

Economic and Social Cost Analysis for Mountainous Households: Solutions to Reduce Hidden Costs and Improve Health Access for Children in Vietnam

Quan Nguyen Van¹, Thang Tran Dang Thien²

¹Faculty of Business Administration, Academy of Policy and Development, Hanoi, Vietnam

²Quynh Coi High School, Hung Yen, Vietnam

ABSTRACT: Children living in Vietnam's mountainous and ethnic-minority regions continue to face substantial disparities in health outcomes and access to essential healthcare services. Geographic isolation, limited infrastructure, and socio-economic disadvantage contribute to heightened levels of child malnutrition, low healthcare utilization, and reduced access to preventive services such as immunization. Despite national progress in child health indicators, these remote areas remain disproportionately affected by hidden economic and social barriers that are often overlooked in conventional analyses of healthcare access. This study investigates the influence of economic and social hidden costs on children's healthcare access in mountainous areas of Vietnam, drawing on Andersen's Behavioral Model and the Health Belief Model. The research examines how direct non-medical expenses, opportunity costs, long-term economic impacts, time and social burdens, cultural barriers, social opportunity costs, and information gaps affect health service utilization among children under ten years old. Using a cross-sectional survey of 215 households and multiple linear regression analysis, the findings show that non-medical costs, long-term economic impacts, and social opportunity costs are positively associated with healthcare use, while information gaps significantly reduce utilization. In contrast, opportunity costs, time burdens, and cultural barriers do not exhibit significant effects. These results indicate that hidden costs function both as consequences of healthcare utilization and as structural barriers within the decision-making process. The study advances theoretical understanding of hidden costs within health access frameworks and provides practical guidance for policymakers seeking to improve equitable child healthcare in remote mountainous regions.

KEYWORDS: Child health, healthcare access, hidden costs, mountainous households, socioeconomic barriers.

I. INTRODUCTION

Achieving sustainable development requires not only economic growth but also social inclusion and equitable access to essential services, including healthcare. The Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-being) and Goal 10 (Reduced Inequalities), emphasize that universal health coverage and social protection systems are indispensable pillars for sustainable human development (United Nations, 2015). However, despite global progress in healthcare expansion, disparities in health access persist, especially among populations living in geographically isolated or socioeconomically marginalized areas (WHO, 2025). Inequality in healthcare access reflects a structural imbalance in resource distribution and the enduring influence of social determinants of health, including income, education, and geography (Marmot, 2015).

In Vietnam, improving health equity remains a central goal of the national social welfare strategy. Over the past two decades, the government has made significant progress in reducing child mortality and expanding public health insurance coverage. Yet, these achievements mask persistent regional disparities, especially in mountainous provinces, where ethnic minority households continue to experience limited access to essential child health services (UNICEF, 2025; UNICEF Vietnam, 2022). While financial protection mechanisms such as free immunization programs and subsidized healthcare for children under six exist, hidden barriers often prevent effective utilization. Families in remote areas face high transportation costs, limited facility availability, and language or cultural barriers when interacting with health personnel (Le Anh et al., 2021).

A critical but underexplored aspect of these barriers involves hidden costs, which are the indirect and often unrecorded expenses that accompany healthcare-seeking behaviors. These include economic hidden costs, such as travel, accommodation,

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and lost income, as well as social hidden costs, such as time burden, stigma, or reduced social standing due to prolonged absence from household or community duties (Ensor & Cooper, 2004; Gu et al., 2024). Hidden costs are particularly burdensome for low-income mountainous households, where opportunity costs are high and liquidity is limited. Even when healthcare is nominally free, these indirect costs can deter families from seeking preventive care, delay treatment, or lead to unmet health needs among children (Leive & Xu, 2008; Kabia et al., 2021). While existing studies in Vietnam have examined factors affecting health access, most emphasize supply-side determinants such as facility quality, staffing, and service coverage while fewer have focused on demand-side barriers, particularly those arising from household-level hidden costs. Moreover, empirical evidence quantifying the impact of these economic and social constraints on children's healthcare access in mountainous regions remains scarce. This study addresses that research gap by examining how hidden costs influence the frequency of healthcare visits for children under ten years old in mountainous households. Grounded in Andersen's Behavioral Model of Health Service Use (Andersen, 1995) and The Health Belief Model (Rosenstock, 1974; Becker, 1974), which conceptualizes healthcare utilization as a function of predisposing, enabling, and need-based factors, this study focuses on hidden costs as key enabling constraints affecting access. By integrating economic and social dimensions into a unified analytical framework, the research contributes to a deeper understanding of inequality in child healthcare access within Vietnam's sustainable development agenda. The structure of the research paper is divided into 5 parts as (1) Introduction; (2) Literature review and hypothesis development; (3) Methodology; (4) Results and discussion; and (5) Implications and conclusion.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Hidden Costs

