, they are compelled to supplement this with support from social networks and the sale of household assets.

Overall, the results for the full sample suggest that households experiencing either form of health shock – death or illness – exhibit a statistically significant increase in the probability of adopting at least one coping strategy. However, the specific combination of strategies differs by the type of shock. One notable exception is the use of credit, for which no statistically significant marginal effects are observed. This may reflect households' limited access to affordable or reliable credit sources, as well as the perceived risks of borrowing under uncertainty.

The findings underscore the vulnerability of Ethiopian households to health-related shocks and highlight the potential long-term welfare consequences of their coping responses. In particular, asset depletion emerges as a common strategy with critical implications: selling productive assets can undermine future income generation and reduce the household's ability to maintain consumption over time. This aligns with evidence from similar contexts, where asset-based coping compromises long-term resilience (Heltberg *et al.*, 2015; Dhanaraj, 2016; Islam & Maitra, 2012).

To better understand the implications of asset-based coping, the analysis disaggregates asset sales into two categories: productive assets (e.g., agricultural tools, land/buildings, and livestock) and non-productive assets (e.g., consumer durables and crop stocks). This distinction helps assess the depth of the impact on long-term welfare. Selling productive assets suggests a more severe erosion of future livelihood potential.

Similarly, the study further disaggregates the "help" strategy by source – specifically, support from (1) relatives and friends, (2) government entities, and (3) NGOs or religious institutions. This breakdown provides insights into the relative roles and reliability of different social safety nets in supporting households during times of crisis.

The marginal effects of death and illness shocks on eight disaggregated coping strategies – captured through a MVP regression – are presented in Table 5. The marginal effect of other covariates is not reported.

**Table 5. Marginal effects of death and illness shocks on disaggregated coping strategies (whole sample)**

| Shock | Coping strategies | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Saving | Productive asset sale | Unproductive asset sale | Help from individuals | Help from the government | Help from NGOs/ religious institutions | Credit | Labor |
| Death | −0.001 (0.051) | 0.048 (0.036) | −0.020 (0.023) | 0.056** (0.029) | −0.039 (0.028) | 0.015 (0.009) | −0.021 (0.023) | 0.040** (0.018) |
| Illness | 0.124** (0.058) | 0.067* (0.042) | −0.011 (0.025) | 0.076** (0.033) | −0.025 (0.028) | 0.017 (0.012) | 0.031 (0.029) | 0.025 (0.022) |
| Sample size | 1934 | | | | | | | |
| *p*-value | 0.0000 | | | | | | | |

Notes: The effects are calculated for each observation in the data and then averaged. Data are presented as mean (standard error). *** Significant at 1%; ** significant at 5%; * significant at 10%.
Abbreviation: NGOs: Non-governmental organizations.

The results reveal that households experiencing the death of a member are significantly more likely to rely on support from individuals, such as relatives and friends, as well as extra labor supply – typically through increased work by present household members or the employment of previously inactive adults. These findings are consistent with the notion that informal social networks remain the primary safety net in the absence of formal support systems. Strikingly, the analysis shows that neither households affected by death nor those affected by illness report statistically significant use of support from government institutions, NGOs, or religious organizations as coping strategies. This suggests a limited or ineffective role of formal social protection mechanisms in responding to health shocks within the study context.

Moreover, while households experiencing illness are likely to seek help from relatives and friends, there is no evidence of significant reliance on support from institutional actors. This reinforces the critical role of informal networks but also highlights the fragility of household resilience in the face of repeated or severe shocks.

Another notable finding is that households affected by either type of shock do not appear to liquidate non-productive assets – such as household durables or crop stocks – as a coping mechanism. Instead, the coping burden falls disproportionately on productive assets, including land, livestock, and agricultural tools, particularly among illness-affected households. This is especially concerning from a long-term welfare perspective, as the sale of productive assets undermines future income-generating capacity and household resilience.

Overall, the findings underscore two critical concerns: (1) the heavy dependence on informal support systems in the absence of formal social protection, and (2) the vulnerability of household livelihoods due to the depletion of productive assets. The lack of meaningful institutional support in times of health crises raises urgent questions about the effectiveness and reach of Ethiopia's existing safety nets.

