ENHANCING EQUITABLE HEALTHCARE ACCESSIBILITY FOR VULNERABLE DEMOGRAPHICS: INSIGHTS FROM VIETNAM

A Preliminary Dissertation

Present to

Graduate School of Humanities and Social Sciences

(Doctor's Course)

OKAYAMA UNIVERSITY

In Partial Fulfillment
of the Requirements of the Degree of
Doctor of Philosophy in Economics (経済学)

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December 2024

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INTRODUCTION

1.1. Research Background and Motivation

Alongside rapid economic development, the health status of people in Vietnam has significantly improved in recent years, with the life expectancy at birth increasing from 71 years in 1990 to 76 years in 2015. However, wide disparities remain in core health indicators between rural and urban residents, across different regions, and among population groups. On the other hand, Vietnam also has one of the most rapidly aging populations in the world, with an increasing demand for quality healthcare services and new issues likely to emerge in the health sector in future years. The country's government is now being forced to consider not only a plan for developing healthcare manpower and improving health infrastructure such as facilities and equipment, but also for better management of limited healthcare resources and reforming health financing to improve overall efficiency.

Ensuring equitable healthcare accessibility is a fundamental challenge globally, particularly for vulnerable demographics in developing countries such as Vietnam. Despite efforts to improve healthcare services, disparities persist, disproportionately affecting marginalized groups. This study aims to investigate strategies to enhance equitable healthcare accessibility for vulnerable demographics in Vietnam, focusing on understanding the current barriers and identifying potential interventions.

Vietnam's healthcare system has undergone significant reforms aimed at expanding coverage and improving service delivery. However, disparities in healthcare access persist, particularly among ethnic minorities, rural populations, and low-income groups. The Revised Health Insurance Law of 2014 marked a pivotal moment, yet its full impact on equitable accessibility for vulnerable demographics remains understudied.

This research seeks to fill this gap by employing a mixed-methods approach. Quantitative methods will analyze national health data to assess current healthcare utilization patterns among vulnerable demographics. Qualitative methods, including interviews and focus groups, will explore the lived experiences and perceptions of healthcare accessibility among these groups. By triangulating findings, this study aims to provide comprehensive insights into the multifaceted barriers faced by vulnerable demographics in accessing healthcare in Vietnam.

The study's findings are expected to contribute to policy recommendations aimed at enhancing equitable healthcare accessibility. By identifying effective strategies and interventions, this research endeavors to inform policy makers, healthcare providers, and

stakeholders on pathways to reduce disparities and ensure that all populations, especially vulnerable demographics, have equitable access to essential healthcare services in Vietnam.

1.2. Research Objectives and Questions

The primary objective of this project is to improve equitable healthcare accessibility for vulnerable demographics. To achieve this objective, this study will employ a comprehensive approach that includes analyzing existing barriers, implementing targeted interventions and evaluating the outcomes through a systematic methodology. By connecting socioeconomic, geographical, and policy-related factors, the project seeks to create sustainable improvements in healthcare access for marginalized populations. To be specific the study will continue with these following specific objectives

1.2.1. Specific research objectives

To achieve the primary aim, this dissertation will utilize the determinants of health outcomes, illustrated in **Figure 1** adapted from Ahnquist, Wamala, & Lindstrom (2012). The study will address the following specific objectives:

- To evaluate the current state of healthcare accessibility in Vietnam, especially in relation to vulnerable demographics
- To identify factors hindering equitable healthcare access for vulnerable populations
- To explore effective strategies and interventions aimed at improving healthcare accessibility
- To propose policy implications designed to enhance healthcare accessibility and outcome for vulnerable demographics

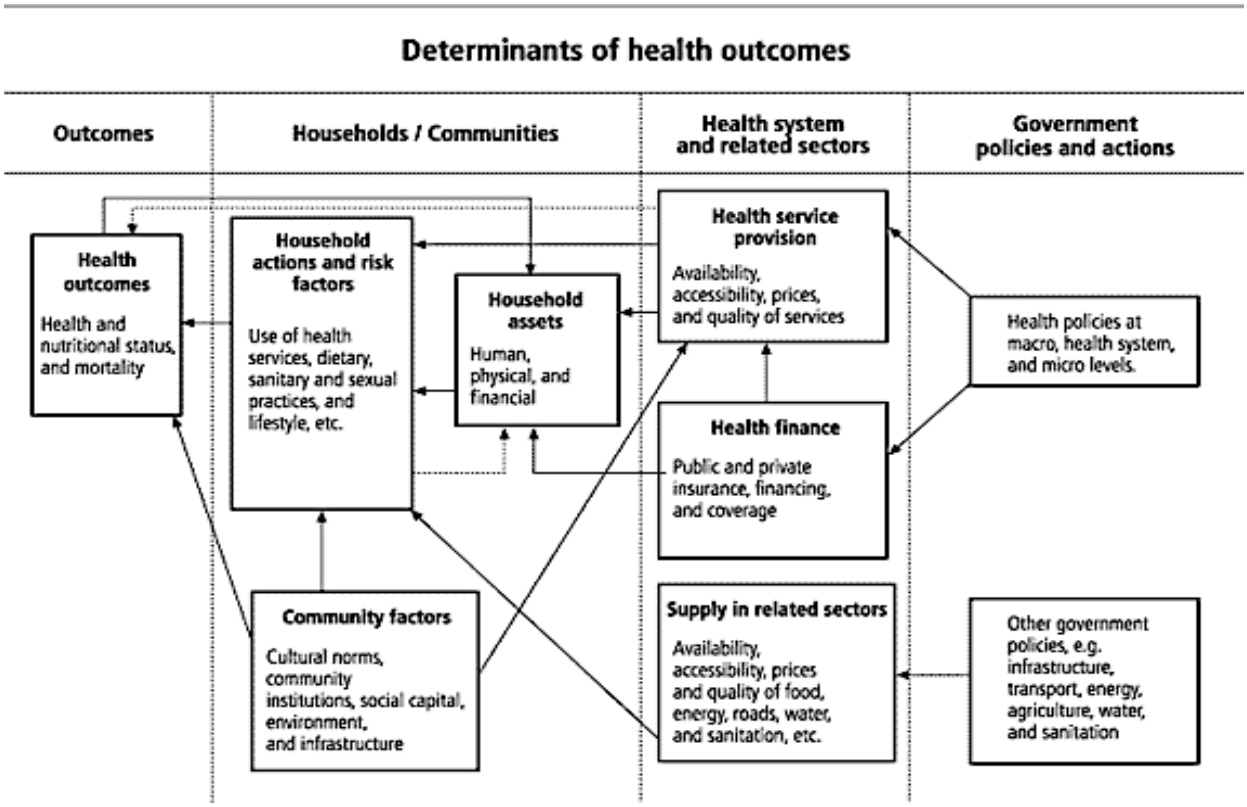


Figure 1. Determinants affect healthcare outcomes

(Reproduce from: Social determinants of health–a question of social or economic capital, Ahnquist, Wamala, & Lindstrom, 2012)

1.2.2. Research questions

As illustrated in **Figure 2**, and to accomplish the research objectives, this dissertation seeks to fulfill the following research questions:

① Whether the healthcare system in Vietnam facing the bottleneck problem? If yes, how is the situation?

② Whether health condition have negative impact on working ability of individuals in Vietnam, with a particular focus on how these effects vary across vulnerable groups.

③ To what extent has the revised health insurance policy of 2014 impacted vulnerable demographic groups?

④ What are the determinants within modern apartment living that influence residents' health outcomes?

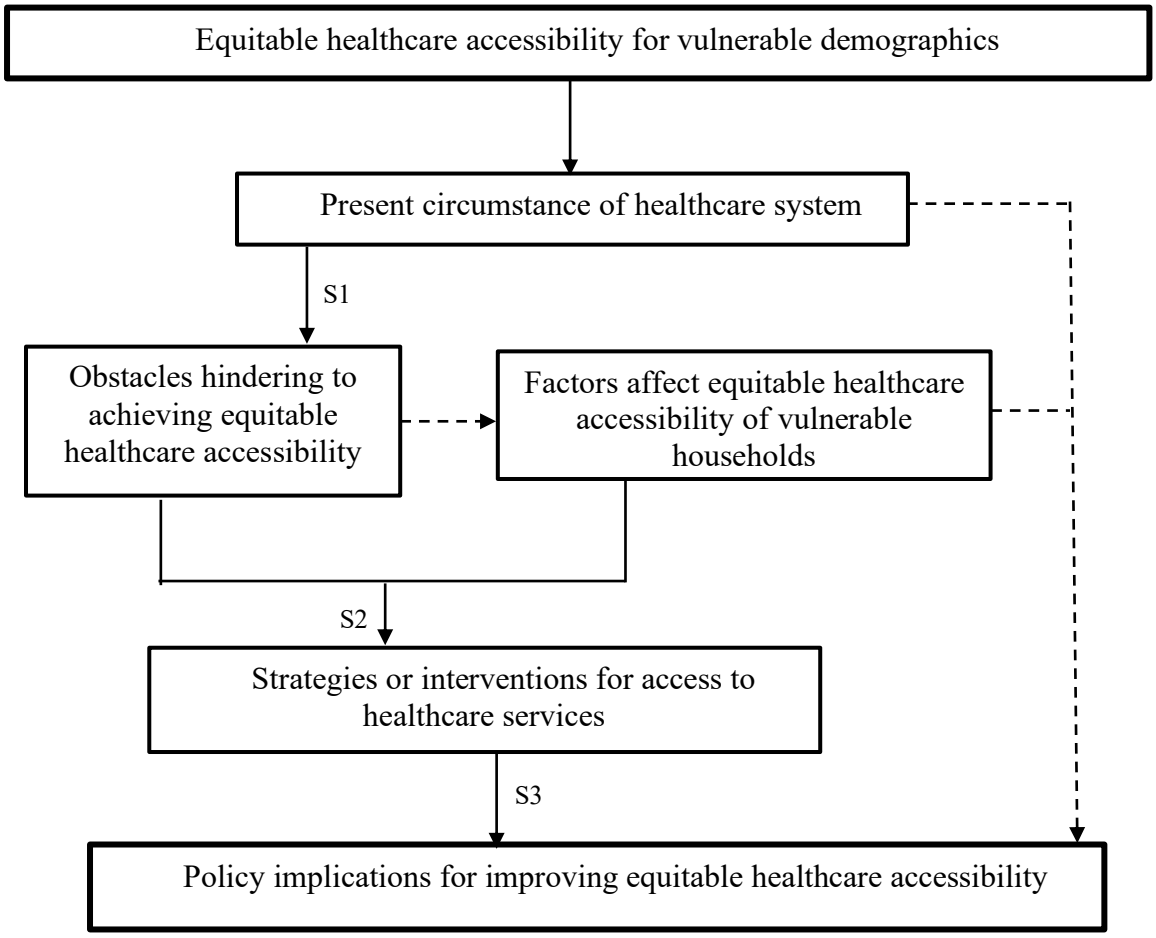


Figure 2. Conceptual framework for the research

1.3. Applied Data

Qualitative data will be thematically analyzed to identify patterns and themes related to healthcare accessibility barriers and strategies. Concurrently, quantitative data will be subjected to descriptive statistical methods and regression analysis to explore relationships between demographic characteristic, healthcare access, and health outcomes. Overall, this dissertation will predominantly employ a secondary data to address its the general and specific objective. To be specific aof this data, will be introduced in this section.

To evaluate living standards for policy-making and socio-economic development planning, from 1993 to now the General Statistics Office conducts the Viet Nam Household Living Standards Survey (VHLSS). From 2002 to 2010, this survey has been conducted regularly by the GSO every two years. From 2011 to 2020, VHLSS are conducted annually. However, the odd-numbered year surveys only collect data on demographics, employment and income. The purpose of the VHLSS in order to systematically monitor and supervise the living standards of different population groups in Viet Nam; to monitor and evaluate the implementation of the Comprehensive Poverty Reduction and Growth Strategy; and to contribute to the evaluation of

achievement of the Sustainable Development Goals (SDGs) and Vietnam's socio-economic development goals.

The VHLSS 2020 was conducted in accordance with Decision No. 1261/QĐ-TCTK dated August 19, 2019 of the GSO Director General. The VHLSS has been organized and implemented in accordance with the contents of the plan and the process of producing high level statistical information.

Subjects, units and scope of survey: the scope of the survey is selected households and communes/wards in 64 provinces and cities. Survey subjects include households, household members and communes/wards. Each survey unit is a selected household or commune/ward.

The VHLSS survey series was conducted from 2002 to 2010 based on the basic sample to select the sample. The base sample is a random sample from the enumeration areas (EAs) of the 1999 Population Census. Similarly, the 2009 Population Census will provide information for the design and implementation of new models from after 2012 onwards.

From these sample pools, multiple household samples will be selected for different surveys or for different survey years for rotating panels such as the VHLSS. The basic sample used for the VHLSS is a sample with two levels, level 1 is the commune level and level 2 are 3 EAs per commune. Communes are stratified by province and rural/urban area. Both commune and EA levels are selected according to Probability Proportional to Size (PPS), the size of each commune or EA is determined by the number of households based on the results of the Census. 1999 or 2009. Surveyed households in each surveyed EA were selected based on the latest household list of that EA (3 months before the survey). The design includes 3 levels: communes/wards are level 1, EAs are level 2 survey units (Secondary Sampling Units, SSUs) and households are level 3.

VHLSS's survey subjects include civilians and people who do not work in Vietnam's state agencies. To clearly understand the survey subjects, interviews were conducted at the household level. Because the survey subjects do not stay in one place, it is important to clearly state where the subjects will be surveyed to avoid double counting. Only people who are considered permanent residents of that household will be included in the survey. Even those who are permanent members of the household but are temporarily absent are also included in the survey. These are absent due to vacation, hospitalization, or students who are away from home while studying. However, student rental properties should not be included in the survey, as data regarding these students may be obtained from their permanent residence registration.

Observations which are not included in the survey, include:

- Household: The General Statistics Office has decided to introduce criteria for selecting survey subjects for the VHLSS. Some households may not be included in the survey. One example is student rental housing. Each household consists of many

dormitory-like rooms and is counted as a real household. However, members in households are not stable, changing from year to year. Another example is the dormitories of agencies (military barracks, hospitals, prisons...).

- EA: some EAs that include most, or all of the households included in the survey can be classified as surveyable. Conversely, EAs with mostly or entirely ineligible households should, if possible, be excluded from the survey sample (e.g., areas made up entirely of student rental housing).

The subject is considered a member of the household:

- The head of the household is still considered a member of the household even if he has not lived in the household for 6 months or more.
- Children under 6 months old are also considered members of the household.
- People who will live in the household for a long time such as daughters-in-law, sons-in-law, relatives returning to the family (retired, discharged from the army...) are also considered members of the household even if these people live in that household for less than 6 months. Students who live far away from their families but are supported by their families are also considered members of the household.
- Guests or relatives who live in the household for 6 months or more and eat with the family are also considered members of the household.
- Employees, maids, boarders or guests who are members of a household elsewhere are not considered members of the household.
- Individuals who have died within the previous 12 months period or have moved out of the household and do not intend to return are not counted as household members.

Methods of collecting VHLSS data: the survey applied a direct interview method. The investigator comes to the household, meets the household head and relevant household members to interview and record information on the household interview form. The survey team leader interviewed commune leaders and relevant local officials and recorded information on the commune interview form. To ensure the quality of information collected, the survey does not accept indirect survey methods or copying information from other available sources into the interview form.

The VHLSS data set is an official data set, covering many aspects of household life, so VHLSS is used in many academic studies. All of this data is saved in dta format of STATA software. Using STATA or other statistical software to exploit this data source will create many feasible and practically meaningful research ideas, such as:

- Poverty: both unidimensional and multidimensional
- Inequality income

- Gender inequality (Inequality gender)
- Social welfare
- The relationship between ages and poverty
- Impact of liberalization of basic public services on the poor and ordinary classes
- Labor market
- Remittances
- Migration
- Income: constituent elements, salary...
- Fuel and Energy consumption
- Food: demand function for foods...
- Health: Health spending, health equity, social insurance...
- Education: educational spending, return on education...
- Urbanization and rural development
- Micro credit: rural credit, hunger eradication and poverty reduction

Some limitations of VHLSS: VHLSS is not specifically designed for informal sector surveys. Therefore, in this field VHLSS still has many weaknesses. The two biggest weaknesses can be listed:

- Reliability: questions related to the informal economy and income were not written in specific detail to obtain complete information about the informal sector
- Lack of mention of some specific factors: some important indicators were not included in the questionnaires (origin of inputs, outputs of production and business activities, investment, capital, prices, difficulties and needs...).

Because the VHLSS is designed primarily to collect information on spending and income, labor market indicators are limited. In particular, it is impossible to accurately determine whether the labor force belongs to the formal or informal sector.

Although the VHLSS data set provides a large amount of information about household characteristics, spending levels and access to services, one shortcoming of the VHLSS is that this data set does not accurately represent the informal migration. This shortcoming can make the assessment of urban poverty difficult and does not allow assessing whether unregistered migrants are a disadvantaged group in terms of access to social services. At the same time, the unit of analysis in the household living standards survey is the "household". Therefore, the data set does not represent the poverty status of members of each household.

1.4. Structure Of the Thesis

As point out in **Figure 1**, this dissertation will be based on the following conceptual framework. Hence, this dissertation will be divided into six chapters: this introduction, four analytical chapters and a conclusion chapter.

This dissertation is organized into six chapters, each addressing distinct yet interrelated aspects of the research. Chapter 1 introduces the study, outlining its objectives, scope, and significance. Chapter 2 provides a detailed overview of the Vietnamese healthcare system, establishing the contextual framework necessary for the analyses that follow. Chapter 3 investigates the effects of health condition on individuals' working hours, analyzing how unexpected health events influence labor market participation. Chapter 4 examines the impact of the Free Government Healthcare Insurance program on healthcare utilization, assessing its effectiveness in improving access to health care services. Chapter 5 explores the association between the relationship of household new basic amenities and health outcomes, offering insights into the socioeconomic determinants of health. Finally, Chapter 6 summarizes the findings presented in earlier chapters, drawing key conclusions and discussing the broader implications for policy and future research.

Chapter 2
AN OVERVIEW OF VIETNAM HEALTHCARE SYSTEM

This chapter offers a detailed examination of Vietnam's healthcare system, addressing its key components and challenges. It begins by outlining the administrative structure of the healthcare sector, providing an essential foundation for understanding the organization and governance of healthcare delivery in Vietnam. The subsequent section traces the historical development of health insurance policies, highlighting their progression in parallel with the nation's socio-economic growth. This analysis underscores the evolving role of health insurance in expanding access to healthcare services and improving financial protection for the population. The final section employs a bottleneck analysis framework to critically assess the current challenges confronting the Vietnamese healthcare system. Through this analytical lens, the chapter identifies systemic constraints and inefficiencies that hinder the equitable and efficient delivery of healthcare services. By integrating historical, structural, and analytical perspectives, this chapter aims to provide a holistic understanding of Vietnam's healthcare system while offering insights into its ongoing transformation and persistent obstacles.

2.1. The Organization System in Healthcare

Formerly, the public health sector was in charge of providing health care services in Vietnam freely. However, following the healthcare reform in 1989, delivering health services was changed to a combination of the public and private providers, with the government in charge of regulating and delivering healthcare services. Currently, the private providers account for a minor portion, less than 20%. Despite this, they deliver a diverse range of services from primary care to specialty therapies, together with the flexible service schedules, have fostered a significant preference among the population (Nguyen, 2013). Consequently, there is a growing number of private healthcare providers, particularly in urban areas. Nevertheless, the public providers still have played an important role, comprise over 80% of the healthcare market. As depicted in **Figure 3**, the Vietnam healthcare system, which is structured into four administrative levels: central, provincial, district and commune level. The Ministry of Health (MoH) is the primary governing body overseeing healthcare services, policy-making, and regulatory functions.