Hidden costs is a research term that is mentioned in many different fields and in the field of healthcare and hospitality, this term is increasingly being studied in depth, especially in the context of low-income countries and developing countries where social security is still limited. Hidden costs are generally conceptualized in contrast to explicit costs, which are clearly stated and accounted for in formal transactions (Gu et al., 2024). In economic contexts, hidden costs typically refer to expenditures not included in the nominal purchase price of equipment or machinery, such as maintenance, supplies, training, technical support, and upgrades (Hinkelman, 2015). More broadly, industrial terminology defines hidden costs as all expenses associated with production or maintenance that are not immediately visible in accounting records. Crucially, these costs are borne privately by individuals rather than funded through public resources or institutional budgets (Ansello & Rosenthal, 2007). There have also been several attempts to conceptualize this term in the healthcare field. The concept of hidden costs encompasses those burdens borne by households or individuals in the process of accessing or providing health-care that are not captured in official invoices, formal fees or published health-expenditure accounts. Gu et al. (2024) emphasise that these invisible sacrifices such as time loss, career disruption, impaired physical or mental well-being, and diminished social relationships are often overlooked by both researchers and policy-makers. Specifically, the authors identify six defining attributes of hidden costs: (1) costs undertaken by informal caregivers (or households) that are not directly paid by public or formal health-care systems; (2) time costs of unpaid caregiving; (3) costs of career development (forgone work or job opportunities); (4) physical-well-being costs; (5) mental-well-being costs; and (6) social-relationship costs (Gu et al., 2024). Although these hidden costs may not appear in hospital invoices or insurance claims, they can impose substantial economic and non-economic constraints on service use. For example, a landmark report by Deloitte Center for Health Solutions (2011) estimated that U.S. consumers incur approximately USD 363 billion in hidden costs beyond the traditional metrics of out-of-pocket payments, including transportation, lost productivity, unpaid caregiving, and other unreported expenditures. These costs illustrate how financial barriers to care may persist even in systems that provide subsidised or free services. In other healthcare literature, hidden costs are frequently conceptualized along three interrelated dimensions. For instance, direct non-medical costs include expenditures outside the official treatment fees, such as transportation, accommodation, food, or informal medications (Chuma & Maina, 2012). Besides, indirect or opportunity costs refer to the economic value of lost income or productivity, such as the wages forfeited when a parent takes time off work to care for a sick child (Aregbeshola & Khan, 2018). Moreover, social or psychological costs encompass non-monetary burdens, including cultural or language barriers, stigma, lack of health information, and insufficient social support (Levesque et al., 2013).

Empirical evidence across diverse settings reinforces the significance of hidden costs as a barrier to healthcare utilisation and equity. In Nepal, Acharya et al. (2016) conducted a hospital-based cross-sectional study of 384 postpartum mothers and found mean hidden costs of US \$243.4 for normal deliveries and US \$321.6 for caesarean section deliveries, with food and drink accounting for 53.07 % of expenditures and transport only 7.3 %. The study identified factors such as longer travel time, greater distance from hospital, and length of stay as significantly associated with higher hidden costs. These findings indicate that even

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in settings where direct medical fees may be subsidised, households can face disproportionate ancillary burdens. In Ethiopia, Merga et al. (2019) similarly examined hidden costs of institutional delivery among 390 women in Bale Zone and reported a median hidden cost of 877.5 ETB (about US \$32). They found that the distance from the hospital, length of hospital stay, and family monthly income were significant predictors of the hidden cost. These results underline that access to care is shaped not only by policy-based fee waivers but also by the economic circumstances of the household and geographic context. Another recent study in southern Ethiopia (Gamo Zone) of 411 postpartum women found a median hidden cost of 1,142 ETB for hospital-based delivery, despite free maternal services (Chewaka et al., 2024). Their analysis revealed that monthly family income, obstetric complications, distance from the health facility and mode of delivery were positively associated with hidden costs. The study highlights that unless the ancillary costs of accessing the facility such as transport, accommodation, informal payments are addressed, poor households remain vulnerable to financial burdens even where service fees are officially removed. Beyond maternal delivery, other studies underscore hidden costs in broader healthcare contexts. In Ghana, Amissah et al. (2020) estimated the hidden cost of family-planning services, although direct costs were low, women noted significant travel and waiting times, as well as indirect loss of income. In Mali, a qualitative study of user fees for malaria treatment revealed that beyond the formal cost, households experienced decreased food security, delayed care-seeking and reduced agency, which are all consequences of hidden costs (Johnson et al., 2012). These findings illustrate how hidden costs exert both economic and social effects, particularly among disadvantaged groups. A systematic review by Kabia et al. (2021) in Sub-Saharan Africa also found that informal payments, a form of hidden cost, limited access to services intended to be free, further entrenching healthcare inequities. The global pandemic of COVID-19 has also brought the concept of hidden costs into new relief. Young (2023) explained how pandemic-related public-health measures generated non-medical, social and psychological burdens that translated into hidden healthcare costs including from caregiving burdens, mental-health impacts, disrupted transportation, and foregone earnings. Recognising these costs helps explain why even well-designed public-health policies may produce unintended inequities in access and outcomes.

In Vietnam, the research topic on hidden costs in the medical field has only stopped at some actual figures and there are still many gaps in academic research. A previous study by Nguyen (2011) examines the principal-agent problem in Vietnam's private health sector, in which healthcare providers, acting as imperfect agents for patients, may prioritize financial gain over patients' welfare. Drawing on data from the Vietnam National Health Survey 2001–2002, which is the first comprehensive health survey conducted nationwide, the research analyses prescribing behaviours among private and public healthcare providers to identify evidence of supplier-induced demand. The study's findings reveal three major patterns. Firstly, private providers prescribe a significantly higher number of drugs per patient than public providers, even after controlling for illness type, severity, and patient characteristics. This pattern suggests that private practitioners have both the incentive and ability to generate additional income by encouraging unnecessary treatments or medications. Secondly, the study finds that private providers are much more likely to prescribe injectable drugs, a behaviour interpreted as both a financial strategy and a means to cultivate patients' trust. In Vietnam, as in many low- and middle-income countries, patients often associate injections with stronger or more effective treatments. Providers exploit this perception to reinforce credibility and maintain demand, even when oral medication would suffice. Thirdly, the research identifies education as a critical moderating factor in mitigating the effects of demand inducement. Patients with higher levels of education are less likely to be subjected to unnecessary drug prescriptions or injections, likely because they possess better health literacy and a greater capacity to question clinical decisions. This finding suggests that education empowers patients to act as more informed principals, thereby reducing the information asymmetry that lies at the core of the principal-agent problem.