### 4.2. Coping strategies for subsamples

To further investigate how health shocks influence household coping behavior, the analysis was extended by disaggregating the sample according to three key household characteristics: place of residence (urban vs. rural), economic status (poor vs. non-poor), and gender of the household head (female vs. male). This extended analysis provides valuable insights into the differentiated impact of health shocks across diverse subpopulations, highlighting variations in household resilience and degrees of vulnerability.

Table 6 presents the marginal effects of death and illness shocks on the five selected active coping strategies – own savings, asset sales, help from others, credit, and labor – conditional on households having reported at least one of the two health shocks. Marginal effects of other covariates are omitted for brevity.

In response to death shocks, urban households are more likely to adopt a dual coping strategy involving asset sales and additional labor. Specifically, the probability of selling assets increases by 6% points, while the probability of employing extra labor rises by 4.5% points. Rural and female-headed households, by contrast, predominantly rely on extra labor employment, with the probability increasing by approximately 4 and 7% points, respectively. The analysis also indicates that non-poor households are more likely to seek help from others, while this coping mechanism is statistically insignificant for male-headed and poor households. A notable finding across all subgroups is that neither credit nor savings is employed as a coping mechanism for death shocks.

In contrast, the response to illness shocks is more diversified but remains constrained by household endowments. All subgroups, except for female-headed and poor households, are significantly more likely to use savings

**Table 6. Marginal effects of health shocks on the choice of coping strategies (subsamples)**

| Coping strategy | Urban | | Rural | | Female | | Male | | Poor | | Non-poor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Death | Illness | Death | Illness | Death | Illness | Death | Illness | Death | Illness | Death | Illness |
| Saving | −0.059 | 0.160* | 0.050 | 0.122* | −0.005 | 0.101 | 0.010 | 0.141** | −0.033 | 0.051 | 0.015 | 0.196*** |
| | (0.079) | (0.090) | (0.064) | (0.070) | (0.090) | (0.091) | (0.057) | (0.067) | (0.069) | (0.076) | (0.067) | (0.074) |
| Asset sale | 0.060* | 0.078* | 0.033 | 0.060 | 0.066 | 0.035 | 0.040 | 0.115* | 0.047 | 0.105* | 0.050 | 0.040 |
| | (0.033) | (0.042) | (0.057) | (0.064) | (0.062) | (0.062) | (0.051) | (0.060) | (0.054) | (0.064) | (0.052) | (0.058) |
| Help | 0.071 | 0.096 | 0.031 | 0.034 | 0.085 | 0.098 | 0.041 | 0.056 | 0.039 | 0.065 | 0.081* | 0.078 |
| | (0.052) | (0.068) | (0.046) | (0.049) | (0.062) | (0.070) | (0.040) | (0.049) | (0.051) | (0.055) | (0.049) | (0.057) |
| Credit | −0.362 | −0.0362 | −0.004 | 0.071* | −0.011 | 0.066* | −0.035 | −0.001 | −0.015 | 0.052 | −0.029 | 0.008 |
| | (0.344) | (0.344) | (0.029) | (0.039) | (0.027) | (0.036) | (0.033) | (0.040) | (0.033) | (0.042) | (0.029) | (0.036) |
| Labor | 0.045* | 0.036 | 0.040* | 0.020 | 0.068** | 0.032 | 0.024 | 0.028 | 0.043 | 0.029 | 0.036 | 0.019 |
| | (0.026) | (0.034) | (0.025) | (0.029) | (0.030) | (0.034) | (0.025) | (0.030) | (0.028) | (0.031) | (0.025) | (0.031) |
| Sample size | 689 | | 1245 | | 627 | | 1307 | | 1033 | | 901 | |
| *p*-value | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |

Notes: The effects are calculated for each observation in the data and then averaged. Data are presented as mean (standard error). *** Significant at 1%; ** significant at 5%; * significant at 10%.

as a primary coping strategy. This divergence highlights underlying disparities in financial resilience – particularly the limited capacity of economically disadvantaged and female-headed households to accumulate precautionary savings. Among households that do use savings, the propensity is markedly higher in non-poor and urban households compared to rural and male-headed ones.

For those unable to rely on savings, the sale of assets emerges as a secondary coping mechanism – especially among urban, male-headed, and poor households. However, the propensity to resort to asset depletion is highest among male-headed and poor households, indicating a more precarious response to illness that can undermine long-term economic stability. Meanwhile, rural and female-headed households appear to turn to credit, likely from informal and high-interest sources. Given the limited role of formal credit for consumption smoothing in Ethiopia, this reliance often translates into distress financing – an unsustainable strategy that compounds long-term vulnerability (Kruk *et al.*, 2009). Indeed, microfinance institutions in Ethiopia tend to focus on development-oriented lending and apply relatively high interest rates, which may not align with the urgent, consumption-related needs triggered by illness.