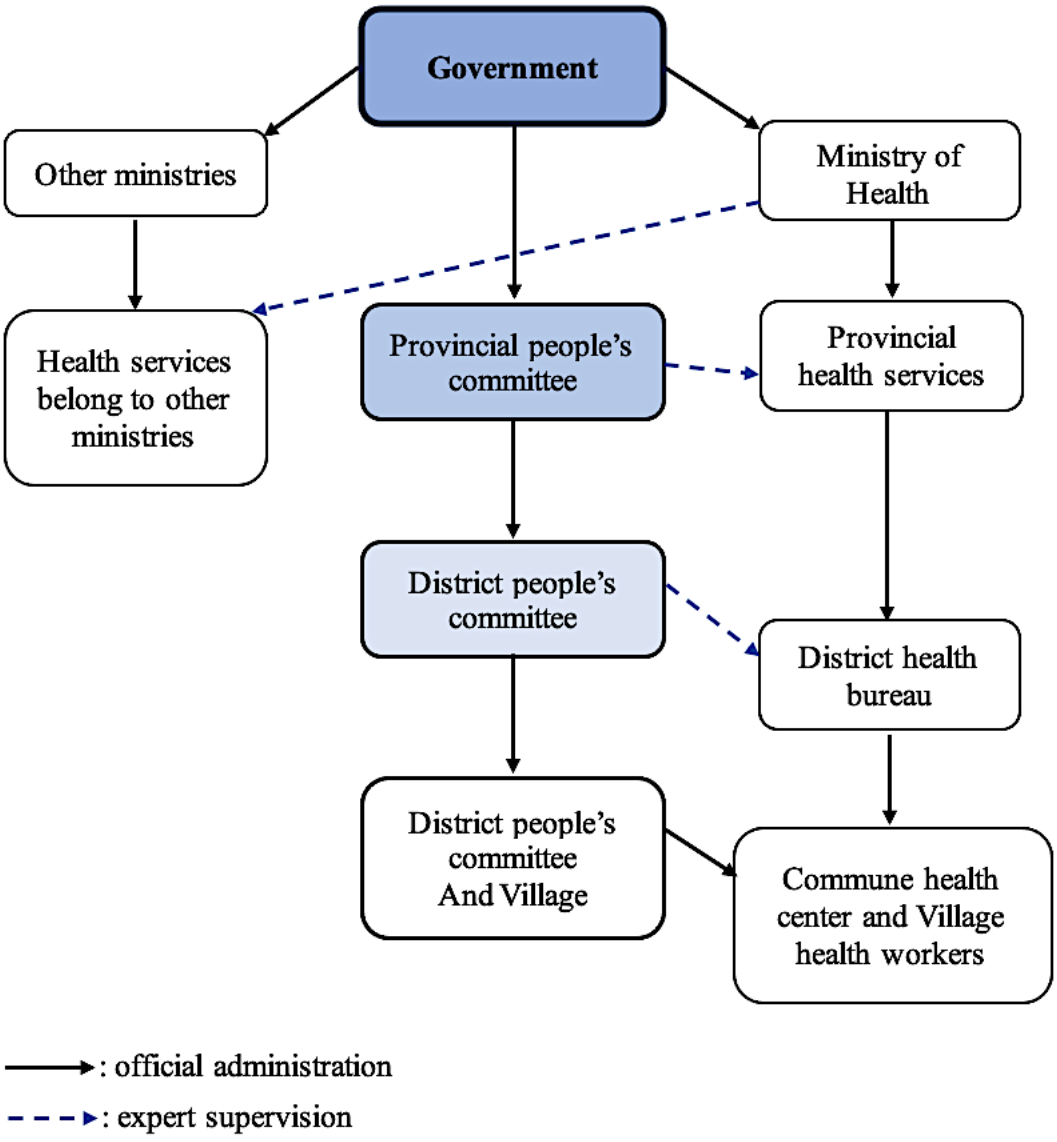


Figure 3: Health system management in Vietnam

As the principal governmental agency at the central level, the Ministry of Health of Vietnam holds the primary responsibility for the care and protection of public health. This includes the issuance of laws and other health-related legal documents, in addition to the development of long-term plans and strategies for the progressive development of the health sector.

Provincial, district and commune health facilities are under the jurisdiction of the Ministry of Health and responsible for the implementation and development of healthcare services at their respective level (**Figure 4**). In these levels, community health centers playing a crucial role in delivering basic health services and preventive care. Additionally, the people's committee is responsible for the financial and human resource allocation, while provincial or district health department is responsible for professional competence under the supervising and monitoring of Ministry of Health. Moreover, provincial and district health departments also

assist the people's committees at their respective levels in terms of healthcare and the protection of public health.

Variety of basic services, including maternal and child healthcare, family planning, immunization and common diseases treatment are provided by commune health centers (CHCs). Thirty years following the implementation of the health care system, a widespread network of CHCs has been systematically organized across the nation, aligned with population demographics and geographical considerations. Despite the provision of more CHCs in mountainous and remote areas, certain regions continue to experience inadequate healthcare services, due to both geographic challenges and the insufficient attractiveness of these areas for healthcare workers.

Currently, the Vietnam's healthcare system relies heavily on paper-based and manually produced reports. In such an inefficient system, behind the main tasks, health workers need to do irrelevant tasks such as creating or summarizing monthly reports for higher levels, which consume a lot of time. Consequently, there is an urgent need for a computerized, universal and comprehensive health management information system at every level to enhance the administration and planning of the healthcare system.

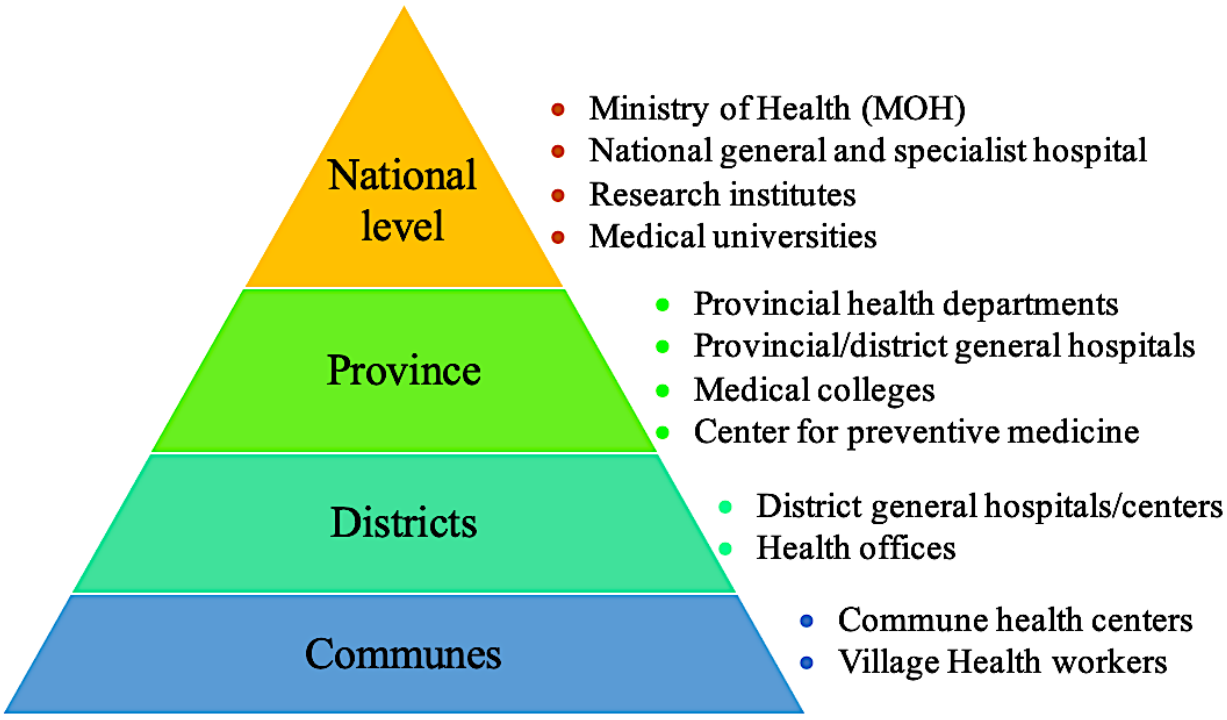


Figure 4: Vietnam health infrastructure

2.2. Health Insurance Policies Evolution In Vietnam

Vietnam government has engaged in various initiatives to restructuring its health insurance system since the commencement of the Doi Moi economic reforms in 1986. The foundations

of Vietnam's health insurance system were laid during the 1990s, and **Figure 5** presents a timeline and roadmap of universal health coverage with the actual coverage rate up to.

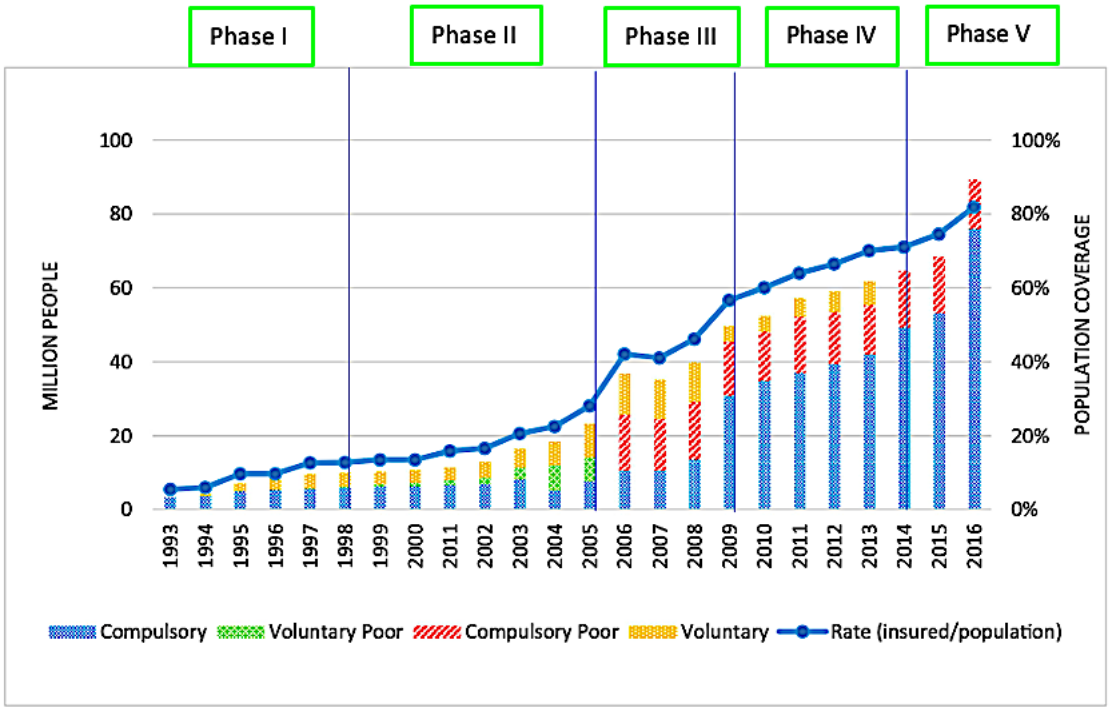


Figure 5: Social health insurance coverage of the Vietnamese population, 1993–2016, by SHI scheme: numbers of people covered and rate of coverage

The initial phase (from 8/1992 to 8/1998) can be characterized as initial establishment of health insurance. Before 1989, the health care system was centrally organized and fully subsidized by the government; therefore, health care services were provided free of charge from central to grassroots levels. However, the first Health Insurance Law was enacted in 1992 by the Council of Ministers issued Decree No. 299/ HDBT. It provided a legal framework for the expansion of health insurance coverage. Its target groups were workers at state-owned and non-state-owned enterprises with more than 10 workers, pensioners, socially disadvantaged people, and staff of international representative organisations in the country, with 3% of payroll tax.

The second phase (from 8/1998 to 5/2005). During this phase, all employees, irrespective of their employment in non-state enterprises or companies with fewer than 10 workers, were required to have mandatory health insurance. A co-payment system was introduced, with a 5% co-payment rate for those with free health insurance and a 20% rate for others.Furthermore, free healthcare insurance was introduced in this phase, targeting on individuals of merit and those receiving monthly social welfare benefits. Examples of such individuals included: People who joined in the revolution before 1945, heroic Vietnamese mothers, heroes of People's Armed Forces, Hero of Labor in the period of resistance; relatives of people with

meritorious services to the revolution include biological fathers, natural mothers, spouses, children (natural children, adopted children), people who have merits to raise martyrs and Elderly people in poor households have no children or relatives who take care...These people got free health insurance from the government. Through this period, the health insurance coverage was progressively extended. .

The third phase (5/2005 to 7/2009) can be imagined as Expansion and Consolidation. The enactment of Decree 63/2005/ND-CP on 16/5/2005, led to significant expansions in eligibility criteria for both compulsory and voluntary health insurance schemes. It included revisions to the benefit package and co-payment mechanism as well. Furthermore, the Decree mandated that impoverished individuals be moved from the "Health Care Fund for Poor People" to the compulsory scheme, with their premiums fully financed by the government. Additionally, to prevent adverse selection, the decree required that at least 10% of students or residents in any given school or commune enroll in the voluntary scheme.

The period from 7/2009 to 6/2014, referred to as the fourth phase, is recognized as the Universal Coverage Goad period. The initial Health Insurance Law (No 25/2008/QH12) which took effect on July 1, 2009. This Law introduced a comprehensive changes to the policy by expanding coverage to 25 insurance categories. Hence, health insurance coverage expanded to more population groups, including children under sex, the elderly and the poor incorporated into the compulsory scheme , but the premiums completely covered by government subsidies.

The fifth phase (from 7/2014 to now), is characterized by Universal Health Coverage. Law No. 46/2014/QH13 on Health Insurance was released on June 13, 2014 and took effect on January 1, 2015. This newly revised HI Law reclassified the eligibility categories, eliminated the voluntary scheme. The household category mandated that all members of a household, not covered by any other social health insurance scheme, must enroll simultaneously and contributed to a combined premium.

Table 1: Modifications in the target group for health insurance throughout various stages

HI type	Stage 1 (8/1992-8/1998)	Stage 2 (8/1998-5/2005)	Stage 3 (5/2005-7/2009)	Stage 4 (7/2009-6/2014)	Stage 5 (7/2014 onward)
Compulsory	• Employees • Pensioners	• Employees • Pensioners	• Employees • Pensioners	• Employees • Pensioners	• Employees • Pensioners
Voluntary	(not available)	• Student/ Pupils • Members of Association/Union Citizens	• Members of households Family-planning workers in commune • Student/ Pupils • Members of Association/Union Citizens	• Farmers (until 2012) • Workers' dependents • Members of cooperatives or business household • Members of households • Family-planning workers in commune • Student/ Pupils • Members of Association/Union Citizens	(not available)
Partly subsidized	(not available)			• Farmers (after 2012) • Near poor • Pupils/students	
Free	(not available)	• People with meritorious services to the revolution • People on monthly social welfare allowance	• National Assembly and People's Committees • The poor • Elderly > 90 years	• Relatives of people with meritorious services to the evolution • Children < 6 years	• Relatives of people with meritorious services to the evolution • Children < 6 years People who have

	• People who lost capacity to work • Overseas students • Veterans • Ethnic minorities • Meritorious people • People receiving monthly welfare allowance	• People who have donated parts of their bodies • National Assembly and People's Committees • The poor • Elderly > 90 years • People who lost capacity to work • Overseas students • Veterans • Ethnic minorities • Meritorious people • People receiving monthly welfare allowance	donated parts of their bodies • National Assembly and People's Committees • The poor Elderly > 90 years • People who lost capacity to work • Overseas students • Veterans • Ethnic minorities • Meritorious people • People receiving monthly welfare allowance

Together with the modification of health insurance policies, **Table 1** shows the structure of health insurance premiums have experienced several adjustments over time. Initially, the compulsory insurance premium was 3% of payroll tax, with employers covering 2% and employees 1%. The premium for pensioner's insurance was 10% of pension in this phase but was decreased to 3% in the phase II and III. Besides, the premium for compulsory HI adjusted, from 3% to 4.5% of pay rolls from 2010 onward. On the other hands, premiums for both free and voluntary insurance were determined based on the base salary, which led to an increase over time as the base salary increased. However, in order to subsidize the vulnerable groups such as the poor, near-poor, students, the government policies were implemented. At the fourth stage, for instance, near-poor individuals received a 50% subsidy, while pupils and students were subsidized 30%. Nevertheless, starting in 2014, near-poor individuals were required to pay only 30% of the premium, and farmers benefitted from a 70% reduction in insurance costs. These policies were designed to encourage participation in health insurance among vulnerable populations.

2.3. Tanahashi model - Bottleneck analysis approach

Through the application of the Tanahashi model, this section investigates the existing problem ins Vietnam's healthcare system. This analytical approach aims to identify any bottleneck issues within the healthcare infrastructure. Initially, an introduction to Tanahashi model will be presented. Subsequently, the applied data will be utilized to examine empirical situation.

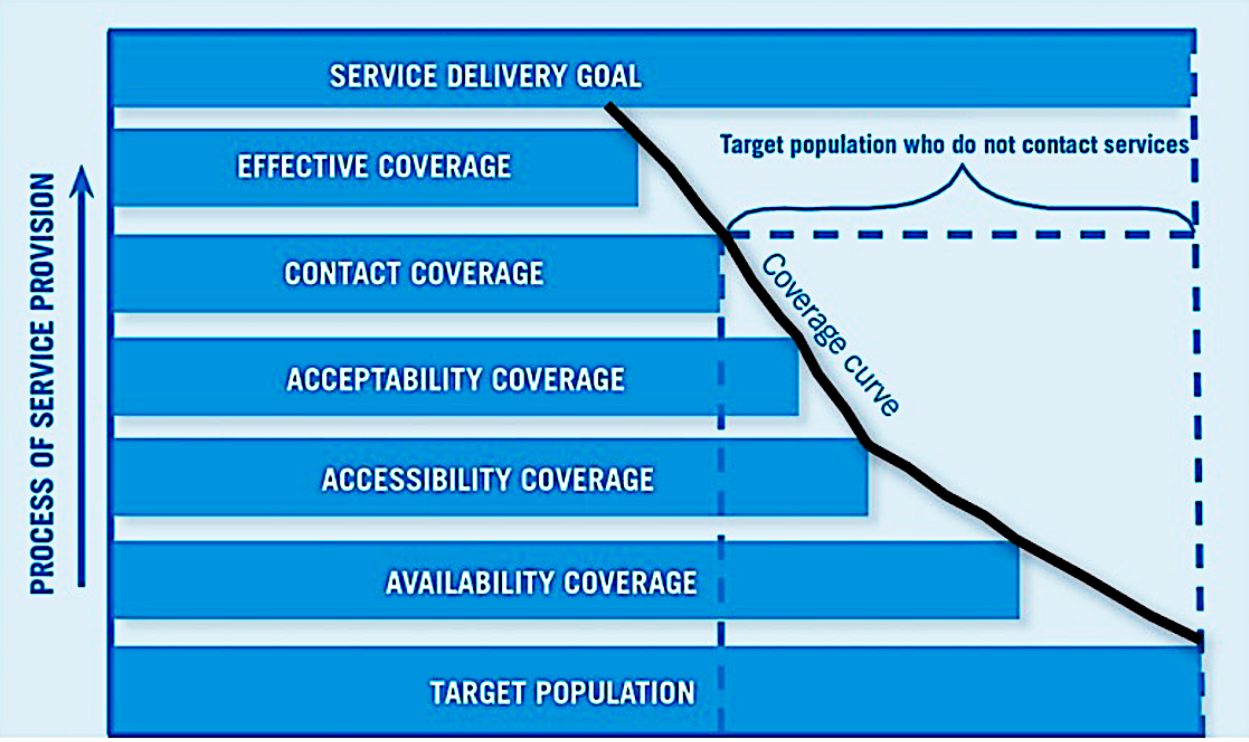
Table 2: Premium rates from 1992 to the present

HI type	Stage 1 (8/1992-8/1998)	Stage 2 (8/1998-5/2005)	Stage 3 (5/2005-7/2009)	Stage 4 (7/2009-6/2014)	Stage 5 (7/2014 onward)
Compulsory	3% of payroll tax (2% employers, 1% employees) 10% monthly pension	3% of payroll tax (2% employers, 1% employees) 3% monthly pension	3% of payroll tax (2% employers, 1% employees) 3% monthly pension	3% of payroll tax (2% employers, 1% employees) – 4.5% (from 2010) 3% monthly pension-4.5% (from 2010)	4.5% payroll tax (3% employers, 1.5% employees) Households insurance scheme ►The first person contributes a premium of 4.5% of base salary ► The second person pays 70% of the of the first person's contribution ► The third person pays 60% of the first person's contribution ► The fourth person contributes 50% of the first person's contribution ► The fifth person pays 40% of the first person's contribution
Voluntary	Students/Pupils	Rural 25000vnd-50000vnd	Urban 35000vnd-70000vnd	Rural 30000vnd-50000vnd	Urban 40000vnd-	3% base salary 4.5% base salary (from 2010)	(Not available)

	Others	60.0000vnd - 100.000vnd	80.000vnd-140.000vnd	70.000vnd-120.000vnd	70000vnd 100.000 vnd-160.000 vnd			
Partly subsidized						Near poor	3% base wage (50% subsidized)	4.5% base wage (100% paid by government)
						Pupils/ Students	3% base wage (30% subsidized) If students/ pupils come from near-poor family (50%)	3% base wage (70% subsidized)
						Farmers (after 2010)	3% minimum wage (30% subsidized)	3% base wage (50% subsidized)

2.3.1. Introduction about Tanahashi model – Bottleneck analysis approach

The Tanahashi coverage model developed in 1978 is one model introduced to clarify the concept of health service and to evaluate effective coverage as well as health systems. In order word, the original Tanahashi can be used to assess the capacity of the health system to deliver the full effect of interventions. The model, as depicted in **Figure 6**, consists of five distinct and indispensable stages required in sequential order to predict quality coverage (a measure of the proportion of people with health benefits): availability, accessibility, acceptability, contact coverage and effective coverage.