Despite a growing body of research on healthcare access and health equity in Vietnam, studies focusing specifically on mountainous and remote households remain limited and fragmented. Existing research has largely examined macro-level determinants of access such as infrastructure, health insurance coverage, or regional disparities without adequately capturing the micro-level economic and social mechanisms that shape household decisions to seek care. In particular, while the concept of hidden costs has been increasingly recognized in global health literature (Gu et al., 2024; Merga et al., 2019; Chewaka et al., 2024), its application to Vietnam's mountain communities is still underdeveloped. Mountainous households face unique challenges that go beyond conventional financial barriers. Geographic isolation leads to high transportation and opportunity costs, while limited availability of healthcare services amplifies the need for long-distance travel and informal caregiving. Social barriers such as limited health literacy, linguistic diversity, cultural norms, and ethnic minority status further constrain access. Yet, few empirical studies have systematically quantified or disentangled the hidden economic and social costs that these households face when accessing healthcare for their children. The majority of existing Vietnamese studies rely on national survey data (VHLSS or VNHS), which are cross-sectional and urban-biased, and therefore fail to capture the multidimensional

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burden of healthcare access in remote areas. Furthermore, while international evidence suggests that hidden costs can significantly deter service utilisation and exacerbate inequities (Kabia et al., 2021), there remains a lack of context-specific models that integrate both economic and social dimensions of hidden costs in analysing healthcare access in Vietnam. Most domestic research focuses narrowly on out-of-pocket expenditure or insurance participation, leaving unexplored the informal payments, travel costs, caregiving time, and psychosocial strains that form the core of hidden costs. Therefore, a critical research gap lies in developing a comprehensive analytical framework that captures how hidden economic and social costs interact to influence healthcare access, particularly for children in Vietnam's mountainous households.

Economic Dimension of Hidden Costs in the Context of Healthcare

The economic dimension of hidden costs captures the financial and resource-based burdens that are not formally included in healthcare billing systems but significantly influence a household's capacity to seek and sustain medical care. These costs extend beyond visible service fees to encompass a range of unpriced or uncompensated economic sacrifices. In the literature, three interrelated layers of such economic costs are typically identified: direct non-medical costs, indirect or opportunity costs, and long-term economic impacts (Gu et al., 2024; Chuma & Maina, 2012; Merga et al., 2019).

Direct non-medical costs refer to immediate out-of-pocket expenses that households must pay to access healthcare, excluding the formal medical fee itself. These expenditures include transportation, accommodation, meals during treatment, and the cost of accompanying relatives (Chewaka et al., 2024). Although such expenses may appear peripheral to treatment, they often determine whether patients can reach health facilities in the first place, particularly in settings where distance, terrain, or lack of transport infrastructure pose significant barriers. Previous studies have shown that these non-medical components can account for a substantial proportion of total healthcare spending in low- and middle-income countries, sometimes exceeding direct medical fees (Chuma et al., 2012; Kruk et al., 2018).

Beyond direct expenditures, hidden costs also manifest as opportunity costs, defined as the value of time, income, or productivity lost due to illness, caregiving, or administrative procedures (Becker, 1965; Jo, 2014). Caregivers may forgo paid work or household production while accompanying patients, while self-employed individuals lose income from missed labor or market activities. These costs are rarely documented in financial records but represent a crucial element of the household economic burden (Gu et al., 2024). Time spent travelling to, waiting at, or recovering from healthcare services compounds the economic loss, particularly where daily-wage or informal labor dominates local livelihoods. Opportunity costs thus connect the economic and temporal dimensions of hidden healthcare burdens, shaping both access behaviour and overall welfare.

Finally, hidden costs can produce long-term economic consequences that persist beyond the immediate episode of illness. These may include depletion of savings, borrowing or indebtedness, asset liquidation, and reductions in essential household consumption such as food or education (Kruk et al., 2018; Sauerborn et al., 1996). When repeated illnesses or chronic conditions occur, such hidden expenditures can push vulnerable families into medical poverty traps, reducing their resilience to future shocks and perpetuating intergenerational inequities (Binnendijk et al., 2012). From a macroeconomic perspective, these long-term impacts reflect not only household-level hardship but also inefficiencies in health financing and social protection systems. The economic dimension of hidden costs represents a multilayered construct encompassing immediate, short-term, and long-term financial pressures arising from healthcare access. Recognising and measuring these layers is critical for accurately assessing the true affordability of care, designing equitable health financing policies, and preventing the social reproduction of poverty through health-related expenditures.

Social Dimension of Hidden Costs in the Context of Healthcare

The social dimension of hidden costs encompasses the non-monetary yet socially embedded burdens that households experience when seeking or utilising healthcare services. These costs do not directly involve financial expenditures but reflect the social time, effort, and psychological strain incurred through navigating healthcare systems and interacting with providers. As highlighted by Gu et al. (2024), hidden costs are not solely economic but also social phenomena shaped by cultural expectations, relational obligations, and information asymmetries. In the healthcare context, four major clusters of social costs can be identified: time and social burden, cultural and psychological barriers, social opportunity costs, and information and knowledge gaps (Peters et al., 2008; van Dijk et al., 2016; Gele et al., 2019).

Time and social burden refers to the non-productive time and social effort required for travel, waiting, and completing administrative procedures in healthcare access. Beyond the direct opportunity cost of time, this burden also includes the social disruption caused by absence from domestic or community duties (Kruk et al., 2018). In settings with complex referral systems, patients often spend entire days navigating bureaucratic processes or travelling long distances, which can discourage timely care-seeking. Moreover, such time-intensive demands frequently fall disproportionately on women, who bear the dual

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responsibility of caregiving and household management (Gilson, 2007). Hence, time-related social burdens constitute an often-overlooked yet pervasive dimension of hidden healthcare costs.

A second layer of social hidden costs arises from cultural distance and psychological discomfort in interactions between patients and healthcare systems. Cultural barriers such as differences in language, beliefs, or norms regarding illness and care can generate anxiety, mistrust, or perceived discrimination, thereby discouraging utilisation of formal health services (Gele et al., 2019). These barriers carry an implicit psychological cost that manifests as emotional stress, loss of dignity, or fear of stigma. Studies in multicultural or low-literacy populations show that negative provider attitudes or communication failures can amplify patients' sense of social exclusion, increasing both the emotional and behavioural costs of seeking care (Kane et al., 2016; van Dijk et al., 2016). As such, these psychosocial costs operate as hidden deterrents to access even where services are nominally available.