Significantly, no subgroup of households activated support from government, NGOs, or religious institutions as a response to illness shocks. Similarly, extra labor work is not employed as a coping mechanism following illness, despite its use in response to death. This likely reflects the urgent liquidity needs associated with illness: unlike death, which may trigger community responses or allow some planning, illness demands immediate financial resources. Mobilizing labor – whether through longer working hours or deploying new earners – requires time, which households experiencing acute illness may not afford. Moreover, the absence of external support networks in responding to illness suggests social safety nets may be less responsive to prolonged or less visible health conditions than to catastrophic events, such as death.

These findings both resonate with and diverge from prior research. For instance, Yilma *et al.* (2014) report the use of savings and credit in rural areas, which aligns with this study. However, unlike Yilma *et al.* (2014), this study finds no evidence that rural households rely on asset sales or external help to manage health shocks. This is consistent with Woldemichael & Gurmu (2018), who report limited effectiveness of kin and non-kin transfers in mitigating transitory health shocks. Similarly, Pan (2009) finds that transfers play a minimal role in offsetting idiosyncratic income shocks in rural Ethiopia. For urban households, the absence of credit as a coping mechanism aligns with Alvi & Dendir (2009). However, contrary to their findings, this study detects no significant use of private transfers in urban areas following income shocks, indicating potential erosion of social capital or growing limits of informal safety nets.

## 5. Conclusion

In low-income countries, such as Ethiopia, where formal health insurance systems and well-functioning financial markets are underdeveloped, households often have limited options to manage the economic consequences of health-related shocks. The author investigates household responses to illness and death shocks using two rounds of nationally representative ESS data, applying a MVP model to capture the interdependence of coping strategies.

The findings reveal a complex pattern of coping behavior shaped by socioeconomic status, gender, and place of residence. In response to death shocks, most households – particularly rural and female-headed ones – resort to additional labor market participation, while urban households often combine this with the sale of assets or reliance on informal help. Non-poor households predominantly rely on social support. In the case of illness shocks, savings emerge as the primary coping mechanism across most groups, with urban and male-headed households supplementing savings with asset sales, while rural households often pair savings with borrowing. In contrast, poor and female-headed households disproportionately rely on asset sales and credit, respectively, strategies that may provide short-term relief but can undermine long-term economic resilience.

These findings have important implications for both health policy and broader strategies for social protection. The reliance on coping strategies, such as the sale of productive assets and informal borrowing – particularly among vulnerable groups – can erode households' future income-generating capacity and deepen poverty traps. Credit, in particular, is often sourced from informal markets under exploitative terms, compounding the financial vulnerability of already disadvantaged households. The use of such strategies reflects not only the inadequacy of public health insurance coverage but also the broader absence of systemic support to buffer households from economic shocks.

Addressing this vulnerability should be a national priority. Policy interventions must focus on building resilient systems that can mitigate the adverse effects of health shocks without forcing households to compromise their long-term welfare. Key policy recommendations include: (1) scaling up the currently limited community-based health insurance schemes and fully implementing the legislated social health insurance program to improve financial protection; (2) expanding access to affordable and regulated microcredit through government-backed financial institutions to reduce reliance on predatory lenders; (3) strengthening the role of health extension programs to promote preventive care and reduce the frequency of health shocks; and (4) enhancing targeted social protection mechanisms, especially for poor, rural, and female-headed households who face disproportionate risks. Overall, this study deepens our understanding of how health shocks affect household economic behavior in resource-constrained settings and underscores the need for integrated policies that link health financing, financial inclusion, and social protection. Promoting household resilience to health shocks is not only a matter of public health but also an imperative for sustainable development and poverty reduction in Ethiopia and similar contexts.

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## Conflict of interest

The author declares no competing interests.

## Author contributions

This is a single-authored article.

## Ethics approval and consent to participate

Not applicable.

## Consent for publication

Not applicable.

## Availability of data

The data that support the findings of this study are publicly available from the World Bank's Microdata Library with the following DOIs: https://doi.org/10.48529/mccp-y123, https://doi.org/10.48529/ampf-7988

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