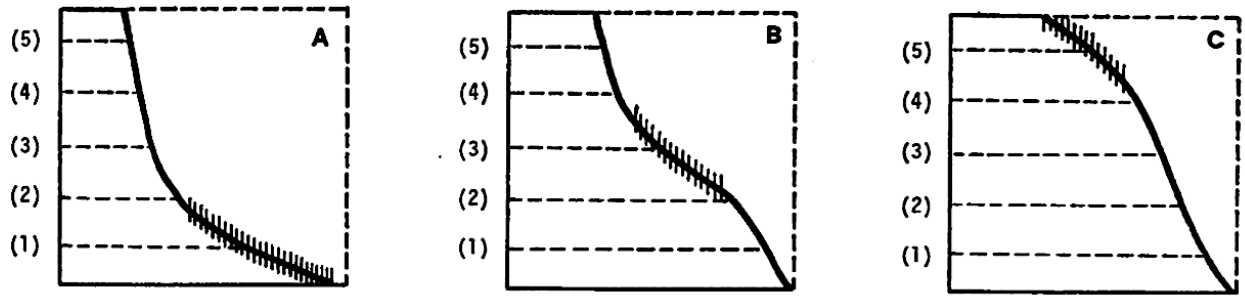
Source: Adapted from Tanahashi T, 1978

Figure 6: Tanahashi framework for effective coverage

- *Availability coverage*: the ratio between the availability of resources (namely, facilities, drugs, etc.) and the target population gives the measurement of coverage for this stage.
- *Accessibility coverage*: refer to the proportion of people who can reach and use service over the total population. The reason people cannot reach or use services can be because of limitation of physical or financial accessibility.

- *Acceptability coverage*: the ratio between people who are willing to use service over the total population.
- *Contact coverage*: the proportion between the population who contact services and total population.
- *Effectiveness coverage*: the number of people who have received satisfactory service.

Generally, the specific approach to calculate each coverage may vary depending on the health sector topic under consideration. On the other hand, the various measurements of coverage have been defined about for the different numerator in the coverage ratio, while keeping the denominator unchanged. However, a particular subgroup of the target population can be chosen for the denominator, and the resulting measurement of coverage will represent a different aspect of the interaction between the service and the population known as specific coverage. There are two types of specific coverage: provision-specific coverage and population-specific coverage. Provision-specific coverage is used in estimating coverage or changes in coverage when the extent or methods of service provision have changed. On the other hand, population-specific coverage refers to the measurement of health service provision and its adequacy within distinct subdivisions of a target population, differentiated by factors that are unrelated to the service provision itself.

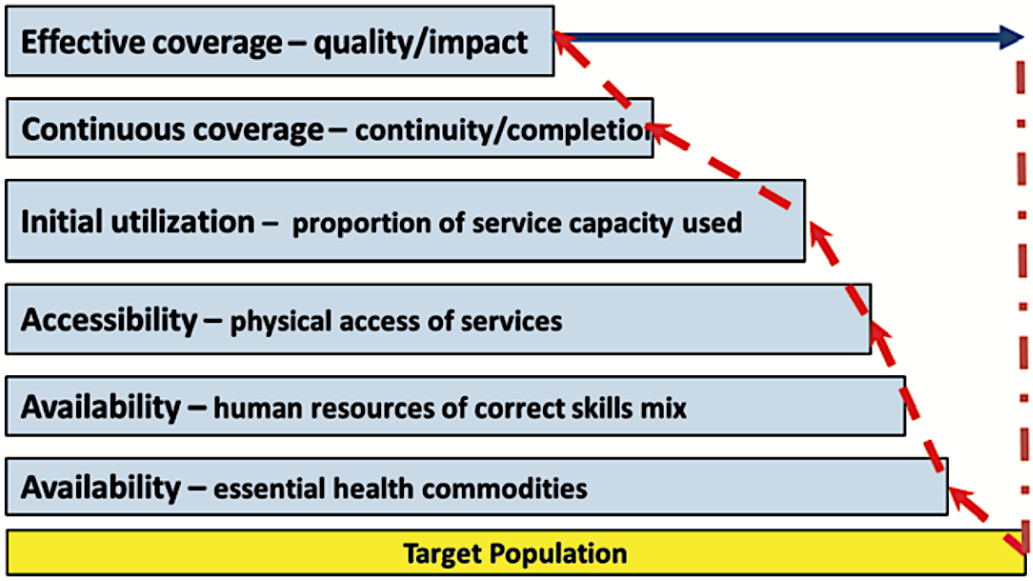


A) Bottlenecks in availability and accessibility of service because of poor allocation and deployment of resources and facilities; (B) Bottlenecks in acceptability of service because of poor appreciation of the service by the people; (C) Bottlenecks in effectiveness of service because of poor quality of the service.

Figure 7: Example of service operation and bottleneck

In 2002, in collaboration between World Bank and WHO has modified this model. This modified model (**Figure 7**) was easier for practitioners to use since it reflected the types of data that were available and permitted the identification of bottlenecks through a step-wise approach that evaluates six determinants of the effectiveness of coverage of an intervention. The first three

determinants focus mainly on supply-side constraints, while the final three focus largely on demand-side barriers.



Source: From (O'Connell & Sharkey, 2013)

Figure 8: The modified Tanahashi model for health systems

As shown in **Figure 6** and **Figure 8**, Tanahashi proposed examining the slope of the curve between each stage of coverage to assess the relative size of coverage loss between each stage. A flatter curve (as illustrated in the slope between "contact coverage" and "effectiveness coverage") indicates a larger loss of health system efficiency, drawing attention to an area in the process of service provision that should be prioritized. Tanahashi referred to this loss of efficiency as a "bottleneck" in the health system. Hence, this model can be known as Bottleneck analytical approach. Supposing that the five measurements of coverage are obtained (as shown in **Figure 6**). A large difference between an adjacent pair of the coverage measurement implies the existence of a problem or a bottleneck in the service provision. In the coverage diagram, the bottleneck appears as a sharp shift of the operation curve to the left.

2.3.2. Existing Constraints in Vietnam's Health Infrastructure by Tanahashi model

After providing a general information about Tanahashi model, this study advances to examine the current situation in Vietnam by looking at general statistical data on healthcare resources.

Table 3: Number of healthcare facilities in Vietnam (Excluding private establishments)

	2013	2014	2015	2016	2017
Hospital	1,069	1,063	1,071	1,077	1,085
Regional polyclinic	60	61	61	62	60
Sanatorium and rehabilitation hospital	636	635	630	609	579
Medical service units in communes, precincts	11,055	11,110	11,113	11,102	11,120
Medical service units in offices, enterprises	710	710	710	710	710
Others	32	33	33	31	29
Total	13,562	13,611	13,617	13,591	13,583

Source: National yearly statistical book

Health facility in Vietnam includes various and **Table 3** showed the number of healthcare facilities in Vietnam, from 2013 to 2017, revealed significant trends and patterns in the distribution and quantity of these facilities. Over this five-year period, the total number of healthcare facilities showed a slight overall increase from 13,562 in 2013 to a peak of 13,617 in 2015, before declining slightly to 13,583 in 2017. Hospitals, which are a critical component of healthcare infrastructure, experienced a modest but steady increase from 1,069 in 2013 to 1,085 in 2017. Regional polyclinics remained relatively stable, fluctuating minimally around the 60-61 range. In contrast, sanatoriums and rehabilitation hospitals exhibited a notable decline, decreasing from 636 in 2013 to 579 by 2017, indicating a significant reduction in this type of healthcare facility. Medical service units in communes and precincts maintained the largest numbers, with a slight increase from 11,055 in 2013 to 11,120 in 2017, reflecting a consistent effort to provide widespread basic medical services at the community level. Medical service units within offices and enterprises remained constant at 710 across all years, suggesting stable healthcare provisions in workplace settings. These data collectively depict a dynamic healthcare landscape in Vietnam, characterized by growth in general hospitals and community-based services, stability in workplace medical units, and a decline in specialized sanatoriums and other unspecified healthcare facilities.

Despite the increasing trend, the medical services unit in commune have consistently accounted for more than 80% of all facilities over the years, whereas hospital have comprised only approximately 8% and are exclusively located in major urban area. This considerable disparity had led to chronic overcrowding in Vietnam, which consequently have a high bed-to-inhabitant ratio.

Table 4 showed the healthcare infrastructure in Vietnam from 2010 to 2022 highlights significant trends in the number of hospital beds and doctors, both in absolute terms and relative to the population. Overall, the total number of beds shows considerable fluctuation, increasing from 246.3 thousand in 2010 to a peak of 335.2 thousand in 2021, before declining slightly to 315.6 thousand in 2022. Correspondingly, the number of beds per 10,000 inhabitants rose steadily from 21.9 in 2010 to 31.7 in 2022, indicating an overall improvement in bed availability relative to the population.

Table 4: Number of doctors and beds throughout Vietnam

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022***
Number of beds (1,000 beds)	306.1	315.0	308.4	330.3	323.8	302.3	335.2	315.6
Number of beds per 10,000 inhabitants (bed)	26.5	27.0	27.5	28.0	28.5	31.0	31.2	31.7
Doctor (1,000 persons)	73.8	77.5	74.4	84.8	96.2	84.0	109.5	99.6
Doctor per 10,000 inhabitants (person)	8.0	8.2	8.4	8.6	8.8	8.6	11.1	10.0

**Tentative statistics*
Source: National yearly statistical book

The number of doctors also demonstrated notable growth. The total number of doctors increased from 61.4 thousand in 2010 to 109.5 thousand in 2021, before a slight decrease to 99.6 thousand in 2022. This increase is mirrored in the number of doctors per 10,000 inhabitants, which rose from 7.2 in 2010 to a peak of 11.1 in 2021, before adjusting to 10.0 in 2022. These figures suggest substantial improvements in medical staffing over the period, although the decline in 2022 may indicate emerging challenges.

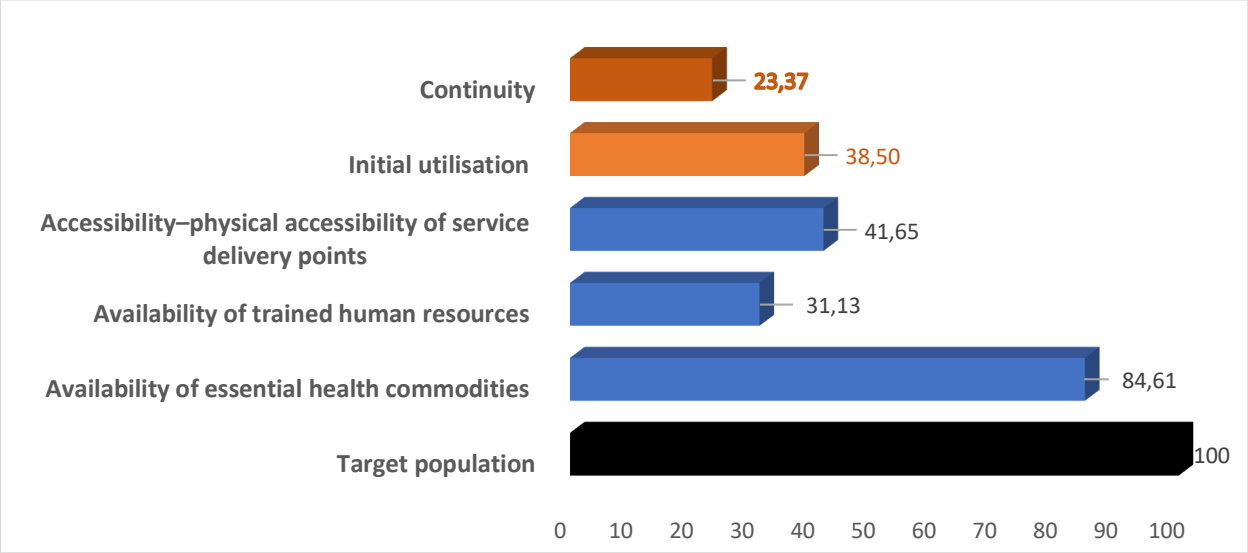
Overall, the data depicts a trend of enhanced healthcare capacity in Vietnam, with significant expansions in both the number of beds and doctors. The general upward trend in beds and doctors per capita reflects ongoing efforts to bolster healthcare services to meet the needs of a growing population, though the slight decreases in 2022 warrant attention to ensure continued progress.

2.3.2.1. Bottleneck analysis in healthcare system of ethnic groups

Following the methodology to measure five coverages in Tanahashi model, **Figure 9** presents a quantitative analysis of various factors contributing to health service delivery challenges in Vietnam. The chart identifies and quantifies five key areas of concern: availability of essential health commodities, availability of trained human resources, physical accessibility of service

delivery pointsand, initial utilization, and continuity, which in turn represent for availability coverage (health facility), availability coverage (human resource), accessibility coverage, initial utilization and continues coverage respectively (as shown in **Figure 8**). To analysis the Tanahashi model's result, it is essential to look and compare the coverage number from the horizontal to the top. The metrics are represented in percentages, with the target population normalized to a baseline of 100%.

Unit: %



Source: author's calculation based on Statistics Book and VHLSS 2018

Figure 9: Modified Tanahashi model application on minority ethnic group

Availability of essential health commodities was calculated as the number of health facilities (HFs) with health systems inputs divided by the number of facilities providing the intervention. The coverage stands at 84.61%, indicating that while there is a strong supply of necessary medical supplies and pharmaceuticals, there may still be gaps that need addressing. Essential health commodities include medications, vaccines, diagnostic tools, and medical equipment, all of which are vital for effective healthcare delivery. Ensuring the consistent availability of these commodities is essential for the functionality of the healthcare system and the ability to provide comprehensive care.

The availability of trained human resources is calculated as sum of service providers that received adequate training in intervention (for example, maternal and newborn care) divided by sum of all service providers in a given facility. The result is shown at 31.13%, suggesting that there

is indicating a shortfall in adequately trained healthcare professionals. This shortfall could impact the quality of care provided and the ability to meet the population's health needs efficiently.

Physical accessibility of service delivery points is generated as the number of people living within a 5 km radius from HFs that offer basic delivery services divided by the population size of the LGA. With percentage is 41.65%, this relatively low figure indicates that geographical and logistical barriers significantly impede access to healthcare facilities. For many individuals, especially those in rural or remote areas, reaching a healthcare provider can be a substantial challenge due to distance, poor infrastructure, or lack of transportation options. Addressing these physical accessibility issues is critical for ensuring that healthcare services are within reach of the entire population.

Exploring further, by calculating the total of the target population that interact or use the service and/or intervention for the first time divided by the target population living within the LGA, the initial utilization stands at 38.50%. It highlighted that a significant portion of the target population does not make initial use of available healthcare services. This could be due to a variety of factors including lack of awareness, cultural barriers, financial constraints, or perceived ineffectiveness of the services. Improving initial utilization is essential for early detection and treatment of diseases, which can prevent more severe health issues in the long run and reduce the overall burden on the healthcare system.

The most significant bottleneck, as illustrated by the graph, is continuity, which is the sum total of the target population who remained in full contact with an intervention and/or service divided by the number of target population living within the LGA. The 23.37% indicated substantial challenges in ensuring ongoing and consistent access to healthcare services. Continuity in healthcare is crucial for maintaining effective treatment regimens, managing chronic conditions, and ensuring follow-up care. The data suggestd that many patients in Vietnam may start receiving healthcare but fail to continue accessing the necessary services, which can undermine health outcomes and lead to worsening conditions or complications.

The graph’s structure and data presentation underscore the multifaceted nature of healthcare bottlenecks that minority ethnic group is facing in Vietnam. It highlighted the disparity between the availability of healthcare resources and their actual utilization and accessibility. While only the high percentages for essential health commodities are promising, the low percentages for trained

human resources, physical accessibility, initial utilization, and continuity suggest areas that require focused interventions.

Improving continuity could involve initiatives such as patient education, follow-up systems, and community health programs that encourage sustained engagement with healthcare services. Enhancing initial utilization might require awareness campaigns, reducing financial barriers, and improving trust in the healthcare system. Addressing physical accessibility could involve infrastructure development, mobile clinics, and telehealth services to reach underserved populations.

2.3.2.2. Bottleneck analysis in healthcare system of minority ethnic groups: by population-specific coverage type

In alignment with the preceding discussion, this section examines the bottlenecks focusing on the type of population-specific coverage. In this context, population-specific coverage is applied to minority ethnic groups. The detailed methodology is provided in **Table 5**.