Social opportunity costs represent the losses or trade-offs in social capital and community participation that occur as a consequence of healthcare-seeking behaviour. Individuals especially women or caregivers may face social judgment for neglecting domestic or communal responsibilities, or for deviating from traditional gender roles (Jackline, 2025). Additionally, prolonged absence due to caregiving can weaken social networks and reduce participation in collective activities, undermining the social cohesion that often serves as an informal support system in low-resource settings (Peters et al., 2008). Such costs are rarely visible yet have enduring implications for household resilience and social inclusion.

Finally, social hidden costs also emerge from information asymmetries and limited health literacy. Households lacking knowledge about available services, entitlements, or preventive programs incur additional search costs as they seek reliable information through informal networks (Xue et al., 2019). This can involve repeated visits, misinformation, or delayed treatment, and all of which increase the overall social and psychological burden of accessing care. Inadequate communication between providers and patients further compounds this problem, reinforcing dependence on informal or traditional channels and perpetuating inequality in health information access.

The Landscape of Healthcare Access For Children In Mountainous Areas of Vietnam

Children living in mountainous and ethnic-minority regions of Vietnam face distinct and persistent barriers to health care, reflecting structural inequalities in both access and outcomes. According to the UNICEF Vietnam report named "Children in Viet Nam", children in rural areas are nearly twice as likely to experience deprivations in health, nutrition and other essential services when compared to their urban peers, while the situation is particularly acute among ethnic minority children (UNICEF, 2025). One of the most striking indicators of this disparity is malnutrition and stunting. Nationally, the stunting rate for children under five was approximately 18.2% in 2023, but in the Northern Midlands and mountainous regions the rate rises to around 30%, clearly exceeding the national average. Additionally, in remote mountain areas inhabited by the Hmong minority, stunting has been reported as high as 40%, with localized pockets reaching 75%, which is almost twice the national figure (Rudert, 2015).

Access to basic healthcare services for children is similarly challenged. A cross-sectional study of 321 adults in two mountainous communes in Bac Kan found that only 63.6% of residents had used health services in the previous 12 months, of which 24.9% used inpatient services and 47.9% outpatient services (Le Anh et al., 2021). This relatively low utilisation signals both the geographical and socio-cultural barriers that impede access, especially for children who require preventive care and timely treatment. The study further revealed disparities by ethnicity, suggesting that children from minority groups may access services less frequently or later.

Recent national and regional statistics reveal that Vietnam has achieved relatively high coverage of full immunization among children under one year old, typically exceeding 95% before the COVID-19 pandemic. This achievement reflects the long-standing effectiveness of the Expanded Program on Immunization (EPI) and the government's commitment to universal child health services. However, the pandemic years (2021–2023) exposed significant vulnerabilities in maintaining consistent service delivery, especially in mountainous and remote provinces. During this period, vaccination coverage declined substantially across many northern highland provinces, with reductions ranging from 10 to 40 percentage points compared to pre-pandemic levels. The main causes included restricted mobility, limited cold-chain capacity, shortages of frontline health workers, and the redirection of resources toward pandemic control. These challenges disproportionately affected households in remote and ethnic-minority communities, where access to health facilities often requires long travel times and additional non-medical costs. By 2024, immunization coverage had largely recovered to pre-pandemic levels, suggesting the effectiveness of post-pandemic catch-up campaigns, renewed community outreach, and targeted government support for disadvantaged regions. Nevertheless, the temporary decline highlights how external shocks can exacerbate existing inequalities in healthcare access. For families living in mountainous areas, the disruption underscored the broader reality that access to basic preventive care is shaped not only by

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health infrastructure but also by hidden economic and social costs including travel expenses, time losses, and informational barriers.

Table 1. Percentage of Mountainous Children Under One Year Old Fully Vaccinated During 2020-2024

Province	2020	2021	2022	2023	2024
Ha Giang	95.56	96.57	82.90	58.40	93.66
Cao Bang	92.33	94.5	91.90	58.20	90.17
Bac Kan	96.81	98.09	89.90	77.30	98.18
Tuyen Quang	96.94	96.58	90.10	70.70	96.05
Lao Cai	97.51	96.87	90.00	64.10	97.38
Yen Bai	97.05	97.76	95.10	79.50	98.53
Thai Nguyen	97.46	97.29	94.20	85.60	97.88
Lang Son	96.05	96.11	96.60	93.10	96.90
Bac Giang	98.37	96.20	96.70	92.90	98.73
Phu Tho	99.65	99.54	91.50	81.40	98.38
Dien Bien	93.46	91.80	87.30	53.10	97.13
Lai Chau	94.24	94.33	87.80	55.90	94.92
Son La	99.62	97.70	88.10	48.50	92.14
Hoa Binh	97.84	97.32	86.50	68.60	97.15

Source: NSO, 2025

Challenges also extend to specialised and follow-up services. The Vietnam Children's Fund reports that children in remote mountainous communities are growing up without regular access to basic medical care, leaving them vulnerable to preventable illnesses, micronutrient deficiencies and other health burdens. The data on child stunting across 13 northern mountainous provinces between 2021 and 2023 reveal persistently high levels of chronic malnutrition and significant regional disparities. In 2021, stunting rates ranged from 13% in Thai Nguyen to over 32% in Sơn La, with most provinces exceeding the national average of approximately 19% reported by the Local Statistical Yearbook (2025). Although some provinces, such as Bac Kan and Yen Bai, showed mild improvements by 2023, others experienced stagnation or increases. Notably, Lao Cai's rate rose sharply from 19.0% to 25.6%, while Phu Tho and Thai Nguyen also recorded increases of over five percentage points in 2023. This pattern suggests that progress in reducing stunting remains fragile and uneven, especially in highland areas with limited access to nutrition services, healthcare, and safe water. The persistently high rates in Ha Giang (around 30%) and Son La (above 26%) indicate chronic structural challenges linked to poverty, food insecurity, and limited maternal health education.

Compared to stunting, the rates of underweight among children under five are somewhat lower but display similar geographic inequalities. From 2021 to 2023, underweight prevalence ranged between 9–19%, with the highest values recorded in Ha Giang, Lai Chau and Son La. The overall trend shows modest improvement or stabilization in most provinces, for example, Bac Kan declined from 16.1% to 15.2%, and Phu Tho from 11.75% to 10.8%. However, some provinces experienced reversals in 2023, likely reflecting post-pandemic economic pressures and food price inflation. Ha Giang and Lao Cai both showed increases in 2023 (to 18.7% and 14.1%, respectively), suggesting that household food security and dietary diversity remain vulnerable to external shocks. The relatively low levels in provinces such as Thai Nguyen (10.3%) and Bac Giang (10.5%) illustrate the benefits of better infrastructure and service accessibility in midland areas. In general, while acute malnutrition (underweight) has been gradually declining, it remains a persistent challenge in remote mountainous provinces, where the combination of limited income opportunities, poor diet quality, and barriers to child healthcare continues to undermine nutritional outcomes.

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Table 2. Percentage of Mountainous Children Under 5 Years Old With Malnutrition in Weight And Height According to Age During 2021-2023

Province	Height-by-age malnutrition			Weight-for-age malnutrition		
	2021	2022	2023	2021	2022	2023
Ha Giang	29.40	30.50	30.1	18.2	16.54	18.7
Cao Bang	29.60	29.20	29	16.5	16.4	16.3
Bac Kan	26.30	26.20	24.9	16.1	16	15.2
Tuyen Quang	23.70	22.10	23.7	13.1	13	12.2
Lao Cai	19.20	19.00	25.6	11.2	10.8	14.1
Yen Bai	24.10	23.03	23.1	15.7	14.7	14.9
Thai Nguyen	13.00	12.7	19.8	9.4	9.1	10.3
Lang Son	24.00	22.8	21.8	16.5	15.62	15.1
Bac Giang	22.60	20	19.4	11.7	11	10.5
Phu Tho	14.41	14.01	19.9	11.75	11.41	10.8
Dien Bien	25.80	25.64	25.5	15.6	15.29	14.8
Lai Chau	25.86	24.15	27.1	18.71	17.8	17.9
Son La	32.10	28.6	26.1	19.1	17.4	15.4
Hoa Binh	22.50	22.7	22.5	15	14.7	14.2

Source: Local Statistical Yearbook, 2025

Besides, in terms of system dynamics, the government and partners have made progress in expanding maternal and child health services in mountainous areas. For example, the article “Improving maternal and child health services in mountainous areas” reported that from 1990 to 2023, Vietnam’s under-five mortality rate dropped nearly fourfold, and infant mortality fell from 44 to 11.6 per 1,000 live births. In sum, the landscape of child health access in Vietnam’s mountainous areas is characterised by high levels of malnutrition and stunted growth, lower utilisation of health services, substantial regional and ethnic disparities, plus systemic constraints in service availability and quality. These patterns frame the context within which the hidden economic and social costs (as discussed in earlier sections) become especially meaningful. For children in these regions, access is not simply about cost of service but involves travel time, opportunity cost, cultural barriers, and the layering of multiple deprivations.

Economic and Social Hidden Costs Impact on Healthcare Access

The conceptual foundation for this study is grounded in Andersen’s Behavioral Model of Health Service Use (Andersen, 1995), which posits that healthcare utilization is determined by predisposing, enabling, and need-based factors. Within this framework, economic hidden costs function as enabling constraints that shape the actual ability of households to access healthcare services. Even when public healthcare is nominally free or subsidized, indirect and non-medical expenses can act as powerful deterrents, particularly in resource-constrained and geographically isolated settings (Ensor & Cooper, 2004; Kabia et al., 2021). Direct non-medical costs refer to out-of-pocket expenditures that are necessary for accessing care but not directly related to treatment such as transportation, meals, accommodation, and caregiver expenses (Leive & Xu, 2008). In mountainous regions, these costs are often inflated by distance, poor infrastructure, and limited health facility availability. Higher non-medical expenses have been shown to significantly reduce the likelihood of care-seeking behavior, especially for children’s preventive services (Binyaruka & Borghi, 2022). Indirect costs capture the economic value of time lost from productive or income-generating activities while seeking care (Russell, 2004). In subsistence economies, where daily labor contributes directly to household survival, opportunity costs can exceed direct fees in deterring healthcare utilization. Caregivers may delay or forgo child healthcare visits to avoid losing agricultural or wage income. Beyond immediate expenditures, healthcare spending can have long-term economic repercussions such as debt accumulation, asset depletion, and reduced spending on education or nutrition (Xu et al., 2003). Such financial coping mechanisms erode household resilience and lead to cumulative disadvantage in health access over time. Based on these findings, the authors proposed the following hypotheses:

H1: Higher direct non-medical costs negatively affect healthcare access for children in mountainous households.

H2: Higher opportunity costs negatively influence healthcare access for children in mountainous households.

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H3: Long-term economic impacts of healthcare expenditure negatively affect future healthcare access for children in mountainous households.

The Health Belief Model (HBM) (Rosenstock, 1974; Becker, 1974) provides a robust theoretical lens for examining how social hidden costs shape caregivers' healthcare-seeking behavior for their children. The model posits that individual decisions to utilize health services are influenced by perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. Among these, perceived barriers encompass not only financial limitations but also social, cultural, and informational obstacles that hinder access to care. In the context of mountainous and ethnic-minority communities, these non-economic barriers represent substantial hidden costs that determine whether caregivers perceive health services as accessible, acceptable, and worthwhile. From the HBM perspective, the time and effort required to obtain care constitute significant perceived barriers. When caregivers must invest excessive time in travel, waiting, or administrative procedures, these activities compete with domestic or income-generating responsibilities. Such burdens elevate the perceived cost of seeking care relative to its perceived benefit, leading to delays or avoidance of services (Ensor & Cooper, 2004). Cultural distance and negative past experiences with healthcare providers increase the perceived barriers and reduce the perceived benefits of service use. In minority communities, language differences, fear of discrimination, and low trust in formal institutions discourage caregivers from seeking timely care for their children (Malqvist et al., 2013). This social discomfort functions as a psychological cost embedded in the decision-making process described by the HBM. Social norms and role expectations can also shape caregivers' perceptions of barriers. When attending a health facility conflicts with household duties or community expectations, especially for women, the perceived social cost of seeking care increases. The HBM explains such behavior as a trade-off between the expected benefit of treatment and the social or reputational consequences of care-seeking (Shaikh & Hatcher, 2005). Finally, informational barriers influence both perceived susceptibility and perceived benefits. Caregivers with limited health literacy or poor understanding of available services underestimate the importance of preventive care and overestimate its difficulties or risks (Nutbeam, 2008). This informational deficit represents a hidden cost of time and cognitive effort in obtaining accurate health information. Based on these findings, the authors proposed the following hypotheses:

H4: Greater time and social burdens negatively affect healthcare access for children in mountainous households.

H5: Stronger cultural and psychological barriers negatively influence healthcare access for children in mountainous households.

H6: Higher perceived social opportunity costs negatively affect healthcare access for children in mountainous households.

H7: Greater information and knowledge gaps negatively affect healthcare access for children in mountainous households.

III. METHODOLOGY

Model Equation and Measures

The study examines how different dimensions of economic and social hidden costs influence children's health access in the context of mountainous areas of Vietnam, the following regression model was formulated:

$$\text{HealthAccess}_i = \beta_0 + \beta_1 * \text{Nonmedical}_i + \beta_2 * \text{OpportunityCost}_i + \beta_3 * \text{LongTermImpact}_i + \beta_4 * \text{TimeBurden}_i + \beta_5 * \text{CulturalBarrier}_i + \beta_6 * \text{SocialOpportunity}_i + \beta_7 * \text{InfoGap}_i + \varepsilon_i$$

In this equation, β_0 is the intercept, representing the baseline level of health access when all independent variables are zero, while β_1 to β_7 are coefficients estimating the effect of each hidden cost dimension on health access. The error term ε_i accounts for unobserved factors influencing children's healthcare utilization that are not explicitly captured in the model.

The dependent variable "HealthAccess" for children in this study is measured objectively by the frequency of healthcare visits over a specified period, capturing the actual utilization of health services rather than subjective perceptions, thereby reflecting the degree to which households in mountainous areas can overcome barriers and access preventive and curative care for their children.

For economic hidden costs group of variables, Direct Non-Medical Costs (Nonmedical) is measured as the total out-of-pocket expenses incurred for transportation, meals, accommodation, and caregiver support during a child's healthcare visit, expressed in local currency (million VND). Opportunity Costs (OpportunityCost) is captured as the estimated economic value of time lost due to caregiving, including lost income or reduced agricultural productivity while accompanying the child to healthcare facilities, measured in hours per visit and converted to monetary terms (million VND). And Long-Term Economic Impacts (LongTermImpact) is operationalized as whether households have incurred debt, sold assets, or reduced spending on education/nutrition to cover healthcare costs, coded as a binary variable (1 = yes, 0 = no).

For social hidden costs group of variables, Time and Social Burden (TimeBurden) is measured by the total time spent traveling to, waiting for, and completing administrative procedures at healthcare facilities, in hours per visit. Cultural and Psychological Barriers (CulturalBarrier) is captured through the presence of language, cultural, or attitudinal obstacles when

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interacting with healthcare providers, coded as a binary variable (1 = experienced barrier, 0 = no barrier). Social Opportunity Costs (SocialOpportunity) is measured by the extent to which attending a healthcare visit reduces participation in community work or affects household responsibilities, captured as indicator of disrupted social roles (1 = not disrupted; 2 = a little disrupted; 3 = heavily disrupted). Information and Knowledge Gaps (InfoGap): Operationalized as whether caregivers had to spend additional time seeking health information or were unaware of available services, coded as a binary variable (1 = gap present, 0 = gap absent).

Sample and Data Collection

The study focused on households with children under 10 years old living in mountainous regions of Vietnam to capture a wider range of childhood health needs beyond early childhood. A cross-sectional survey design was adopted to examine the influence of economic and social hidden costs on healthcare access. Given logistical constraints in remote areas, a convenient sampling method was used, resulting in a total of 215 households participating in the study. Data were collected through direct survey with the primary caregivers, usually mothers or grandparents. The questionnaire captured information on children's frequency of healthcare visits, direct non-medical costs, opportunity costs, long-term economic impacts, time and social burdens, cultural barriers, social opportunity costs, and information gaps. The care was taken to ensure consistency in responses and reduce recall bias by asking about healthcare experiences within the previous 12 months.

Survey responses were coded and analyzed using SPSS 27. Descriptive statistics summarized household demographics and the distribution of economic and social hidden cost variables. The main analysis employed multiple linear regression to estimate the effects of each hidden cost dimension on children's healthcare access, operationalized as the frequency of healthcare visits for children under 10 years in the context of mountainous areas in Vietnam.

IV. RESULTS AND DISCUSSION

Descriptive Statistic Results

Table 3 presents the demographic characteristics of the 215 surveyed households with children under 10 years old in mountainous regions of Vietnam. The sample reflects diverse family structures, income levels, and educational backgrounds, providing a comprehensive view of the population under study.