Table 5: Tanahashi model of ethnic group by population-specific coverage

Coverage	Definition	Indicator	
		Numerator	Denominator
Availability of health commodities	The availability of critical health system inputs, such as drugs, vaccines, and related commodities, in sufficient quantities to cover the target population.	Number of beds per 10000 ethnic people in region 2 and 4*	Number of beds per 10000 ethnic people in Vietnam
Availability of human resources	The issue here is not simply sufficient staff, but staff trained in providing quality and effective interventions or services.	Number of health personnel per 10.0000 people in region 2 and 4	Number of health personnel per 10.000 people in Vietnam
Accessibility coverage	The conditions determining physical access to health services such as distance, travel time or ease with which a client	Ethnic people who visited any nearby** clinics "Near" category is measured by travel time less than 30 minute for one way	Ethnic people who have been to any clinics

	can access a facility, outreach session		
Initial utilization	The first use of, or contact with, services or interventions	Ethnic people who use health insurance to have health checkup (in region 2 and 4)	Ethnic people who use health insurance to have health checkup (in region 2 and 4)
Continuous coverage	The extent to which the full course of contact or intervention required to be fully effective	Ethnic Inpatients who have serious illness and have been to hospital more than 1 time (in region 2 and 4)	Ethnic inpatients who have serious illness (in region 2 and 4)

** Regions 2 and 4 refer to Northern midlands and mountain areas, North central and central coastal areas and Central highlands where more than 80% of minority ethnic people settle*

As revealed in **Figure 10**, both of the availability coverages were more positive compare to the ones in **Figure 9.** However, both charts displayed the low issues with initial utilization and accessibility and continuity of care. To improve healthcare delivery for the ethnic group, focus should be placed on addressing the consistent issues of low continuity and initial utilization, enhancing physical accessibility, and ensuring a steady supply of trained human resources and essential health commodities. By focusing on these areas, healthcare systems can work towards more equitable and effective service delivery, ultimately improving health outcomes for the target population.

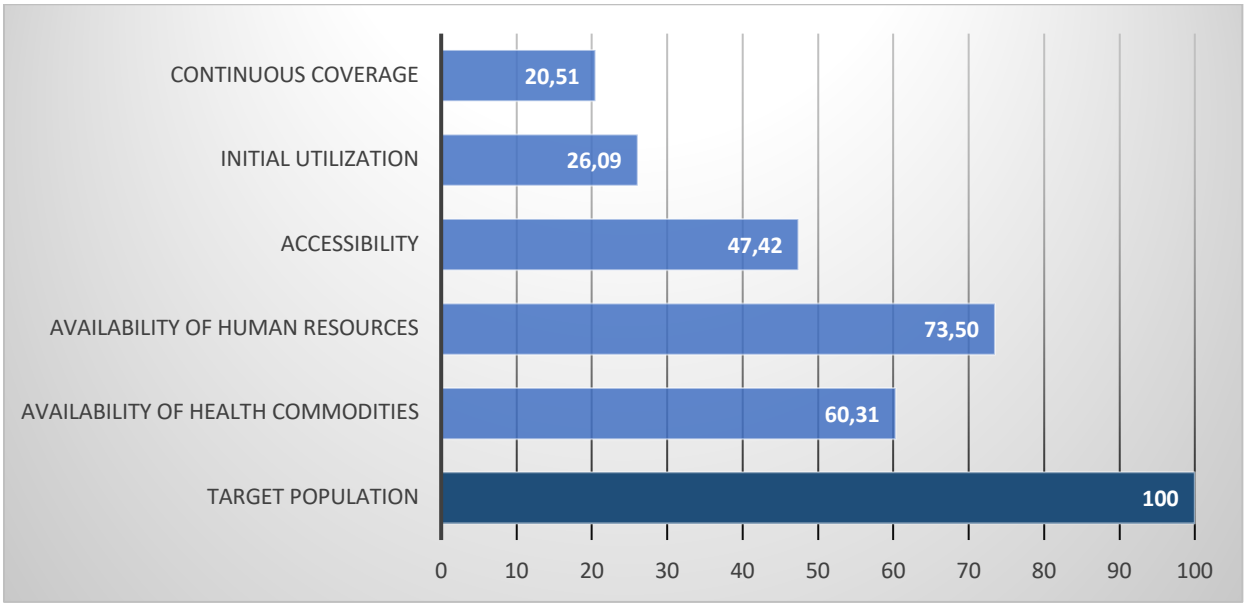


Figure 10: Modified Tanahashi model application by population-specific coverage

In summary, the graphs gave us an overview of current challenge affecting the target population's interaction with health services. In order words, they reveal Vietnam healthcare system is facing bottleneck hinder: bottlenecks in acceptability of service because of poor appreciation of the service by the people, and bottlenecks in effectiveness of service because of poor quality of the service The high rating for the availability (of essential health commodities and of human resources) suggested a strong supply chain, while lower ratings for factors such as continuity and initial utilization indicate areas needing significant improvement. Addressing these gaps requires a multifaceted approach, including enhancing healthcare infrastructure, improving training and retention of healthcare personnel, ensuring physical accessibility, and fostering initial engagement with health services.

In conclusion, the graphs provided a comprehensive look of health services provision, highlighting critical areas for improvement. By addressing these bottlenecks, Vietnam can work towards a more efficient and equitable healthcare system, ultimately improving health outcomes for its population.

Chapter 3
EFFECT OF HEALTH CONDITION ON VULNERABLE GROUPS IN VIETNAM

From the system-wide overview, Chapter 3 will focus on an examination of the intersection between health and labor, this chapter is going to investigate the impact of health condition – unexpected and adverse health events – on individuals' working hours. By analyzing how the shocks influence labor market participation, this chapter provides information about the broader economic consequences of health vulnerabilities. It also sets the stage for later discussions about potential healthcare solutions and the broader factors that influence health outcomes.

3.1. Introduction

The relationship between health condition and labor market outcomes, particularly the effect of such shocks on working hours, is an area of growing academic interest. Health condition—unexpected and significant changes in an individual's health status—can affect economic behavior, especially in developing economies where formal safety nets are less comprehensive. For many individuals, health condition may lead to a reduction in working hours or even a complete withdrawal from the labor force due to physical limitations or the need for medical care (Staiger et al., 2018). In other cases, individuals facing health condition may be compelled to work more hours to compensate for lost income, despite deteriorating health (Lindahl, 2005). The impact of health condition on people's ability to work has been widely studied in developed countries (Islam & Parasnis, 2022). However, there is much less research on how the health condition affect individuals in low and middle-income countries, especially Vietnam.

Vietnam, a rapidly growing economy in Southeast Asia, faces a complex set of health and labor market challenges. The country's economic growth has lifted millions out of poverty, but significant disparities remain, particularly between ethnic groups, genders, and income levels. In recent years, Vietnam has seen an increasing prevalence of non-communicable diseases, aging populations, and rising healthcare costs, which may make health condition an even more critical issue for labor market participation (Nguyen et al., 2019). However, despite the potential significance of health condition, research specifically examining how such shocks affect individual labor supply in Vietnam is sparse. Most studies tend to focus on broader demographic or

macroeconomic trends, leaving a gap in understanding how health condition influence the working hours and economic behavior of individuals, particularly at the microeconomic level.

This gap is particularly important given the diverse socio-economic landscape of Vietnam. The country is home to a large number of ethnic minorities who, compared to the Kinh majority, face greater economic disadvantages, including lower levels of education, limited access to healthcare, and poorer labor market outcomes (Bui et al., 2016). Gender inequalities are also prevalent, with women—particularly in rural areas—facing structural barriers that hinder access to both healthcare and labor markets (Gammarano & Puertas, 2024). Additionally, poverty exacerbates vulnerability to health condition, as individuals with lower incomes are less likely to afford healthcare services and have fewer resources to absorb the financial impact of health events (Ma et al., 2022; Ouadika, 2020). Understanding how these socio-economic factors interact with health condition is critical for designing effective public policies that can protect the most vulnerable populations from the negative consequences of poor health.

This study aims to fill this gap by examining the impact of health condition on working hours of individuals in Vietnam, with a particular focus on how these effects vary across vulnerable groups. Specifically, this research will explore the following key questions: (1) How do health condition affect the working hours of individuals in Vietnam? (2) How do the effects of health condition differ by socio-economic factors such as ethnicity, gender, and economic status?

The objectives of this research are threefold: (1) to quantify the overall impact of health condition on working hours in Vietnam, (2) to explore whether and how this impact differs across ethnic minority, women, and individuals in poverty, and (3) to provide evidence-based recommendations for policymakers aimed at mitigating the adverse labor market consequences of health condition.

The findings of this study are expected to make several important contributions to both the academic literature and policy discussions in Vietnam. First, by examining the effect of health condition on individual working hours, this research will provide valuable insights into the microeconomic consequences of health events in a developing country context. Second, by disaggregating the impact of health condition by socio-economic factors, the study will shed light on how vulnerable populations in Vietnam are uniquely affected by health events and how these impacts can be mitigated. Finally, the results of this study may inform the development of more

targeted policies aimed at supporting individuals and communities that are most at risk from the economic consequences of health condition.

3.2. Vulnerable Groups in Vietnam: Ethnic Minorities, Women, And People Living In Poverty

Vietnam has made significant progress in terms of economic development and poverty reduction over the past few decades. However, despite these achievements, certain groups in the population remain disproportionately disadvantaged. These vulnerable groups include ethnic minorities, women, and individuals living in poverty (*Summary Report: National Study on Violence Against Women in Viet Nam 2019*, 2020; Hinh & Van Minh, 2013). They continue to face substantial barriers to achieving social and economic equality, including limited access to education, healthcare, employment, and political representation. This overview examines the socio-economic challenges faced by these groups, highlighting key statistics and factors contributing to their vulnerability.

3.2.1. Minority ethnic groups in Vietnam

Vietnam has a wide variety of cultures, with 54 ethnic groups officially recognized. The Kinh (or Viet) people make up approximately 85% of the population, while the remaining 15% comprises various minority ethnic groups, such as the H'mong, Tay, Khmer, and Thai (General Statistics Office of Vietnam, 2020). Ethnic minorities tend to reside in the more remote and rural areas of the country, particularly in the Northern Highlands, the Central Highlands, and the Mekong Delta. These communities face a range of socio-economic challenges, including poverty, limited access to services, and discrimination.

One of the most pressing issues for ethnic minorities in Vietnam is poverty. According to the World Bank (2021), approximately 30% of ethnic minority groups live below the poverty line, which is significantly higher than the national average. This disparity is particularly pronounced in the mountainous regions, where many ethnic minorities reside. Limited infrastructure, poor road connectivity, and inadequate access to markets and basic services contribute to their high poverty rates. A report by the World Bank (2021) found that about 2.3 million ethnic minorities in Vietnam were living in poverty, a figure that represents a significant portion of the country’s impoverished population.

In addition to poverty, health outcomes are also worse for many ethnic minority groups. Ethnic minorities often face barriers to healthcare due to language differences, cultural misunderstandings, and geographic isolation. The maternal mortality rate among ethnic minority women is higher than the national average, and there are higher rates of malnutrition and child mortality in these communities (UNICEF, 2017). Access to basic healthcare services is limited, and many people in these areas rely on traditional medicine, which can be less effective than modern treatments.

3.2.2. Women in Vietnam

Despite Vietnam's economic growth, gender inequality remains a crucial issue, particularly for women in rural and remote areas. Vietnam has made notable progress in closing the gender gap in health and education. The literacy rate for women is high, with 94% of women aged 15 and older being literate (World Bank, 2021). However, significant gender disparities persist in other areas, particularly in the labor market, political representation, and domestic roles.

One of the most notable issues for women in Vietnam is economic inequality. Women earn, on average, 20% less than their male counterparts, despite having similar levels of education (Asian Development Bank, 2020). Women are overrepresented in low-wage, informal, and part-time employment sectors, which often lack benefits such as healthcare, job security, and paid leave. Women are also more likely to work in agriculture, which is a sector with limited income potential. While Vietnam has achieved high levels of female participation in the labor force, women's economic empowerment is still hampered by these disparities in pay and job quality.

Another challenge facing women in Vietnam is their underrepresentation in decision-making positions. Although women have made significant strides in education and employment, they remain underrepresented in leadership roles, particularly in politics. As of 2022, women hold only 26.7% of seats in the National Assembly, which, while higher than the global average for female political participation, still reflects a gender gap in political representation (Inter-Parliamentary Union, 2022). This underrepresentation limits women's ability to influence policies that directly affect their lives and perpetuates gender inequality.

Violence against women is also a critical issue in Vietnam. Domestic violence is widespread, and the 2019 Vietnam Women's Union survey revealed that nearly 58% of women in Vietnam have experienced some form of violence in their lifetime, with physical and emotional abuse being the most common forms (Vietnam Women's Union, 2019). Although legal frameworks and

policies have been put in place to combat gender-based violence, enforcement remains weak, and many women continue to face violence without adequate support or legal protection.

3.2.3. Poverty in Vietnam

Poverty continues to be a significant challenge in Vietnam, with an estimated 9.2% of the population living below the national poverty line in 2022 (General Statistics Office of Vietnam, 2023). While Vietnam has made impressive strides in poverty reduction, much of the progress has been concentrated in urban areas, and rural areas, particularly in the Central Highlands and Northern mountainous regions, continue to experience high levels of poverty. Ethnic minorities, women, and individuals with disabilities are particularly vulnerable to poverty, as they often face intersecting forms of discrimination that limit their opportunities for economic advancement.

One of the key drivers of poverty in Vietnam is the lack of access to quality education and vocational training. In rural areas, where poverty rates are highest, schools are often underfunded, poorly equipped, and located far from students' homes. As a result, many children in these regions drop out of school early to help support their families. According to the General Statistics Office of Vietnam (2023), children from poor households are twice as likely to be out of school compared to children from wealthier families. This lack of education significantly reduces their future employment opportunities and perpetuates the cycle of poverty.

Another factor contributing to poverty is limited access to healthcare. People in rural and remote areas have fewer healthcare facilities and often face higher costs for medical services. Many individuals in these regions, particularly those in ethnic minority communities, do not have access to essential health services, such as maternal care, vaccinations, and treatment for chronic conditions. As a result, health outcomes are poorer, and the financial burden of medical expenses can push families further into poverty.

Vietnam's poverty reduction efforts have focused primarily on economic growth, but there is growing recognition that poverty is a multi-dimensional issue that requires comprehensive solutions. In addition to addressing income inequality, policies must also focus on improving access to education, healthcare, housing, and social services to ensure that all individuals, regardless of their background, have the opportunity to live a healthy and productive life.

Despite Vietnam's remarkable economic growth and progress in poverty reduction, ethnic minorities, women, and individuals living in poverty remain vulnerable groups that face significant challenges. These groups experience systemic inequalities in healthcare, education, and

employment, which limit their ability to fully participate in and benefit from the country's development. Addressing these disparities requires targeted policies and interventions that focus on improving access to education, healthcare, and economic opportunities, while also promoting greater social inclusion and gender equality. Only through such inclusive measures can Vietnam achieve sustainable and equitable development for all its citizens.

3.3. Methodology

3.3.1. Data

This study aims to explore the impact of health condition on the working hours of vulnerable groups in Vietnam. The data utilized for this analysis comes from the Vietnam Household Living Standards Survey (VHLSS) panel data for the years 2016 and 2018. The VHLSS is a comprehensive household survey conducted every two years, providing detailed information on various socio-economic indicators, including health status, income, employment, and household welfare. The 2016 and 2018 VHLSS panel data are ideal for this study as they track individual-level data across two time points, allowing for the analysis of changes over time. Panel data also allow for the identification of health condition at the individual level, which is essential for understanding the dynamic impact of these events on working hours (Smith, 2015). The availability of such rich data provides an opportunity to conduct a more detailed and rigorous analysis of how health condition affect individuals' labor market behavior in Vietnam.

3.3.2. Model specification

To analyze the effect of health condition on working hours, both Fixed Effects Models (FEM) and Random Effects Models (REM) will be appropriate. These models are appropriate for panel data analysis as they account for the time-invariant and time-varying heterogeneity across individuals and households. Given the availability of panel data, this study considered using a Random or Fixed Effect Model to attempt to address endogeneity. Nevertheless, the author conducted Hausman tests that strongly rejected the null hypothesis that random effects provide consistent estimates, and thus adopted the FE specification as our main specification as follow.

The Fixed Effects Model is used to control for unobserved heterogeneity by focusing on within-individual variations over time. This model assumes that individual-specific effects are correlated with the explanatory variables.

The equation for the FEM is:

$$Work\_Hour_{it} = \alpha_i + \beta Sick_{it} + \delta X_{it} + \varepsilon_{it}$$

Where:

- $Work\_Hour_{it}$ is the primary dependent variable. It records the total hours of an individual i work per day, at time t.
- α_i is the individual-specific intercept, which reflects unobserved individual heterogeneity.
- $Sick_{it}$ captures the health condition variable for individual i at time t. It is a dummy variable and equals 1 if individual was ill or injured, 0 otherwise. Hence, β is the main interested coefficient in the model. If an individual experiencing a not-good-health condition reduce his/her working hours, β will be a negative coefficient. And β will receive a positive value, which indicate that health condition boosts his/her working hours.
- X_{it} represents the vector of control variables (demographic, household, and regional characteristics) of individual i at time t.
- ε_{it} the error term.

Health conditions may be evaluated using three distinct methods: objective health, which is determined through clinical observations and diagnostic testing; subjective health, based on the individuals' personal feelings of well-being; and functional health, which evaluates an individuals' ability to perform daily activities effectively (Monden, 2014). In this study, the author will apply objective health to capture health condition, namely the occurrence of a serious injury or illness within the past year. To be specific, interviewee answered the question: "In the past 12 months, has [NAME] been ill/injured so badly that [NAME] had to stay in bed and needed someone to take care or had to be absent from work/school or not be able to carry out regular activities?". For this measure, a binary variable is generated, which takes the value of 1 if the interviewee's answer is "Yes" and 0 otherwise.

Following the conceptual framework outlined by Strauss and Thomas (1998), this research includes a set of controls at the individual level X, which are relevant and the time-varying determinants of welfare: characteristics of the individual (gender, ethnicity, age, marital, and education status), and characteristics of the household (household size). The model also includes a vector of control, which is relevant and the time-invariant determinant of welfare: urban area. Below is a description of variables measurements used in the models.

Table 6: Variables' measurements

Variable	Measurement
Dependent variables	
Working hours	Total of working hours per day of an individual
Interested independent variables	
Sick	= 1 if an individual was being sick during last 12 months = 0 if not
Control variables	
Ethnicity	= 1 if an individual is a minority ethnic group = 0 if an individual is a majority ethnic group
Poverty	= 1 if he/she is a member of a household classified as a poor one of the commune/ward = 0 if otherwise
Female	= 1 if an individual is a female = 0 if an individual is a male
Urban	= 1 if individual lives in urban = 0 if living in rural
Marital status	= 1 if an individual is married = 0 if otherwise
HI	= 1 if an individual owns any type of health insurance = 0 if not
Age	Age of individual
Education	The highest diploma of an individual, include: No degree……..... 0 Primary school..... 1 Lower secondary school..... 2 Upper secondary school..... 3 Elementary vocational school..... 4 Intermediate vocational school..... 5 Prof. Secondery school..... 6 Vocational college..... 7 College..... 8 University..... 9 Master..... 10 PhD..... 11

This study employs Fixed Effects Models (FEM) to analyze the impact of health condition on individual working hours, with a specific focus on demographic vulnerabilities. By interacting the health shock variable with three key demographic factors—gender (female), poverty, and ethnic minority status—the research aims to explore nuanced effects across these subgroups. This approach not only captures the direct consequences of health condition but also highlights how these intersect with existing inequalities. The application of FEM enables the control of unobserved heterogeneity, ensuring robust and reliable insights into the socioeconomic dynamics of health condition in Vietnam.

Finally, the research investigate if results change across different population groups. Results are presented for the entire sample and by subsample: female individuals, ethnic minority (all ethnicities other than Kinh group), and poor individuals. Conducting specific regressions across vulnerable groups in Vietnam, such as women, the poor, and ethnic minorities, is essential to capture the nuanced impacts of health status on their working hours. These subgroups are often more challenges, like limited access to healthcare and financial instability, which makes their work hours more likely to be affected by poor health. For instance, restricted access to medicine and healthcare services in rural or underserved areas exacerbates health disparities, reducing these groups' ability to maintain stable employment. Women may face additional challenges due to caregiving responsibilities, further amplifying the effects of illness on their working performance. Similarly, poor households and ethnic minorities often experience structural inequities, such as geographic isolation or discrimination, compounding the health-related vulnerabilities in their labor contributions. By running targeted regressions, researchers can quantify the differential impact of unhealthy status on working hours, providing critical insights into the intersection of health inequities and economic participation. Such analyses are vital for formulating policies that address the root causes of these disparities.