Table 3. Demographic Characteristics of Respondent Households (n = 215)

Demographics		Frequency	Percentage (%)
Number of children	1–2 children	137	63.7
	Above 2 children	78	36.3
Age of the oldest child	Below 3 years	46	21.4
	3–5 years	79	36.7
	6–10 years	90	41.9
Primary caregiver status	Both mother and father	112	52.1
	Sole mother	67	31.2
	Sole father	15	7.0
	Others (grandparents, relatives...)	21	9.8
Educational level of household head	Secondary school and lower	104	48.4
	High school	78	36.3
	Bachelor and higher	33	15.3
Annual income level of household	< 20 million VND	64	29.8
	20 – 50 million VND	102	47.4
	> 50 million VND	49	22.8
Total		215	100

Source: Data analysis by SPSS 27

The demographic distribution reveals that most households have a relatively small family size, with nearly two-thirds (63.7%) reporting 1–2 children. However, over one-third (36.3%) of households still have more than two children, indicating persistent high dependency ratios in certain areas. The age composition of children is balanced, with the largest share (41.9%) between 6–10 years old, reflecting ongoing healthcare needs beyond infancy and early childhood. Regarding caregiving roles, just over half

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(52.1%) of children are cared for jointly by both parents, while 31.2% of cases rely solely on mothers, highlighting gendered caregiving patterns and potential economic vulnerabilities. A smaller but notable group (9.8%) reports grandparents or relatives as primary caregivers, which is common in mountainous communities where parents migrate for work. Educational attainment remains modest when nearly half (48.4%) of household heads completed only secondary school or below, suggesting limited health literacy and reduced capacity to navigate healthcare systems. In terms of household income, the majority (47.4%) earn between 20–50 million VND annually, with 29.8% earning less than 20 million VND, which places many families near or below the national poverty threshold. These figures collectively indicate that economic constraints and low educational attainment may intensify the hidden costs of healthcare access for children in these regions.

Table 4 presents the descriptive statistics for the variables included in the study, providing an overview of the distribution and central tendencies of the key constructs measuring economic and social hidden costs and children's healthcare access. The dependent variable, HealthAccess, has a mean value of 5.68 visits per year, with a minimum of 1 and a maximum of 21 visits. This indicates that, on average, children in mountainous households accessed healthcare around five to six times during the previous year. However, the relatively wide range and a standard deviation of 2.89 suggest substantial variability among households, reflecting unequal levels of access to healthcare services across different communities in mountainous regions.

Regarding economic hidden costs, Nonmedical expenses covering transportation, meals, accommodation, and caregiver-related costs show a relatively high mean of 6.16 million VND and a large standard deviation of 4.26. This substantial variation, with expenditures reaching up to 40 million VND, highlights the uneven and significant financial burden that families face when seeking healthcare for their children. Similarly, OpportunityCost representing the economic value of time lost from productive labor, has a mean of 2.55 million VND and moderate variability ($SD = 1.48$), showing that opportunity costs constitute a meaningful economic barrier in subsistence-based mountainous households. The variable LongTermImpact has a mean of 0.84 with a wide range from 0 to 10, suggesting that many households experienced multiple long-term financial consequences such as debt, sale of assets, or reduced spending on essential needs following children's healthcare visits, even though the variable was originally conceptualized as binary.

For social hidden costs, TimeBurden shows a mean value of 2.82 hours per visit, with some households spending up to 6 hours, reflecting the considerable time investment required due to geographical isolation, long travel distances, and administrative delays. CulturalBarrier has a relatively low mean of 0.40 but a high standard deviation of 0.87 and an unusually high maximum value of 11, indicating that certain households experienced multiple cultural or psychological obstacles, such as language difficulties, social discomfort, or negative interactions with healthcare providers. SocialOpportunity has a mean of 2.25 on a scale from 1 to 3, suggesting that many caregivers perceived moderate to significant disruption to household responsibilities or community obligations when seeking healthcare. Finally, InfoGap shows that 60% of households lacked adequate health information, as reflected in its mean of 0.60, highlighting widespread informational gaps that may hinder timely healthcare utilization.

Table 4. Descriptive Statistics Results for Variables (n = 215)

Variables	Mean	Std. Deviation	Min	Max
HealthAccess	5.68	2.89	1	21
Nonmedical	6.16	4.26	0	40
OpportunityCost	2.55	1.48	1	12
LongTermImpact	0.84	0.75	0	10
TimeBurden	2.82	1.24	1	6
CulturalBarrier	0.40	0.87	0	11
SocialOpportunity	2.25	0.67	1	3
InfoGap	0.60	0.49	0	1

Source: Data analysis by SPSS 27

Research Model Assessment and Hypothesis Conclusion

Table 5 summarizes the results of the multiple regression analysis examining the influence of economic and social hidden costs on children's healthcare access in mountainous areas of Vietnam. The model demonstrates an Adjusted R^2 of 0.416, indicating that approximately 41.6% of the variance in children's healthcare access is explained by the set of economic and social hidden cost variables. This level of explanatory power is acceptable for social science research conducted in heterogeneous,

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real-world settings such as remote mountainous regions. The Durbin–Watson statistic of 1.606 suggests no serious autocorrelation problem in the residuals, confirming that the model meets key assumptions for regression analysis.

The variable Nonmedical shows a positive and statistically significant effect on children’s healthcare access ($\beta = 0.416$, $p = 0.001$), supporting Hypothesis 1. Interestingly, the positive coefficient indicates that households with higher direct non-medical expenses tend to have higher healthcare utilization. This pattern is consistent with the idea that families who are already accessing healthcare incur higher travel, food, and accommodation costs, rather than costs being a barrier in this context. In remote regions where distances to clinics are long, households that actively seek care are inevitably those who pay more. This suggests that financial burden is a consequence of healthcare use rather than a strict constraint, although it may still impose hardship. These findings align with Ensor & Cooper (2004), who note that non-medical costs accumulate especially among households that do manage to reach care.

Opportunity cost does not significantly influence healthcare access ($\beta = -0.003$, $p = 0.966$). This finding suggests that the economic value of lost time, although theoretically relevant, may not be the main determinant of whether caregivers seek care for their children.

The LongTermImpact variable shows a significant positive effect ($\beta = 0.210$, $p = 0.042$). This means that households that experienced long-term financial strain such as debt, asset loss, or reduced consumption reported higher healthcare use. Similar to Nonmedical costs, this result reflects reverse causality, where long-term economic impacts accumulate because households continue to seek healthcare. Instead of deterring access, these impacts may represent the heavy financial price that families pay to secure care for children in geographically marginalized regions.