3.3.3. Robustness checks

Since FEM controls for unobserved heterogeneity by differencing out time-invariant effects, therefore, to validate the results, this study will perform a robustness checks, namely applying alternative specification. Interaction terms allow researchers to test whether the effect of a primary independent variable changes across levels of another variable (Giesselmann & Schmidt-Catran, 2020). For instance, adding an interaction term between a policy intervention and a contextual

variable helps understand if the intervention's impact varies by context (e.g., region, income level). To be specific, the research will explore additional model specifications, namely controlling interactions between health condition and some socio-economic factors which reflect status of vulnerable groups.

3.4. Results

3.4.1. Data description

Table 7 gives the descriptive statistics that provided a comprehensive overview of key socioeconomic and demographic characteristics of individuals in the sample, including individuals' working hours, health status, poverty, ethnicity, gender, and education. This dataset serves as a foundation for analyzing labor dynamics, particularly in relation to vulnerable groups. Below is a summary and interpretation of the data. In addition, the table summarizes an overview of general statistics of individuals characterized as unhealthy (sick) and healthy (non-sick).

On average, each individual works 6.93 hours per day, with a standard error of 2.30, ranging from 0 to 20 hours. This average number aligns closely with average working hours in Vietnam's labor market, where many workers, especially in informal sectors, work between 6 and 8 hours per day (ILO, 2020). The working hours of unhealthy individuals are likely fewer (6.24 hours) compared to healthy individuals (6.97 hours). The difference, though seemingly small, underscores the adverse impact of poor health on labor performence and economic participation. The higher standard error for unhealthy individuals (2.82) compared to healthy individuals (2.23) indicates greater variability in work hours among the unhealthy group, likely due to interruptions caused by illness. This aligns with findings from labor economics literature, which consistently show that health condition reduce an individual's capacity to work, particularly in labor-intensive jobs.

About individuals' health, the main interested factor, shows that approximately 6% of individuals reported being sick during the survey period, which equivalent with around 4,400 observations. However, this rate could vary across subgroups, particularly among ethnic minorities and the poor, who may face barriers to healthcare access. We can take a deeper exploration in later analyzation.

The poverty rate in the dataset is 11%, which exceeds Vietnam's national poverty rate in 2018, estimated at 7% by the World Bank. The poverty rate is higher among unhealthy individuals (13%) than among healthy individuals (10%). This may reflect the economic vulnerability associated

with poor health. This disparity is consistent with national and international research, which shows that poor health often leads to increased healthcare expenses, reduced income, and limited labor market opportunities. The higher poverty rate among unhealthy individuals is particularly concerning in contexts where social safety nets and healthcare systems are underdeveloped, as seen in many rural areas in Vietnam.

Ethnic minority constitutes 23% of the sample, substantially higher than their proportion in Vietnam's overall population, which is approximately 15% (World Bank, 2019). This overrepresentation is crucial for analyzing disparities in labor and economic outcomes, as ethnic minorities in Vietnam tend to have lower levels of education, less access to healthcare, and reduced economic opportunities compared to the majority Kinh group. However, this character has the same distribution between two groups of individuals.

Looking at gender characteristic, women make up 47% of the sample, reflecting an almost equal gender distribution. This is consistent with Vietnam's population gender composition, where women constitute about 49.5% of the population (General Statistics Office of Vietnam, 2021). Females constitute a slightly higher proportion among unhealthy individuals (49%) compared to healthy individuals (47%). This difference, while minor, aligns with broader evidence suggesting that women are more likely to report health problems due to a combination of biological, social, and economic factors. Women's dual burden of work and caregiving responsibilities can exacerbate health risks, particularly in rural areas or low-income settings where access to healthcare is limited.

Regarding education, the sample reflects a relatively low level of formal attainment. For instance, 17% of respondents are illiterate, 25% have only completed elementary school, and only 10% have a college or university degree. Higher education is rare, with only 0.4% of individuals reporting postgraduate qualifications. These figures underscore the challenges in human capital development, particularly in rural and minority communities, where educational access remains a critical barrier.

Table 7: Descriptive statistics of total sample in panel data 2016 - 2018

		Unit	Total sample				Unhealthy Individuals		Healthy Individuals	
			Mean	SE	Min	Max	Mean	SE	Mean	SE
Working hours		hours	6.93	2.30	0	20	6.25	2.82	6.97	2.23
Sick		%	0.06	0.24	0	1	1	0	0	0
Poverty		%	0.11	0.31	0	1	0.13	0.34	0.10	0.31
Ethnic minority		%	0.23	0.42	0	1	0.23	0.42	0.23	0..42
Female		%	0.47	0.50	0	1	0.49	0.50	0.47	0.50
Maritial status		%	0.79	0.41	0	1	0.83	0.38	0.79	0.41
Voluntary health insurance		%	0.23	0.42	0	1	0.28	0.45	0.22	0.42
Urban		%	0.26	0.44	0	1	0.27	0.44	0.26	0.44
Age		age	40.99	12.18	15	65	44.46	12.10	40.77	12.16
Education	Illisterature	%	0.17	0.38	0	1	0.21	0.41	0.17	0.37
	Elementary	%	0.25	0.43	0	1	0.25	0.44	0.24	0.43
	Secondary	%	0.31	0.46	0	1	0.29	0.45	0.31	0.46
	High school	%	0.18	0.39	0	1	0.17	0.38	0.18	0.39
	College_University	%	0.10	0.30	0	1	0.07	0.26	0.10	0.30
	Higher education	%	0.004	0.06	0	1	0.002	0.04	0.004	0.06
Total observations		Individual	72,807				4,375		68,432	

Moreover, the descriptive statistics shows in **Table 8** gave offer an insightful comparison of various socioeconomic and demographic characteristics for the total sample and key subgroups: female individuals, ethnic minorities, and individuals living in poverty.

The average work hours for the total sample are 6.93 hours per day. Among subgroups, females work slightly fewer hours on average (6.74 hours), and ethnic minorities work 6.76 hours, which is marginally higher than those living in poverty (6.48 hours). The lower work hours for individuals in poverty reflect structural disadvantages such as limited access to stable employment or reliance on informal labor markets. Similarly, the reduced work hours for females may indicate the dual burden of paid work and unpaid domestic responsibilities.

Table 8: Descriptive statistics of individuals across various subgroups

		Unit	Subgroups			Total sample
			Female	Ethnic minority	Poverty	
Work hours		hours	6.74	6.76	6.48	6.93
Sick		%	0.06	0.06	0.07	0.06
Poverty		%	0.11	0.33	100.00	0.11
Ethnic minority		%	0.23	100.00	0.77	0.23
Female		%	100.00	0.48	0.49	0.47
Marital status		%	0.81	0.76	0.71	0.79
Voluntary health insurance		%	0.24	0.04	0.002	0.23
Total household members		member	4.32	4.95	4.99	4.38
Age		age	41.22	37.02	35.63	40.99
Education	Illiterature (base group)	%	0.19	0.34	0.45	0.17
	Elementary	%	0.25	0.25	0.27	0.25
	Secondary	%	0.29	0.25	0.23	0.31
	High school	%	0.16	0.11	0.06	0.18
	College_University	%	0.10	0.04	0.004	0.10
	Higher education	%	0.003	0.0004	0	0.004
Total observation		individual	31,659	16,863	5,150	72,807

About poverty, it is notable that 33% of females and 77% of ethnic minorities also fall into poverty. These figures demonstrate the intersection of socioeconomic vulnerability with gender and ethnicity. The poverty rate among ethnic minorities is alarmingly high compared to the total sample (11%), reflecting persistent structural disadvantages such as limited access to education, healthcare, and economic opportunities, particularly in rural areas. Furthermore, only 4% of ethnic minorities have completed college or university education, and none have

pursued higher education, further exacerbating their marginalization in the labor market. This lack of human capital development directly contributes to their reduced earning potential and limited mobility. Moreover, the statistic numbers also show that the individuals in poverty and belong to ethnic minority group likely live in larger household size (namely 5 members/household) compare with total sample. This reflects the demographic reality that ethnic minority and impoverished families often have more dependents, increasing economic strain.

In conclusion, while the total sample reflects general trends in Vietnam's labor market, the subgroups analyzed highlight stark inequalities that disproportionately affect ethnic minorities, women, and individuals in poverty. These findings provide a critical basis for designing inclusive policies aimed at improving socioeconomic outcomes for the country's most vulnerable populations. The disparities evident in these descriptive statistics underscore the significant structural inequalities faced by vulnerable subgroups in Vietnam. Ethnic minorities and individuals in poverty stand out as the most disadvantaged, with lower educational attainment, reduced income, and limited access to healthcare and employment opportunities. These issues are compounded for women, who face intersecting barriers related to gender, caregiving responsibilities, and economic participation.

3.4.2. Interpretation of health shock's effect on working hours

After conducting the Hausman test to determine the appropriate model for the analysis, the FEM was selected as the most suitable approach. This decision ensures the control of unobserved individual heterogeneity, which is particularly important given the potential correlation between individual-specific traits and the explanatory variables. The use of FEM thus enhances the reliability of the estimated coefficients by addressing issues of endogeneity.

Table 9 presents the results of the FEM estimation, analyzing the effect of health condition on working hours across the total sample of Vietnamese individuals. The results indicate that health condition exert a statistically significant negative impact on working hours. Specifically, the coefficient associated with health condition is significant at the 1% level, underscoring the robustness of the finding. This suggests that health condition are a critical determinant of labor supply among individuals, reducing their ability or capacity to maintain previous levels of work.

The findings reveal that individuals experiencing health condition, categorized as "sick," work fewer hours compared to their healthier counterparts. On average, sick individuals work 0.34 fewer hours per day than healthy individuals. This reduction reflects the direct consequences of poor health on labor productivity and participation. It also highlights the broader socioeconomic implications of health issues, as diminished working hours can lead to reduced income and potentially exacerbate financial vulnerabilities among affected individuals.

The observed relationship underscores the importance of health as a determinant of economic well-being and labor market outcomes. These results suggest that policymakers should consider interventions aimed at mitigating the effects of health condition, such as improved healthcare access or social safety nets, to support affected individuals in maintaining their labor market engagement and overall livelihood.

Table 9: FEM results of effect of health shock on working hours (in total sample)

		Coefficient	SE
Sick		-0.372***	(0.0420)
Poverty		-0.104	(0.0508)
Ethnic minority		0.298**	(0.1240)
Female		-0.280***	(0.0591)
Total household members		-0.021	(0.0130)
Voluntary health insurance		-0.017	(0.0288)
Urban		0.046	(0.5280)
Marital status		0.122**	(0.0605)
Age		0.118***	(0.0116)
Age square		-0.001***	(0.0001)
Education	Elementary	0.250***	(0.0555)
	Secondary	0.376***	(0.0642)
	High school	0.640***	(0.0782)
	College_University	0.586***	(0.1030)
	Higher education	0.699	(0.3130)
Constant		4.464***	(0.2780)
Number of observations		72,807	

****, **, and * indicate significant levels at 1%, 5%, and 10%, respectively*

The analysis presented in **Table 10** explores the interaction effects of health shock and three demographic factors – gender (female), poverty, and ethnicity (ethnic minority), highlighting the differential impacts across various subpopulations. Above all, this table serves to reaffirm the impact, as the interaction term is used as a method of robustness check. Based on the FEM, the results reveal that health shock exacerbate socioeconomic inequalities, namely health shock cause a negative impact on individuals with some specific characteristics. The interaction between health shocks and poverty's results (column 1, **Table 10**) indicate that poverty intensifies the negative impact of health condition on working hours. Compared to the baseline group (healthy and wealthy individuals), whether an individual are living in a wealthy or indigent life, if he or she get sick, his/her working hours are less than the counterparts. To be specific, sick individuals who are not poor work 0.342 fewer hours per day (significance at

1%), and this reduction is even greater for sick individuals who are poor, who work 0.396 fewer hours per day ($p < 0.01$).

The interaction between health condition and ethnic minority status (column 2, **Table 10**) reveals a complex relationship. Healthy ethnic minorities work 0.282 hours per day more than healthy Kinh individuals - ethnic mạjority (with the effect significant at 5% level), likely reflecting the labor-intensive nature of occupations held by many ethnic minorities. However, for individuals experiencing health shock, the pattern shifts. Sick individuals from the majority group work 0.356 fewer hours ($p < 0.01$), while the reduction for sick ethnic minorities is statistically insignificant.

Gender-specific differences in the effect of health condition on working hours are also evident. Females who in good physical condition, work 0.291 hours less than their counterparts – namely healthy males, with the effect significant at the 1% level. Among individuals experiencing health condition, sick males see a substantial reduction of 0.465 hours per day, while sick females experience a slightly smaller but still significant reduction of 0.558 hours per day. Both effects are significant at the 1% level.

Table 10: Effect of health shock interact with demographic factors on working hours

	Interaction with		
	Poverty	**Ethnic minority**	**Female**
	(1)	**(2)**	**(3)**
Sick*Poverty:			
Non-sick x Non-poor (base)			
Non-sick x Poor	-0.105**		
	(0.052)		
Sick x Non-poor	-0.374***		
	(0.045)		
Sick x Poor	-0.466***		
	(0.115)		
Sick*Ethnic Minority:			
Non-sick x Ethnic majority(base)			
Non-sick x Minority		0.296**	
		(0.124)	
Sick x Majority		-0.379***	
		(0.048)	
Sick x Minority		-0.055	
		(0.147)	
Sick*Female:			
Non-sick x Male (base)			
Non-sick x Female			-0.291***
			(0.059)
Sick x Male			-0.465***
			(0.057)
Sick x Female			-0.558***
			(0.082)
Control variables included	Yes	Yes	Yes
Number of observations	72,807	72,807	72,807

Full set of control variables are included in all regressions.
****, **, and * indicate significant levels at 1%, 5%, and 10%, respectively*
Standard errors in parentheses

The statistical results in **Table 11** show the effects of health condition on working hours across different demographic subgroups—female, ethnic minorities, and individuals in poverty—using FEM and interactions with these variables. Overall, the results consistently show that health condition reduce working hours across all subgroups, with the most significant effects observed among ethnic minorities and those in poverty. Gender, while also influential, exhibits slightly smaller interaction effects when compared to poverty or ethnicity and highly significant at the 1% level. Specifically, health condition decrease working hours by 0.244 hours for females, 0.353 hours for ethnic minorities, and 0.337 hours for those in poverty. These results emphasize how vulnerable these groups are to health problems.

Table 11: Effect of health shock across various vulnerable groups

	Subsample		
	Female (1)	**Ethnic minority (2)**	**Poverty (3)**
Sick	-0.244***	-0.353***	-0.337**
	(0.063)	(0.079)	(0.144)
Sick*Poverty:			
Non-sick x Non-poor (base)			
Non-sick x Poor	-0.034	-0.103*	
	(0.080)	(0.062)	
Sick x Non-poor	-0.254***	-0.348***	
	(0.068)	(0.096)	
Sick x Poor	-0.216	-0.465***	
	(0.167)	(0.140)	
Sick*Ethnic Minority:			
Non-sick x Ethnic majority (base)			
Non-sick x Minority	0.368*		0.396
	(0.191)		(0.334)
Sick x Majority	-0.244***		-0.304
	(0.073)		(0.275)
Sick x Minority	0.124		0.046
	(0.224)		(0.372)
Sick*Female:			
Non-sick x Male (base)			
Non-sick x Female		-0.187*	-0.414**
		(0.107)	(0.210)
Sick x Male		-0.386***	-0.578***
		(0.110)	(0.200)
Sick x Female		-0.505***	-0.495*
		(0.150)	(0.285)
Controlled variables	Yes	Yes	Yes
Geographic variable included	Yes	No[1]	No[1]
Observation	31,659	16,863	5,150

Note: Control variables are included in all regressions. Geographic variable is urban
****, **, and * indicate significant levels at 1%, 5%, and 10%, respectively*
Standard errors in parentheses

Interactions between health shock and other three demographic factors further reveal nuanced impacts. Firstly, examining the female subgroup (Column 1, **Table 11**), the analysis reveals that illness significantly reduces working hours compares the healthy counterparts. Specifically, a non-poor sick woman works 0.254 hours less, while a Kinh sick woman works 0.244 hour less. Next, within ethnic minority group (Column 2, **Table 11**), the coefficients of interaction terms indicate that the more vulnerable characteristics individuals have, the more

[1] "Urban" is not included in ethnic minority subgroup analysis due to its minimal variability. As. The result, it has been excluded from the model.

their working hours are affected. To be specific, if a poor ethnic individual gets sick, he/she will work less than a healthy non-poor ethnic individual 0.465 hour. Furthermore, the effect of illness is more pronounced for ethnic minority women than for men, with sick women working 0.505 hours less, compared to a reduction of 0.386 hours for sick men. Lastly, looking at poverty group **(**Column 3, **Table 11**), while health shock negatively affects working hours of individual, the impact does not statistically vary across two factors, like the other two subgroups. However, a notable exception is observed among sick poor men, whose working hours decrease by 0.578 hours compared to their healthy poor male counterparts.

Overall, these results emphasize the amplified vulnerability of marginalized groups to health shocks, with ethnicity and poverty having the most substantial interaction effects, while gender differences are smaller but consistently significant.

3.5. Discussion

This chapter uses panel data in 2016 and 2018 of VHLSS to explore the impact of health condition on labor supply in Vietnam, with a particular focus on vulnerable groups. The findings of this study provide critical insights into the negative impacts of health condition on labor supply in Vietnam. Consistent with prior research, the results confirm that health condition significantly reduce working hours, with implications for individual working ability, income stability, and broader socioeconomic outcomes.

Firstly, from the general analysis, it is stressing that health shock occurs will significantly reduce working hours. Specially, individuals who experience health shock work, on average, more than 0.3 hours per day less than their healthier counterparts. This result aligns with prior research on the labor market impacts of health condition, such as Goryakin and Suhrcke (2016), which similarly found a negative relationship between poor health and labor supply. Moreover, Asfaw et al. (2017) also showed that sickness reduced number of workdays lost and economic participation. The reduction in hours demonstrates how health condition directly affect individual working ability and labor participation, with broader socioeconomic implications including income loss and exacerbation of financial vulnerabilities. In fact, as evidenced by studies in Sub-Saharan Afica and Ghana, health condition are linked to increased poverty (Atake, 2018), food insecurity, child labor (Militao et al., 2022), and financial vulnerability (Novignon et al., 2012).

Noticeably, the research even though the health condition negatively affects the employee's work hours, its' magnitude varies across vulnerable groups. This finding once again, align with and support for findings from Mitra et al. (2015) which highlighted that health condition significantly disrupt household labor supply, income stability, and overall economic resilience. Consistent with the author findings, the FEM results presented in **Table 9** confirm a statistically

significant and negative relationship between health condition and working hours in Vietnam. The reduction of 0.37 hours per day for sick individuals compared to their healthy counterparts mirrors Mitra's observation that poor health leads to a substantial drop in workers' perfermance and participation in labor markets. Both studies underscore how health issues can escalate financial vulnerabilities, particularly for households already on the socioeconomic margins. Additionally, this study's focus on subgroup analyses—examining the interactions of health condition with gender, ethnicity, and poverty—offers a complementary dimension to Mitra's research. Mitra's research suggested that coping mechanisms for health condition are unevenly distributed, with poorer households and marginalized groups bearing the brunt of adverse outcomes. Similarly, the subgroup analysis here reveals some deeper impacts such as sick poor men experience the largest decrease in working hours (0.578 hours per day), while ethnic minority women also face compounded disadvantages. These results demonstrate how health condition worsen existing inequality in Vietnam labor market, which is align with Mitra's focus on how different vulnerabilities overlap. These findings also emphasize the important role of health as a critical determinant of economic well-being.

Among three vulnerable groups, the impact of health condition on working performance of the ethnic minority group is the most evident one. Almost all of the coefficients' interaction term are significant and negatively be impacted by health condition (**Table 11**). Within the ethnic minority group, health shocks are observed to have a greater impact on those with overlapping vulnerabilities. This aligns with findings from Baulch et al. (2010), who reported that ethnic minorities in Vietnam often face limited access to healthcare and social protection, making them more susceptible to the negative economic impacts of poor health.

In summary, the study provides robust evidence that health condition are not only a personal health crisis but also a critical socioeconomic issue. They emphasize that interventions aimed at improving healthcare access and financial resilience are essential to safeguarding both individual livelihoods and broader economic stability in Vietnam. Howerver, the interpretation of this study must be interpreted with caution, as outlined by the following reasons. Firstly, it is data limitation. Health shock in this case is not cover self-report or self-evaluation in health of an individual. Secondly, due to external validity, findings from this study may not be fully generalizable to other developing countries or regions because of differences in healthcare system, economic structures, and cultural contexts.

In conclusion, this study addresses a critical gap in the literature on the effects of health condition on labor market outcomes, particularly in Vietnam. By examining the impact of health condition on working hours using panel data from the VHLSS and employing advanced econometric techniques, namely Fixed Effects Models, this research provides important insights into the ways in which health condition affect labor supply in a developing country

context. Furthermore, by focusing on vulnerable groups such as ethnic minorities, women, and the poor, this study contribute to a better understanding of how socio-economic factors intersect with health events to shape labor market outcomes, ultimately informing policies that can help protect vulnerable populations in Vietnam.

3.6. Conclusions

By employing both Fixed and Random Effects Models, the study stress on the impact of health condition on working hours among vulnerable groups in Vietnam using VHLSS panel data from 2016 and 2018 and how health condition affect labor supply in vulnerable populations. The findings underscore the intersectionality of health condition with demographic vulnerabilities, demonstrating that the impact of illness on labor supply is not uniform but varies by poverty status, ethnicity, and gender. Ethnic minorities and impoverished individuals, in particular, bear a compounded burden, highlighting the need for targeted interventions to address these disparities. Policymakers should prioritize accessible healthcare and social safety nets tailored to the unique challenges faced by these vulnerable subgroups. Expanding access to healthcare, particularly for ethnic minorities and individuals in poverty, could help reduce the economic burden of illness. Social safety nets and income protection programs for those unable to work due to health issues are essential to support labor market engagement and financial stability. Gender-sensitive policies that address the caregiving burden on women and promote equitable access to healthcare are also necessary. In conclusion, the study reveals critical insights into how health condition exacerbate existing inequalities in labor participation, emphasizing the need for equity-driven approaches to healthcare and labor policies.

Chapter 4

THE IMPACT OF FREE GOVERNMENT HEALTHCARE INSURANCE ON THE UTILIZATION OF HEALTHCARE SERVICES IN VIETNAM

This chapter investigates the impact of Free Government Healthcare Insurance on the utilization of healthcare services in Vietnam. The opening section establishes the "Rationale for this study", emphasizing the need to assess how government policies influence healthcare access, particularly among vulnerable populations. The second section reviews "Transformations in Vietnam's health insurance scheme" following the enactment of the Revised Health Insurance Law in 2014, which expanded coverage and aimed to improve equity in healthcare access. Next, the section details the "Methodology," applying Propensity Score Matching (PSM) to isolate the causal impact of Free Government Healthcare Insurance on service utilization. The "Results" section highlights the significant effect of the Free Government Healthcare Insurance. These findings are critically analyzed in the "Discussion," where broader implications and limitations are explored. Finally, the "Conclusion" synthesizes key insights, offering recommendations for future healthcare policy improvements in Vietnam.

4.1. Rational of study

Poor health and the inability to access healthcare are key factors leading to and resulting from poverty. And in Vietnam, secondary and tertiary treatment are often out-of-reach for the poor because of their expensiveness, as well as in other developing countries. Indeed, out-of-pocket payments for healthcare in Vietnam accounted for about 41% of total health expenditure in 2016 (Le et al., 2010). This places Vietnam within the range recommended by the World Health Organization for countries from the Asia Pacific Region, where out-of-pocket payments should not exceed 30 percent–40 percent of total health expenditure (Thành et al., 2021). Compared to other developing countries, the high proportion of out-of-pocket payments in Vietnam indicates a significant financial burden for its population. While Vietnam has made progress in health insurance coverage, out-of-pocket payments remain a substantial component of healthcare financing, posing challenges in ensuring financial risk protection and equitable access to healthcare services (Giang et al., 2023). Therefore, Vietnam government has sought to accelerate progress towards Universal Health Coverage (UHC) by introducing and expanding non-profit health insurance schemes to increase healthcare coverage and financial protection through in-cash or in-kind support (i.e., free health care services for vulnerable targeted groups). There has been a substantial transformation in the health insurance system in Vietnam since 1998. Vietnam has made significant progress towards achieving UHC through the enactment of the Law of Social Health Insurance and the provision of free or low-cost

community-based services. In addition, the most up-to-date transformation is the Revised Health Insurance Law of 2014, which takes effect on January 1, 2015. And the most noticeable change in this novel amendment is the free health service subsidized by the government. In other words, eligible people can receive a 100 percent subsidy from the government as long as they have a health checkup at any public service. In conjunction with the change in the social health insurance system, it has attracted plenty of researchers' attention to various schemes such as voluntary health insurance (Cuong, 2011; Jowett et al., 2003), the Health Care Fund for the Poor (Guindon, 2014; Lê et al., 2019), health care insurance for children under 6 (Palmer et al., 2015; B. Nguyen & Lo Sasso, 2017), and health insurance reform in 2005 for nonpoor children under 6 (M. T. Nguyen, 2020).

Even though the government has targeted the low-income population with Free Health Care Cards for the Poor and has implemented health insurance reforms, out-of-pocket payments for health care in Vietnam still account for a high proportion of health expenditure, posing a substantial burden to households, particularly the poor (K. T. Nguyen et al., 2012). Therefore, the efficiency of Vietnam government's free health care scheme remains a topic of debate, and accessibility issues persist, indicating limitations in the current system. Nonetheless, it lacks empirical investigation about free government healthcare support's influence in Vietnam. To my knowledge, the only research focusing on the effect of Free Government Health Services in public facilities in Vietnam was conducted by Nguyen, H., & Wang, W. (2012). This study, centered on children under the age of six, utilizes data from the Vietnam Household Living Standard Survey (VHLSS) conducted in 2004 and 2006. Employing a difference-in-difference analytical framework, the study revealed a substantial enhancement in both inpatient and outpatient care. However, it is important to note that this research was conducted before the implementation of the revised health insurance policy in 2014. On the other hand, the most recent research focusing on the effects of the revised health insurance policy in 2014 was conducted by Thuong (2020). This investigation sought to assess the impact of the Revised Health Insurance Law of 2014 on the utilization of outpatient and inpatient care services, utilizing the propensity score matching method. To gauge the effect of the revised law, the author considered Voluntary Health Insurance and Heavily Subsidized Health Insurance, observing a positive influence on the number of outpatient visits and inpatient admissions for the enrolled. However, considering the law's active implementation since 2015, the study conducted in 2016 using the VHLSS may not fully capture the true impact of the revised law. Therefore, my current paper is dedicated to a meticulous examination of the post-revised 2014 health insurance landscape, specifically focusing on the impact of the Free Government Healthcare Insurance (FGHI). Utilizing data from the Vietnam Household Living Standard

Survey (VHLSS) in 2018, this study aims to provide a comprehensive understanding of the FGHI scheme's influence subsequent to the revision of the health insurance law in 2014. Specifically, the author focuses on the number of health checkup times and tests the theoretical prediction that free government healthcare insurance schemes assist in increasing the number of health checkup visits in households. Moreover, it has been noted that there is inequality in the pattern of visiting health facilities between rural and urban areas and ethnicity. Therefore, these factors causing this gap are explored in the study as well. In summary, the following questions are asked: whether households' utilization of the health care services offered by the scheme leads to any changes in household's total number of health outpatient and inpatient checkups; and whether the scheme affects different population groups and regions covered. Hence, this study contributes to recent works in developing countries by emphasizing the necessity of welfare systems that provide Free Government Healthcare Insurance both theoretically and practically.

To ensure comprehensiveness and facilitate cross-study comparisons, the rest of this chapter was organized as follows. Section 2 summarized about the health insurance scheme. Methodology was provided in detail in Section 3. Section 4 revealed results about the impact of the FGHI scheme and continued with our discussion in Section 5. Finally, a brief conclusion was condensed in Section 6.

4.2. Transformations in Health Insurance scheme after the Revised Health Insurance Law in 2014

In June 2014, the Health Insurance Law was amended through Law No.46/2014/QH13 to reclassify the eligibility categories, eliminate the voluntary scheme, schedule premium increases, and to change the mechanism of collection of revenue and revise the benefit package. The Social Health Insurance categories were reclassified based on source of premium payment and included a new category for household enrolment.

According to the Revised Health Insurance Law, from 2014, the co-payment rate for inpatient treatment without the referral was reduced by 10% in provincial and central hospitals (40% and 60% respectively, compared with 50% and 70% before). At the district hospital, the co-payment rate was reduced from 30% to 0%. And from 2021, inpatient services will be covered fully by Health insurance at district and provincial hospitals. The purpose of these policies is to encourage people to use health services at district and provincial levels and to reduce overcrowding in central hospitals.

In general, there are five target groups in the new law:

- The people belong to first group need to pay 4.5 percent of payroll tax and 20 percent co-payment rate. Contribution will be paid by employees and employers.
- The second group whose contributions are 100 percent paid by the government, and the co-payment rate reduced from 5 percent (2012 Law) to 0.
- The third, fourth and fifth group's contribution are paid by partly by the government, by the social insurance fund and based on unit subscription of the family respectively. And the co-payment rate of these groups is 20 percent.

The ones who are eligible for second group, will receive Free Government Health Insurance. According to Decree 146/2018/ND-CP, there are 17 target groups that can receive this FGHI, e.g., members of poor households; ethnic minority people living in areas; commune, ward or township cadres who have stopped working and are receiving monthly allowances from the state budget; etc. Later, in 2015, with the aim of eliminating the disparities in health service prices across provinces set by the authority of Provincial People's Committees from previous years, the Ministry of Health revised and released the list of reimbursement prices for health services under Social Health Insurance payment.

4.3. Methodology

4.3.1. Data

In this investigation, the VHLSS 2018 dataset, encompassing 70,593 households, was utilized. Given the biennial nature of the survey and the implementation of the Revised Health Insurance Law in 2014, which took effect the subsequent year, the decision was made to analyze the 2018 VHLSS data in this study. Specifically, the focus was directed solely towards households providing information regarding their enrollment status in the FGHI support scheme during 2018. Additionally, the study incorporated data pertaining to household heads' demographics, household income, and pertinent health-related information of household members. Consequently, the total number of observations considered for analysis in this research was reduced to 33,125 households, facilitating a more focused and refined examination of the FGHI scheme's impact on healthcare utilization.

The evaluation of disparities in healthcare service utilization outcomes may be influenced by biases arising from concurrent enrollment of households in different health insurance schemes. Consequently, this chapter seeks to mitigate these biases by examining two distinct scenarios:

- The initial scenario involves a comprehensive comparison between the treatment group (FGHI scheme participants) and the control group within the entire sample.
- To explore potential biases introduced by participation in other HI programs alongside the FGHI scheme, the second scenario is examined. In this case, we

evaluate between treatment and control group that having at least one member enrolled in an alternative HI program.

To be specific, the treated group and control group are explained as follows:

4.3.2. Treatment groups

The treatment cohort comprises households whose members were beneficiaries of the complimentary healthcare service scheme throughout the calendar year of 2018. As delineated earlier, the treatment group, which encompasses 393 households in the overall sample, is subsequently reduced to 371 households in the second scenario.

4.3.3. Control groups

As the scenario detailed above, the allocation of control group is categorized as follows:

- The first control group encompasses the full sample, consisting of households with members eligible for any type of HI coverage and those devoid of any HI coverage. The total observations are 32,732 households.
- The second control group, denominated as the insured household subsample, consists exclusively of households wherein at least one member is enrolled in a HI scheme other than the FGHI. Consequently, this group encompasses a total of 27,308 households.

This stratification allows for a comprehensive evaluation of the effect of the FGHI scheme on healthcare service utilization while considering variations attributable to diverse HI enrollment statuses within households.

4.3.4. Outcome variable

The parameter of interest in this study was defined as "access to healthcare," operationalized as a proxy for healthcare service utilization. Access to healthcare denotes the timely acquisition of healthcare services within the healthcare system where necessary treatments can be obtained. Axelson et al. (2009) and Wagstaff (2007, 2010) have previously employed the frequency of outpatient visits and inpatient admissions over a twelve-month period as metrics to gauge healthcare utilization. Hence, in evaluating the impact of health insurance service support, the health checkup has been employed as the primary outcome variable in this analysis. This variable is from the following questions: (1) “Times and expenses of [NAME]'s outpatient treatment in the last 12 months?” and (2) “Times and expenses of [NAME]'s inpatient treatment in the last 12 months?”. The two questions enabled us to create the variable “a number of health checkups", which is the average of all household members’ number of outpatient and inpatient visits. Following the implementation of the revised health insurance policy in 2014, there has been a transition from a health insurance scheme based on individual insurance to one that focuses more on family-centric approach, by including new categories for household enrolment

(Law on Health Insurance 46). This shift in emphasis is attributed to a modification in the target demographic for insurance coverage. Therefore, within the scope of this study, the primary objective is to examine the impact of the FGHI scheme on the utilization of healthcare services, with a specific focus on household utilization.

Additionally, to evaluate whether the impacts of the HI scheme are heterogeneous across the targeted classifications, namely ethnicity (minority–majority) and places of residence (urban–rural), the study will assess the intensity of visiting health facilities in this range of subpopulations.

4.3.5. Explanatory variables

To enhance the precision of the exposure impact, it is suggested that factors relevant exclusively to the result should always be included in a propensity score model. The variables taken into consideration have been categorized in accordance with Andersen's utilization of healthcare model, which highlights those three main elements—needs, predisposing factors, and enabling factors—that determine service utilization. These control variables have been employed as determinants impacting healthcare access in a rising number of public studies. These variables include enabling factors reflecting a household's characteristics such as "household's economic status" (yearly household income and poor status), "household size," and "ethnicity," as well as predisposing elements like "characteristics of the household head" (namely age, gender, and highest educational attainment) and residential location.

4.3.6. Analytical approach

Rosenbaum and Rubin (1983) introduced the propensity score matching (PSM) method, which will help create a counterfactual group based on the probability of assignment to a particular treatment given a vector of observed covariates. As a result, this method will optimally achieve randomization to assess the impact of a treatment. Growing interest has been shown in utilizing PSM to calculate the impact of interventions on outcomes using observational data; for instance, Cannonier et al. (2018); Yu et al. (2018); Thuong (2020) and Njagi et al. (2020). Moreover, propensity score matching is a statistical matching technique that can be applied when observations are limited. It is used to estimate the effect of a treatment, policy, or intervention by accounting for the covariates that predict receiving the treatment, thereby reducing bias due to confounding variables. PSM can be particularly useful in observational studies with limited observations, as it allows for the formation of matched sets of treated and untreated subjects who share a similar propensity score, thus enabling more robust inferences on treatment effects (Austin, 2011, Pirracchio et al., 2012, Bottigliengo et al., 2021). Therefore, the application of propensity score matching is well-suited for situations where the availability of observations is constrained, as it helps mitigate the impact of limited

data on the estimation of treatment effects. Accordingly, this study employed this methodology as well.

Presently, there is various code in Stata to run PSM methods such as -teffects- (StataCorp. 2013b); -pscore- (st0026); -psmatch2-; and -pstest- (within the -psmatch2- package. Previously, -psmatch2- , which was written by Edwin Leuven and Barbara Sianesi, was commonly applied. And in this study, we applied the "teffect" command. Because its advantage is that this command accounts for the fact that propensity scores are approximated rather than known when computing standard errors.

$$numofcheckup_i = \alpha + \beta_{1i} FGHIscheme + \beta_{Xi} X_i$$

In which:

- Numofcheckup: average number of outpatient and inpatient health checkup times of all members in the i^{th} household
- X_i: control variables
- β_{1i}: coefficient shows effect of the Free Government Health Insurance scheme on the outcome

4.4. Results

4.4.1. Descriptive statistics of the study sample

Table 12 showed some elementary characteristics of the three distinct research cohorts. Within the entire cohort, it was observed that 45.55 percent of households (HH) benefiting from the FGHI support, constituting the treatment group, belonged to ethnic minority groups. Of this subset, 33.84 percent exhibited economic vulnerability, with an approximate monthly income of 15,775 thousand VND, and the highest educational attainment of the household heads was limited to primary school. In contrast, the control group demonstrated a higher educational threshold, with household heads having completed at least lower secondary school. Additionally, a notable affluence was evident within the control group, as only 6.21 percent of households were categorized as economically disadvantaged. The mean monthly income for households in the control group was approximately double that of the treatment group, amounting to 29,068 thousand VND. Lastly, 14.76 percent of households in the treatment group were situated in urban areas, while the corresponding figure for the control group residing in the municipality was 31.53 percent. Similarly, the analysis in the insured households subsample indicated households in the treated group experienced relatively disadvantageous conditions: 39.3 percent of households were poor, only 12.8 percent of households lived in the city, and the average monthly household income was approximately 13 million VND for four members. It presented prima facie evidence, if not conclusive, that the treatment group was

considerably in a fragile position compared to the control group: low total income, low education, and living in poor and rural areas.

Table 12 summarized the number of times all household members had access to healthcare services during 2018 across different subsamples of interest. Searching through the full sample, the results revealed that the average number of healthcare visits per year for the treated group was 5.5, whereas the number for the control group was 4.5. It was notified that the maximum visit times of the control group were 347, triple compared to the highest visit times of households in the treated group. Similarly, the statistics from the insured subsample were not as diverse as those from the full sample.

Table 12: Households' characteristics across subpopulations

		Full sample		**The insured HH subsample**	
	Unit	**HH receive FGHI (Treatment group)**	**HH do not receive FGHI (Control group)**	**HH receive FGHI (Treatment group)**	**HH do not receive FGHI (Control group)**
Poor	%	33.84	6.21	34.23	7.36
Urban	%	14.76	31.53	14.29	31.72
Elders in HH	%	38.17	32.47	38.54	34.63
Ethnic group	%	45.55	14.61	46.90	16.34
HH head's gender	%	19.59	25.20	19.41	25.85
HH size	Member	4.02	3.69	4.01	3.67
HH head's education	Educational level	1.32	2.12	1.34	2.23
HH income	1,000 dong	15,774.98	29,068.90	14,845.33	29,710.19
HH head's age	Year old	50.25	52.74	50.53	53.68
Total observation	Household	393	32,732	371	27,308

Following a comprehensive review of the applied dataset, the analytical course proceeds by employing two distinct methodologies. Firstly, Tobit regression was engaged to elucidate the correlation between the FGHI scheme and healthcare service utilization. Subsequently, the outcomes of propensity score matching were presented. Although propensity score matching

served as the primary analytical method, Tobit regression was strategically incorporated to assess and compare the effects of the relationship across various methodologies, ensuring consistency in results.