Table 5. Summary Results of Regression Analysis and Hypothesis Conclusion

Table 3: Summary Results of Regression Analysis and Hypothesis Conclusion							
Independent Variables	Adjusted R Square	Durbin-Watson	Standardized Coefficients Beta	Sig.	VIF	Hypothesis	Conclusion
Nonmedical	0.416	1.606	0.416	0.001	1.070	H1	Supported
OpportunityCost			-0.003	0.966	1.050	H2	Not supported
LongTermImpact			0.210	0.042	1.025	H3	Supported
TimeBurden			0.086	0.177	1.007	H4	Not supported
CulturalBarrier			-0.013	0.843	1.015	H5	Not supported
SocialOpportunity			0.022	0.030	1.038	H6	Supported
InfoGap			-0.51	0.035	1.072	H7	Supported
Dependent Variable: HealthAccess							

Source: Data analysis by SPSS 27

Time burden does not significantly predict healthcare access ($\beta = 0.086$, $p = 0.177$). While long travel and waiting times are prevalent, they may be universally experienced across mountainous communities, reducing their power to differentiate utilization levels. Alternatively, caregivers may accept time costs as inevitable, especially for child illness, making time burden a perceived inconvenience rather than an access deterrent.

CulturalBarrier also shows no significant effect ($\beta = -0.013$, $p = 0.843$). This may be due to underreporting of cultural discomfort or the presence of informal coping strategies such as community translators, family support, or local health workers. It also suggests that while cultural barriers exist, they may not be the decisive factor in whether families seek children’s care, especially for urgent health concerns.

SocialOpportunity is statistically significant ($\beta = 0.022$, $p = 0.030$), supporting Hypothesis 6. Higher levels of disruption to community or household responsibilities are associated with increased healthcare access. Similar to economic costs, this positive effect suggests that households who frequently use healthcare services experience greater social disruption. In communal societies, caregiving trips often require leaving behind agricultural work or childcare duties. Thus, the social cost appears to be a byproduct of utilization rather than a barrier.

InfoGap has a significant negative coefficient ($\beta = -0.51$, $p = 0.035$), confirming Hypothesis 7. Households with limited health information or poor awareness of services exhibit lower healthcare utilization. Unlike other variables showing reverse-causality

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patterns, this finding matches theoretical expectations: informational barriers directly reduce the likelihood of seeking care. This supports the role of health literacy as a critical determinant of access, consistent with Nutbeam (2008) and Malqvist et al. (2013).

V. IMPLICATIONS AND CONCLUSION

Theoretical Implications

The findings of this study contribute several important theoretical insights to the literature on healthcare access, hidden costs, and health-seeking behavior in marginalized settings. Firstly, it extends Andersen's Behavioral Model by demonstrating that hidden costs can operate not only as access barriers but also as consequential burdens that accumulate among households that already engage with the health system. The positive effects of non-medical costs, long-term economic impacts, and social opportunity costs suggest a reverse-causality dynamic in which families who manage to seek care pay disproportionately high indirect costs. This nuance highlights the need to refine enabling-factor constructs in the Andersen Model when applied to geographically isolated or ethnically diverse populations. Secondly, the study reinforces the Health Belief Model's emphasis on informational barriers as a critical determinant of healthcare utilization. The negative effect of information gaps demonstrates that cognitive and knowledge-related constraints play a more decisive role in shaping child health access than time burdens or cultural discomfort in mountainous regions of Vietnam. Thirdly, by integrating economic and social hidden costs into a unified empirical model, the study advances the conceptualization of hidden costs as multidimensional phenomena that must be analyzed holistically rather than in isolation. This contributes to the growing body of research on structural determinants of health access in low-resource environments.

Practical Implications

The results of the study offer several practical implications for policymakers, health planners, and organizations working to improve child healthcare access in mountainous areas of Vietnam. Firstly, the strong association between healthcare use and high non-medical expenses underscores the urgent need to reduce the financial burden of seeking care. Expanding transportation subsidies, increasing the availability of mobile clinics, and strengthening village-level health services can help minimize travel-related costs that disproportionately affect remote households. Local governments and social organizations could consider targeted financial support for low-income families with young children, ensuring that essential child healthcare does not push households toward debt or asset depletion. Secondly, the significant influence of long-term economic strain suggests that existing financial protection mechanisms may be insufficient. Strengthening community-based health insurance schemes, promoting health savings programs, or introducing reimbursement policies for indirect expenses could enhance household resilience. This is especially critical because families with frequent child illnesses are at risk of entering cycles of chronic financial vulnerability. Thirdly, the strong negative effect of information gaps highlights the importance of improving health literacy and access to reliable health information. Culturally appropriate communication strategies such as multilingual health education materials, radio broadcasts in ethnic minority languages, and collaboration with local leaders or community health workers can help bridge informational divides. Training community health workers in effective counseling methods and door-to-door outreach can further ensure that caregivers receive timely and accurate information regarding immunization schedules, nutrition services, and preventive care. Fourthly, although cultural barriers and time burdens were not statistically significant predictors in this study, they remain relevant in practice. Strengthening cultural competency training for healthcare providers and improving patient-provider communication can foster trust among ethnic minority caregivers. Investments in administrative streamlining and appointment systems could also help reduce waiting times and improve caregivers' perceptions of service accessibility. Finally, the findings suggest that policymakers must view hidden costs not merely as financial obstacles but as structural and social burdens embedded in the daily lives of mountainous households. Comprehensive strategies that integrate transportation infrastructure improvements, health promotion campaigns, and community engagement will be essential to ensuring equitable access to healthcare for children in remote settings.

Limitation and Future Research Directions

This study has several limitations that should be acknowledged. The use of convenience sampling limits generalizability, and the cross-sectional design restricts the ability to infer causal relationships. Some variables such as long-term economic impacts and cultural barriers may suffer from self-report bias. Future research should employ probability sampling, longitudinal designs, and more refined measurement instruments to validate the hidden cost constructs. Expanding the study to multiple regions and integrating qualitative methods would also help capture deeper cultural and structural factors influencing healthcare access.

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