4.4.2. Effect of the FGHI scheme

Firstly, we estimated a Tobit regression to analyze the relationship between the scheme and the number of checkup times. The model was statistically significant at a 1 per cent level. The Tobit estimated, given in **Table 13**, provided suggestive evidence indicating that the FGHI scheme and the frequency of health checkups were correlated. More specifically, households that had members enrolled in the scheme had a greater number of visits to any kind of hospital or clinic than the households that did not enroll, namely 2 number of inpatient and outpatient visits per year. Moreover, living area and ethnicity affected the interested outcome of the study, as well.

Table 13: Tobit estimation for the FGHI scheme of the full sample

	Tobit
FGHI scheme	2.121***
Minority group	-2.211***
Interaction term: in-kind and ethnicity	-1.930**
Poor	0.966***
Education: (illiteracy as base group)	
Primary school	-0.767***
Lower secondary school	-1.845***
Upper secondary school	-1.553***
Vocational college	-1.013**
University	-0.613**
Master	-0.234
PhD	-1.127
Urban	0.871***
Total income of household	-5.06e-06***
HH head's gender	-0.139
HH head's age	0.063***
Elders in family	1.227***
HH's size	1.093***
Constant	-3.613***
Number of Observation	33,125
Prob > chi2	0.000

*Note: ***p<0.01, **p<0.05, *p<0.1*

Subsequently, employing Propensity Score Matching estimation facilitated the discernment of the causal effects of the government-provided free healthcare service on the frequency of

healthcare checkups across diverse sample groups. Prior to delving into the exploration of results, an evaluation of the PSM and Nearest Neighbor Matching (NNM) outcomes was conducted using standardized differences and variance ratios to assess the quality of matching. An ideally balanced covariate is characterized by a variance ratio of 1 and a standardized difference of 0. Our findings aligned with the notion that covariates were likely balanced within our model, as evidenced by standardized differences nearing 0 post-matching and variance ratios approaching 1. Additionally, the outcomes of Nearest Neighbor Matching appeared to exhibit a higher degree of adequacy compared to those obtained through Propensity Score Matching (refer to Appendix). Hence, in the upcoming sections, we will discuss the results of Nearest Neighbor Matching method.

Table 14 provides a comprehensive summary of the Average Treatment Effects on the Treated (ATTs) and Average Treatment Effects (ATEs) associated with the government-sponsored free healthcare scheme concerning the aggregate count of health checkup occurrences. The analysis revealed a statistically significant positive influence of the policy on the frequency of outpatient and inpatient healthcare service utilization across all subpopulations examined. Specifically, the estimations indicated that the policy led to an increase in health service utilization, with the enrolled group exhibiting an augmented number of visits ranging between 1.38 and 1.41. Similarly, the insured household subsample displayed slightly lower estimated impacts, ranging from 1.07 to 1.40 in terms of visit frequencies, respectively.

Table 14: Estimated average treatment effects by Nearest Neighbor Matching on the treated and on population of FGHI scheme on healthcare utilization across different samples in Vietnam

	ATT		ATE	
	Coef.	95% CI	Coef.	95% CI
Full sample	1.410*** (0.488)	0.454 to 2.366	1.377** (0.557)	0.287 to 2.468
The insured HH subsample	1.398*** (0.507)	0.404 to 2.393	1.065* (0.620)	-0.151 to 2.281

*Note: SEs in parentheses. ***p<0.01, **p<0.05, *p<0.1*

Moreover, **Table 15** provided an in-depth analysis elucidating the impact of the healthcare support scheme on household healthcare utilization concerning ethnic backgrounds and residential areas within the full sample. The findings revealed a discernible increase in both outpatient and inpatient service utilization due to the implementation of the support scheme. Furthermore, the magnitude of this impact exhibited variability among ethnic minority and

majority groups as well as across distinct residential areas. For instance, among enrolled households belonging to ethnic minority communities, the FGHI scheme contributed to an increase of 0.92 (ATT) in the number of healthcare visits compared to non-enrolled households. In contrast, this impact was more pronounced among majority group households, with estimated increases ranging from 1.74 (ATE) to 1.8 (ATT) visits. Similarly, the scheme demonstrated a positive effect on healthcare utilization among households residing in rural regions, resulting in an augmented frequency of service utilization by 1.19 (ATT) to 1.52 (ATE) visits. However, no perceptible evidence was found regarding the scheme's impact on healthcare utilization in urban areas.

Table 15: Estimated average treatment effects on the treated and on population of FGHI scheme on healthcare utilization across various sample

	ATT		ATE	
	Coef.	**95% CI**	**Coef.**	**95% CI**
Minority group	0.924*** (0.424)	0.093 to 1.755	0.485 (0.427)	0.477 to 2.992
Majority group	1.800*** (0.823)	0.188 to 3.413	1.735*** (0.642)	0.477 to 2.992
Urban	2.886 (2.065)	-1.161 to 6.932	0.709 (1.193)	-1.629 to 3.048
Rural	1.192*** (0.446)	0.318 to 2.067	1.516*** (0.584)	0.373 to 2.660

*SEs in parentheses. ***p<0.01, **p<0.05, *p<0.1*

4.5. Discussion

The primary aim of this chapter was to assess the impact of the FGHI scheme on healthcare service utilization within households. The study significantly contributes to the existing body of literature, particularly in the context of Vietnam, by providing evidence of the impact of the government's free healthcare service. Notably, the investigation revealed a positive correlation between the implementation of the scheme and healthcare utilization among Vietnamese households in the year 2018. Nonetheless, notable variations in the strength of this correlation were observed, across distinct subsamples and the variables considered. Regarding the impact on ethnic characteristics, disparities emerged between minority and majority populations, suggesting a differential effect of the program. Specifically, the scheme appeared to exercise a more substantial influence on healthcare utilization within majority group households compared to those belonging to minority groups. Moreover, the free healthcare services exhibited notable effectiveness in rural areas. Yet, there was no sufficient evidence about the effect in urban areas, as the result was statistically insignificant.

The results notably revealed that the free healthcare service scheme exhibited a positive association with the boosted utilization of both outpatient and inpatient services across households. This finding aligns with similar conclusions drawn from previous studies. For instance, Nguyen H. and Wang W.'s research in 2012, highlighted an escalation in service utilization among preschool-aged individuals. Additionally, an assessment conducted by Thuong (2020) on the impact of the 2014 healthcare reform found that enrollment in Voluntary Health Insurance led to an increase in healthcare service utilization by 0.55 times annually, while Heavily Subsidized Health Insurance enrollment correlated with a rise of 0.22 contacts. However, Gwatkin (2004) pointed out that the vulnerable people were "probably not" receiving the benefits as expected from the free government services, as "the benefits of subsidized government health services will flow primarily to the better-off, rather than to the poor". One explanation for the positive impact on vulnerable households' service utilization under the scheme, as displayed in the study of Khe et al. (2002), might be that low-earning families were deterred from health checkups because the health-related expenditure was a substantial burden. Alternatively, the improvement among this disadvantaged population might be influenced by moral hazard behavior, as highlighted by Nguyễn V.P. (2013) and T. M. H. Nguyen (2014). Notably, **Table 12** underscored that enrolled households tended to exhibit lower incomes and lived under comparatively disadvantaged conditions compared to their unenrolled counterparts.

Regarding the effect of the FGHI scheme on ethnic minority households compared to the ethnic majority, the observed impact might have been relatively less pronounced among ethnic minorities. This observation could be rationalized through two potential explanations. Firstly, it pertains to health-seeking behavior, as highlighted by Van Toan et al. (2002) and Khe et al. (2002), indicating that individuals with minor ailments in ethnic minority groups tend to resort to self-treatment through customary practices or seek assistance from private healthcare providers. Moreover, despite the provision of free services for the insured, a requirement for at least one accompanying person during hospitalization may result in additional out-of-pocket expenses for ethnic minorities. Additionally, residency status, whether as resident or non-resident patients, could potentially elevate the likelihood of financial hardship, as emphasized by Pekerti et al. (2017).

Furthermore, it was observed that the impact of the FGHI significantly enhanced healthcare utilization within rural households, yet it had no statistical significance within urban households. This aligns with the findings of Giang et al. (2023), who similarly reported overall benefits accruing to the insured. Likewise, Wagstaff (2007) demonstrated a 16 per cent and 30 per cent augmentation in the likelihood of utilizing outpatient and inpatient services, respectively, among economically disadvantaged individuals in Vietnam. Besides, M. P. Nguyen et al. (2023) illustrated that urban households exhibited a greater propensity to avail

themselves of private health services compared to their rural counterparts. There is, hence, an insufficiency of evidence to establish the scheme's impact on urban households.

Overall, this section significantly contributes to the literature by exploring the impact of Vietnam's FGHI scheme on healthcare service utilization among households. The findings underscored a positive association between the scheme and healthcare utilization in Vietnamese households during 2018. However, variations were observed across subgroups and variables, particularly evident in the distinct impact on majority and minority ethnic groups. While the scheme notably benefited households in rural areas, its effect in urban settings lacked sufficient evidence. Therefore, policy implication may emphasize the effectiveness of initiatives offering free government healthcare services in promoting healthcare utilization. Yet, the lack of evident impact in urban areas warrants further investigation and suggests the need for targeted interventions in these settings. Moving forward, policymakers should consider the nuanced implications uncovered in this study to design more inclusive and effective healthcare policies that address the specific needs of diverse demographic and geographic groups, thereby fostering equitable access to healthcare services for all.

This section presented several potential limitations that warrant consideration when interpreting the obtained results. Firstly, due to constraints within the available secondary data, our modeling was restricted to demand-sided factors, lacking the incorporation of supply-sided elements. However, in an effort to minimize potential biases, the model meticulously controlled for numerous factors that have been documented in the existing literature. Additionally, it is noteworthy that panel data could potentially offer a more comprehensive and informative approach for evaluating this type of impact. Furthermore, a limitation lies in the substantial discrepancy in the number of observations between the treatment and control groups, with fewer treated observations compared to the control group. However, as highlighted by Pirracchio et al. (2012), even in instances of restricted study samples or low treatment prevalence, Propensity Score Matching might generate reliable estimates of treatment effects without significantly affecting the Type I error rate. Therefore, future research endeavors could address these limitations by employing panel data and addressing the observational discrepancies to enhance comparative evaluations of the FGHI scheme's impact.

4.6. Conclusion

In conclusion, the findings from this chapter highlight the substantial impact of the Free Government Health Insurance scheme on healthcare utilization patterns among enrolled households. The robust statistical analyses conducted, including Tobit regression and Nearest Neighbor Matching collectively provide compelling evidence supporting a causal relationship between scheme enrollment and increased healthcare checkup frequency. However, the

observed impact is not uniform across demographics and geographic locations. Ethnic minorities and rural households appear to benefit more from the scheme, experiencing a notable rise in healthcare visits compared to the majority group and urban residents. This underscores the necessity for tailored policy strategies to address demographic disparities and geographic variations, ensuring equitable access to healthcare services.

Chapter 5
EXPLORING THE LINK BETWEEN HOUSEHOLD NEW BASIC AMENITIES AND HEALTH IN VIETNAM

While access to healthcare services is a critical determinant of health, it is not the sole factor shaping health outcomes. Living conditions, as reflected in access to basic household amenities such as clean water, sanitation, electricity, and cooking facilities, also play a significant role. These amenities are vital for reducing exposure to environmental health risks and enabling healthier lifestyles, especially among vulnerable populations.

Chapter 5 expands the scope of analysis by investigating how improvements in household amenities contribute to better health outcomes. This exploration underscores the importance of integrating healthcare access initiatives with broader socioeconomic development efforts. By examining this relationship, the chapter aims to provide a comprehensive understanding of the social determinants of health and their implications for achieving equitable health outcomes in Vietnam.

5.1. Rational of study

Housing and health are two important interconnected indicators for measuring an individual's quality of life, and substandard housing conditions have long been thought to have a close relationship with poor health (Angel and Bittschi 2017), making housing improvement a powerful social policy instrument for health intervention. Indeed, living conditions are elemental social determinants of health (Marmot et al., 2008). They have multiple effects on physical and mental health, through direct or indirect influence (Barskova T. and Oesterreich R., 2009). Inadequate living conditions are seemingly to blame for the infection of chronic diseases, infectious diseases or other illnesses (Saegert S.C. et al, 2003; Myhrvold T. and Småstuen M.C, 2017). Hence, increasing access to high-quality affordable housing, particularly for low-income families, by improving the Government's housing policy, which can in turn improve residents' health, especially for vulnerable groups (Mwoka et al., 2021) and reduce health inequalities (Alidoust S and Huang W, 2021). Nevertheless, most recent research is significantly more abundant in developed countries (e.g. Western Europe and North America) but insufficient in developing nations (Wang et al., 2019), where living environments are generally much poorer (Cairncross et al., 1990). With the rapid rise of urban populations and the challenges of creating infrastructure quickly enough to keep up with this development, investigating the impact of housing quality on health in developing countries has become critical (Fuller et al., 1993). Especially little attention has been given to the relationship between household basic amenities and occupants' health outcomes. Therefore, in this study,

we aim to apprehend how dwelling basic amenities (mainly construction materials, sanitary conditions, cooking fuel, homeownership, and internet accessibility) affect its occupants' health after controlling for a range of potential confounders. Moreover, in this modern life, the internet has become a crucial amenity to connect almost aspects of our society, such as enhancing distance education in developing countries (Ivala, 2000), as well as negative impacts such as causing declines in participants' communication with family members in the household (Kraut et al., 1998) or leading to "a significant negative impact on citizens' social safety perception" (Wang et al., 2022). However, while existing literature identifies internet accessibility's effects and the above household basic amenities as factors that affect health, it does not offer a joint examination of these factors. We called it "household new basic amenities". Hence, this chapter enhances empirical data to the expanding body of knowledge about the relationship between new basic amenities and health in developing countries.

Two specific questions are asked:

① Which household basic new amenities indicators play a crucial role in influencing occupants' health? and

② Does the newly acquired basic amenity, namely internet connectivity, strongly correlate with dwellers' health?

This chapter is delineated across five sections. Section 5.2 expounds on the factors employed for the comprehensive assessment of household new basic amenities in this chapter comprehensively. Section 5.3 enlightens the methodology to be employed, providing intricate details concerning data and variables. The empirical outcomes are subsequently explained in Section 5.4, followed by an in-depth discussion in Section 5.5. Finally, primary assertions are encapsulated in the concluding section.

5.2. Household New Basic Amenities

The variability of fundamental amenities significantly differs based on geographical location, economic status, and urban or rural settings. Household basic amenities encompass the essential facilities, services, and resources imperative for facilitating a comfortable and efficient living environment within a household. This investigation considers typical fundamental facilities, such as:

5.2.1. House material

To address issues linked to the physical structure of dwellings, which symbolize the outdoor living environment, a binary variable is employed to denote the construction materials of respondents' houses. These materials are categorized into two groups: concrete/cement and alternative construction materials like bamboo partitions, calcareous soil, wood, etc.

5.2.2. Soap handwash

"Soap handwash" is an indicator that is constructed to assess the sanitation conditions of households based on whether they use soap for handwashing. As highlighted in previous research, handwashing with soap significantly aids in preventing bacterial contamination (Burton et al., 2011). However, despite the potential health benefits, international studies (Freeman et al., 2014) have revealed infrequent handwashing following contact with excreta. This study considers the use of soap for handwashing as a fundamental daily practice within a dwelling, aiming to reduce occupants' illnesses, consistent with earlier investigations.

5.2.3. Wasted disposal method

Both outdoor and indoor sources of pollutants contribute to indoor pollutant concentrations, which can adversely affect occupants' health, leading to respiratory diseases (Bardana, 2001). To gauge indoor pollution, an index of the indoor pollution source is devised based on households' waste disposal methods, categorized into two groups: households employing collection methods and households utilizing alternative methods like burning or burying waste.

5.2.4. Internet access

In the contemporary digital era, internet accessibility plays a pivotal role in various aspects of daily life, becoming increasingly vital for communication, information dissemination, and other tasks. Over the past two decades, the internet has become an integral part of societal life, serving as a crucial tool for social interaction and communication (Tsitsika et al., 2009). Internet access has become affordable, leading to a rapid surge in users, especially in developing countries. Vietnam's internet penetration rate reached 73.2 percent of the total population at the beginning of 2022 (Digital Report 2022: Vietnam). Besides, according to the Ministry of Information and Communications Vietnam exhibits a higher level of information and communication infrastructure penetration compared to developed countries, while maintaining lower cost structures. Vietnam's 4G coverage is 99.8%. slightly exceeding the 99.4% coverage observed in high income nations (**Figure 11**). However, while internet access expands opportunities for mental healthcare and peer support, excessive and addictive use of social media can negatively impact mental health (Kohli et al., 2024). Therefore, accessing the internet is a factor of interest among the three fundamental amenities in this recent research. Examining how internet access influences health and well-being is necessary when studying the impact of basic utilities on health in Vietnam.

In summary, this chapter aims to capture the effects of household new basic amenities, including hygiene, house structure, and internet usage, on health outcomes.

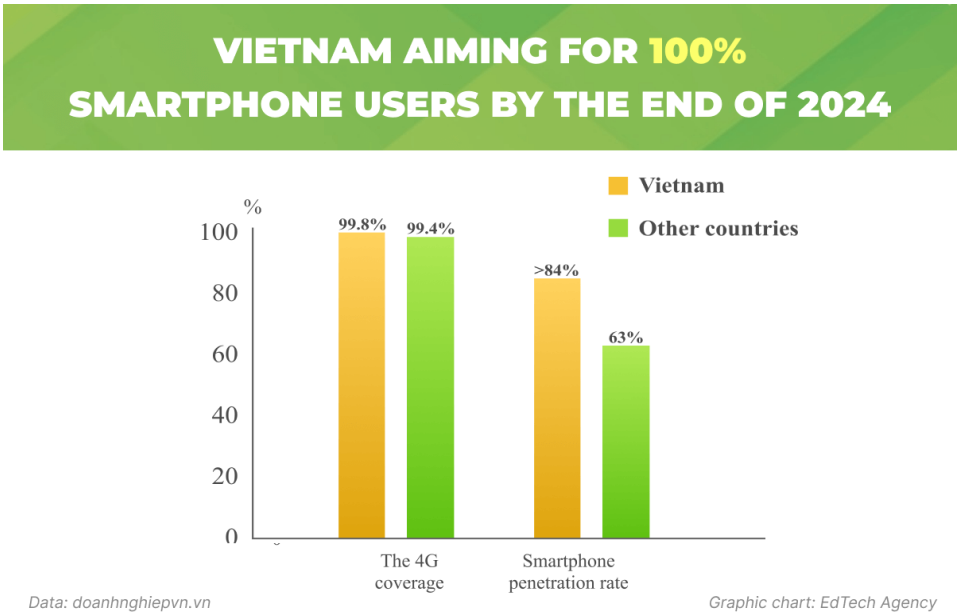


Figure 11: Smartphone and 4G coverage rate in Vietnam

5.3. Methodology

5.3.1. Dependent variable

To achieve the primary objective of our study, the analysis is structured into two sequential phases. Firstly, employing the Logistic regression model, we scrutinize the nexus between the probability of Vietnamese individuals being in an unhealthy state and the basic amenities available in their residences. A binary variable indicating an individual's health status during the year 2018 (coded as 1 if the individual experienced illness in 2018 and as 0 if not) serves as a pivotal outcome measure in this model. Should a correlation be detected, subsequent investigation will delve into exploring the substantive effects of these amenities.

Secondly, we proceed to evaluate the impact of these amenities on individuals' health, gauged by the count of incapacitated workdays within or without an official doctor's note over the preceding 12 months in 2018. This metric serves as a proxy for both physical and mental health. Within the survey, each household member is asked to provide information on the following query: “For how many days did [NAME] been ill so badly that [NAME] had to stay in bed and needed someone to take care or had to be absent from work/school or not be able to carry out regular activities in the past 12 months?”. The count of unable workdays consequently ranges from 0 to 365 days. Employing the censored regression model, commonly referred to as the Tobit regression, we address sickness-related absence. Given that sickness-related absence possesses both countable and censored values, the Tobit model is deemed more sensitive for analyzing count data like absenteeism, as it can detect more statistically significant effects (Sturman, 1999; Farahani et al., 2009). As the variables in the Tobit model predict the

score on the hypothetical latent concept of illness absence, the interpretation of coefficients necessitates a specialized approach. To facilitate such an interpretation, we adopt a coefficient decomposition method as proposed by Kang (2007)

An empirical model is articulated to ascertain the relationship between an array of indoor and outdoor housing amenities and the residents' health, formulated as follows:

$$Y_i = \alpha_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_i Z_i$$

In which:

Y_i denotes

- Whether a person ith was sick or not during 2018 in the Logit model
- Number of unable-to-work days of individual ith in the Tobit regression

X_i denotes four crucial independent variables reflecting new basic amenities in a household

Z_i shows set of some controlled explanatory variables

5.3.2. Independent variables

To mitigate time-varying unobserved differences among individuals, the model accounts for various variables capturing occupants' socioeconomic attributes. These variables encompass enabling factors such as individual economic status, represented by yearly personal income. Additionally, predisposing elements, including characteristics of dwellers such as age, gender, marital status, ethnicity, and residential location, are also controlled for in the analysis.

Table *16* provides an overview and summary of the measurement of variables employed in this study.

Table 16: Variable explanation in the chapter

Variable	Measurement
Dependent variables	
sick	= 1 if an individual was being sick during last 12 months = 0 if not
Number of unable-to-work days	Number of unable-to-work days of an individual because he/she was sick during a year
Interested independent variables	
Internet accessing	= 1 if an individual has accessed internet during last 3 months = 0 if not
Waste collection	= 1 if households use waste collection = 0 if households use other methods
Soap	= 1 if households use soap for handwashing = 0 if not
House material	= 1 if individual’s house is built by concrete or cement

	= 0 if individual's house is built by other materials (such as wood, straw…)
Control variables	
Marital status	=1 if an individual is married =0 if otherwise
Female	= 1 if an individual is a female = 0 if an individual is a male
Urban	= 1 if individual lives in urban = 0 if living in rural
Ethnicity	= 1 if an individual is a minority ethnic group = 0 if an individual is a majority ethnic group
Education	The highest diploma of an individual, include:
	No degree……..... 0
	Primary school..... 1
	Lower secondary school..... 2
	Upper secondary school..... 3
	Elementary vocational school..... 4
	Intermediate vocational school..... 5
	Prof. Secondary school..... 6
	Vocational college..... 7
	College..... 8
	University..... 9
	Master..... 10
	PhD..... 11
HI	= 1 if an individual owns any type of health insurance = 0 if not
Total income	Total personal income in one year (1,000 dong)

5.3.3. Data

In this chapter, data from the 2018 VHLSS is employed as well. However, the focus of the observation in this case is individual. Initially, the original dataset for 2018 included information on over 270,000 individuals. Nevertheless, after removing cases with missing sickness information, the sample size was shrunk to 42,266 valid participants. These numbers were then employed in Logit estimation, known as the first step.

In the second step, the Tobit regression is used to explore further. In this analyzation, only those individuals who reported being ill (approximately 10,000 observations) and be reported data on the number of days they were unable to work, were included. Consequently, the sample size for this stage was further reduced to approximately 2,800 observations.

5.4. Results**Table *17*** presents selected socio-demographic profiles of individuals within the sample, categorized into three cohorts: those identified as healthy individuals, individuals reporting sickness, and the total sample. The descriptive statistics unveiled comparable proportions—approximately 87%—of individuals practicing handwashing and residing in cement or concrete houses across all three groups. However, marginal disparities were noted in the other two factors related to basic amenities.

Specifically, among healthy individuals, 61.46% resided in households employing trash collection methods, whereas this figure is approximately 58% among the sick individual group. Notably, among the four interested factors, the most conspicuous divergence was observed in the utilization of internet access during the three months preceding the interviews. While 52.46% of the unhealthy individuals reported internet usage, the corresponding figure among the healthy group was at 66.20%. Furthermore, examining additional socio-economic characteristics, we observe that the average age of likely healthier individuals is approximately 39 years old, with the highest educational attainment typically reaching upper secondary school, and the average personal income exceeding 62 million Vietnamese Dong (VND). On the other hand, these metrics in the unhealthy group are 46 years old, a typical educational attainment at the lower secondary school, and an average personal income surpassing 53 million VND.

Table 17: Means of selected variables via different sub-samples

	Unit	**Unhealthy individuals**	**Heathy individuals**	**Total sample**
Collecting trash	%	58.03	61.46	60.65
Washing hand	%	87.29	87.96	87.80
Cement/concrete house	%	86.01	88.33	87.77
Accessing internet	%	52.46	66.20	62.94
Ethnicity	%	12.07	16.57	15.50
Female	%	47.14	41.05	42.50
Having health insurance	%	88.23	83.37	84.50
Marital status	%	77.25	72.66	73.75
Urban	%	37.90	36.83	37.08
Education	level	2.79	3.34	3.21
Age	Year old	46.39	38.93	40.70
Total personal income	1,000 vnd	53,700.25	62,292.85	60,255.20
Total observation	Individual	10,023	32,243	42,266

To address the specific inquiries, Logit estimation and Tobit regression methodologies were employed sequentially. Logit estimation showed a preliminary relationship between the variables of interest and the well-being of residents. Subsequently, applying Tobit regression analysis, a more detailed investigation of the connection intensity was carried out.

Table *18* and **Table *19*** provided specifics of results from Logit and Tobit estimation, respectively. **Table *18*** presented the outcomes derived from a series of multivariate logistic regression analyses, namely coefficient, conducted to examine the association between an individual's health status and the basic amenities present within their dwelling. These analyses encompassed several models, denoted as Model 1 through Model 4, each of which included additional controlled factors. The estimated probability of all models (namely prob>chi) demonstrated statistical significance at the 1% level.

In Model 1, the examination primarily focused on the relationship between health outcomes and the variables of interest. Subsequently, in Model 2, further biological factors were introduced. However, following an assessment of goodness of fit via the Hosmer–Lemeshow test, insufficient evidence was found to reject the null hypothesis. Consequently, additional controlling factors are essential in the model. Accordingly, social elements such as marital status, education level, residential location, possession of health insurance, and total personal income were integrated into Model 3 and Model 4, resulting in enhanced and well-calibrated models (each with a p-value > 0.29).

Across all four models, a minimum of two factors exhibited statistical significance at the 1% level. Notably, all variables pertinent to basic amenities within a household and health outcomes had an inverse relationship. To elucidate, in Model 3, individuals residing in concrete or cement houses or those dwelling in residences utilizing a waste collection system exhibited a decreased likelihood of experiencing illness compared to individuals residing in alternative housing types or using methods other than collection for waste disposal. Moreover, the presence of hygiene in a household, as indicated using soap for handwashing, emerged as statistically significant, showcasing a negative impact on an individual's likelihood of falling sick. Noteworthy among these findings was the observation that internet accessibility, considered a contemporary basic amenity in Vietnamese households, exhibited potential for mitigating illness (evident in the negative coefficients from Model 1 to Model 3). Nevertheless, the effect of internet use on health lost significance upon the continued control of socioeconomic factors (such as household total income and education) in Model 4.

Building upon the findings derived from the Logistic regression, the subsequent step involved employing the same set of variables from Model 4 in a Tobit analysis. At a significance level of 1%, substantial evidence emerged to reject the null hypothesis, indicating the presence of at least one variable in the model that influenced the number of days an

individual was incapacitated for work due to illness. However, among the four independent variables of interest, only internet accessibility emerged as statistically significant, displaying a negative coefficient. Specifically, the coefficient suggested that individuals who had accessed the internet in the past 30 days were anticipated to experience a reduction of approximately 6 days in their inability to work due to illness compared to those who did not utilize the internet.

Table 18: Binary logistic regression results

	Model 1	**Model 2**	**Model 3**	**Model 4**
Collecting trash	-0.011	-0.333***	-0.374***	-0.308***
Soap washing	0.093***	-0.071*	-0.086 **	-0.047
Concrete house	-0.053	-0.368***	-0.373***	-0.334***
Internet	-0.575***	-0.133***	-0.177***	-0.030
Ethnicity		-0.480***	-0.537***	-0.572***
Female		0.306***	0.285***	0.263***
Age		0.034***	0.032***	0.032***
Marital status			-0.023	0.018
Urban			0.066 **	0.141***
Health Insurance			0.348***	0.422***
Education				-0.047***
Total income				-0.154***
Constants	-0.856***	-2.000***	-2.161***	-0.620***
Prob>Chi	0.000	0.000	0.000	0.000

*Note: ***p<0.01, **p<0.05, *p<0.1*

Additionally, other controlled variables exhibited significance. Specifically, gender, residential location, and total income demonstrated an inverse impact on the number of days an individual was unable to work, while age and education exhibited a negative impact on these off-days as they increased.

The individual characteristics accounted for in both the Logit and Tobit regressions emerged as noteworthy determinants influencing health outcomes. Notably, concerning economic indicators (namely total income), there was an obversable association that a higher income corresponded to fewer unable workdays for an individual.

Table 19: Causal effect of basic amenities on number of unable-to-work days by Tobit

	Estimated Coefficient
Collecting trash	-0.297
Soap washing	2.432
Concrete house	0.759
Internet	-6.126***
Ethnicity	0.605
Female	-6.040***
Age	0.499***
Marital status	-8.207***
Urban	-4.324 **
Health Insurance	4.266
Education	0.587*
Total income	-3.528***
Constants	38.769***
Prob>Chi	0.000

*Note: ***p<0.01, **p<0.05, *p<0.1*

Regarding sociodemographic determinants, particularly age, our findings coincided with the common understanding that aging is typically associated with declining health and an increased risk of illness. The outcomes derived from our models (referenced in **Table *18*** and **Table *19***) corroborated this notion. Furthermore, variables including individuals' gender, marital status, and residential location exhibited statistically significant associations, namely having an inverse relationship with the number of days individuals were unable to work.

5.5. Discussion

This chapter undertakes an appraisal using cross-sectional data to explore the plausible relationship between an individual's health status and the basic amenities available within a household. To our knowledge, limited research has investigated the influence of household basic amenities on health among the Vietnamese population, particularly with a scarcity of studies considering internet accessibility as a fundamental household amenity. The findings of this investigation unveil several significant insights. Initially, the results disclose a noteworthy correlation between an individual's illness and basic amenities in a household. Specifically, factors encompassing internet access, house material, and waste treatment exhibited a consistently inverse correlation with illness prevalence (namely the number of days individuals

were unable to work). This correlation persisted even upon the inclusion of other sociodemographic variables into the models (Model 1 to Model 3 in **Table *18***. However, the influence of internet usage is not statistically significant when economic factors are accounted for (as observed in Model 4 in **Table *18***). Nonetheless, the prevalence of internet use emerged as the sole basic amenity factor exhibiting an adverse impact on the frequency of incapacitated workdays (as evidenced in **Table *19***).

This study provides evidence suggesting that certain basic household amenities are estimated to exert an inverse influence on the probability of falling ill or experiencing multiple days of inability to work. This finding is consistent with broader research findings. For instance, a study by Nguyen et al. (2022) revealed that housing issues contributed significantly to adverse health consequences among occupants in Vietnam, leading to an increased number of sick days. Similarly, research by Shrestha and Shrestha (2005) indicated a higher prevalence of respiratory diseases among occupants residing in mud and brick dwellings compared to those dwelling in concrete houses. This, once again, stresses that a lack of fundamental living standards may have detrimental effects on resident wellbeing.

Additionally, households utilizing trash collection methods appeared to exhibit improved health outcomes compared to those employing methods involving burning or burying waste. Notably, in Vietnam, daily trash collection in households contributes to a better indoor environment, whereas alternative disposal methods may lead to infrequent trash removal and improper storage practices, potentially impacting dwellers' health adversely (Matte & Jacobs, 2000).

Regarding internet accessibility, occupants who utilized the internet in the last 30 days exhibited a reduced number of incapacitated workdays compared to those who did not. This observation may be correlated with contemporary health-related behavior, as highlighted in the research by Park and Kwon (2018), suggesting that the primary aim of internet use for health-related purposes is information gathering. Additionally, a study by Johnson et al. (2015) indicated that young individuals frequently seek online information regarding daily health concerns, which eventually translates into health service utilization (Burns et al., 2010), a trend that is particularly common among the youth (Horgan & Sweeney, 2010). Similarly. the utilization of health information from internet and television help increasing the propensity to seek medical consultation and hospitalization occurrences (H. T. L. Nguyen et al., 2017). Hence, the increasing role of information technology in enhancing healthcare quality is anticipated to become more pronounced.

The outcome of other control variables is aligned with extant research. Specifically, our observations indicate a lower likelihood of illness among urban residents in comparison to their rural counterparts, consistent with the findings articulated by Fotso (2007). Fotso's research

revealed a lower prevalence of malnutrition among urban children relative to their rural counterparts. Furthermore, the influence of financial factors on the reduction of unable workdays aligns with the conclusions posited by Thoa et al. (2013). Thoa's group underscored that individuals residing in economically prosperous environments are better off in terms of health service utilization. This outcome is consistent with Grossman's theory in 1972 that health behaves as normal goods, as well.

In summation, our chapter underscores a statistically significant relationship between household amenities and the health status of residents. This observed association aligns with existing research in developing countries, illustrated by the correlation between occupants' health and substandard housing quality, as evidenced by Herrin et al. (2013), and Montgomery and Hewett (2005), who demonstrated a connection between birth attendance and household living standards. It is imperative to note that our research constitutes a pioneering contribution to the existing body of literature about the health - household basic amenities nexus within the context of Vietnam. This novel investigation is poised to enrich the literature on Vietnam by providing valuable insights into the dynamics of health in relation to fundamental domestic amenities.

Although the results yield some notable insights, there are limitations that should be taken into account to increase the reliability of the findings. Firstly, the measurement of the "internet access" variable remains inadequate, as it does not provide comprehensive data on the specific information individuals were searching for on the internet. Furthermore, the model's outcome measurement is a binary indicator (i.e., whether individuals were sick or not) and does not account for the severity of the illness. However, we have supplemented the analysis by incorporating additional model, which is expected to enhance the reliability of the findings. Lastly, our research did not differentiate between mental and physical health outcomes, suggesting a potential avenue for future investigations to explore these distinct aspects. Hence, future research endeavors may consider incorporating these considerations to conduct comparative impact evaluations.

5.6. Conclusion

This chapter utilized data from the VHLSS in 2018 to investigate the associations between the basic amenities in a dwelling and the health status of its occupants. The analysis revealed several statistically significant relationships between the health of occupants and various indoor and outdoor basic amenities in Vietnam. This suggests that potential improvements in household amenities could potentially lead to enhanced health outcomes among residents. Particularly noteworthy is the discovery regarding the presence of internet access within

households, which appears to correlate with a reduced likelihood of illness or decreased instances of incapacitated workdays. This relationship may be attributed to the prevalent health-seeking behavior observed among Vietnamese individuals through mobile internet access. Consequently, policymakers may find it beneficial to consider promoting health-related initiatives via internet platforms, especially in regions with high internet usage, such as Vietnam, as a means to facilitate health improvements in the population.

Chapter 6
CONCLUSION AND DISCUSSION

6.1. Conclusion

During the past 5 years, the entire political system and society have made efforts to implement the SDGs with the core: no one left behind. To assist the Government in approaching its target efficiently, this research focused on enhance equitable healthcare accessibility for vulnerable demographics groups. To reach the aim, the dissertation was divided into four main analyses to look through the hinders, as well as looking for a connection method.

In the first part of analysis, the dissertation applied Tanahashi model – a quite rare application methodology in Vietnam literature about health-related topic. It gave an overview of current hinder in health service provision: availability, accessibility and quality of services. It appeared to have bottleneck in the quality of service itself and the limitation in accessibility and contact to service. Indeed, the results once again stressed on the same issues with previous studies.

The findings of this study underscore the critical relationship between health conditions and labor supply, particularly in the context of Vietnam's vulnerable groups. Health shocks are shown to significantly reduce working hours, worsen financial vulnerabilities, and reinforce existing socioeconomic inequalities. Notably, ethnic minorities bear a disproportionate burden, with health-related reductions in labor supply further amplifying existing disparities in income stability and economic resilience.

In the continue analysis part, the study tried to explore for hinder in health finance sector, namely supporting in term of finance from the Government. In order to do this, this section evaluated the effect of Free Government Healthcare Insurance to the vulnerable groups. The findings significantly enrich the existing body of literature by providing robust evidence of the positive correlation between the implementation of the FGHI scheme and increased healthcare utilization in 2018. Specially, this section revealed disparities in the scheme's effectiveness, particularly highlighting a more substantial influence on healthcare utilization among majority group households compared to minority groups. The differential impact underscores the need for tailored interventions to address the unique barriers faced by ethnic minorities, such as reliance on traditional self-treatment practices and additional out-of-pocket expenses due to hospitalization requirements.

The subsequent section explored the effect of related sectors, such as water and sanitation, on health. The chapter explored the influence of household basic amenities on health outcomes, revealing a significant inverse relationship between amenities like internet access, housing

quality, and waste treatment, and illness prevalence. These findings align with broader research, emphasizing the detrimental effects of inadequate living standards on health. Policy initiatives aimed at improving these basic amenities could substantially enhance health outcomes for Vietnamese households.

6.2. Policy Implication

The world is anticipated to continue to endure various difficulties and instability, including fluctuation in the prices of crude oil, food, and essential goods. Furthermore, the increasing complexity and unpredictability of natural disasters and climate change cause substantial damage across various nations. In light of these conditions, to facilitate the progression toward the SDGs in Vietnam, particularly SDG 3 and SDG 10, the author suggests several policy implications informed by prior research findings.

6.2.1. Promoting Digital Health Initiatives

To improve healthcare accessibility for vulnerable demographic groups, as well as Vietnamese in general, internet – a supplement tool in this modern society, will be an importance bridge for health-related communication. Hence, policymaker should consider promote digital literacy programs to ensure that online health resources can be reach effectively by the citizens. Moreover, expanding broadband coverage, especially in disadvantage areas, should be consider in the upcoming policy. These approaches can enhance the accessibility of healthcare information and services, thereby supporting overall health improvement.

6.2.2. Infrastructure And Accessibility Enhancement

The significant connection between basic household amenities and dwellers' health suggested that policymakers should prioritize improving supplement services for a household, as well as housing quality as part of broader public health strategies. Investments in infrastructure to ensure adequate water supply, sanitation, and electricity can have substantial health benefits, particularly in underserved areas as in northern mountains area. Such initiatives will ensure that healthcare services reach remote and marginalized populations, thereby aligning with the targets of SDG 3.

6.2.3. Enhancing Supplement Healthcare Infrastructure and Resources

In healthcare management, constrains such as insufficient supporting equipment compel professional staff to spend to on auxiliary duties, including information input and organizing suppliers in health clinics. Policymaker should support healthcare work force by implementing mobile clinics and telehealth services. This would be likely to free them from unrelated stuffs and have more time to focus on their expert job.

In summary, by incorporating these findings into policy development, authorities can create more effective public health strategies that address the root causes of health which are linked to household aminites. Moreover, ensuring equitable access to essential services and leveraging digital health solutions can significantly improve health outcomes, particularly in vulnerable and underserved communities in Vietnam. A multisectoral approach that aligns healthcare improvements with broader social policy objectives, such as education and poverty reduction, is crucial for addressing the root causes of health disparities. By fostering collaboration across sectors, the government can ensure that health interventions are both comprehensive and sustainable.

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