

EXPLORING DETERMINANTS FOR RECRUITMENT AND RETENTION OF FAMILY  
DOCTORS FOR RURAL PRACTICE IN VIETNAM: LESSONS FROM  
A DISCRETE CHOICE EXPERIMENT

by

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For my supportive parents,  
my beloved husband,  
my precious son Ryan,  
and all special people in my life.

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by

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The University of Texas at Dallas, 2017

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In Vietnam, health professional shortage in rural and remote areas is a widely acknowledged problem. Policies promulgated up to now have had very little impact on correcting the critical geographical imbalance of health human resources. This study provides comprehensive and quantitative information to understand the determinants of recruiting and retaining family physicians for rural practice in Vietnam, to examine whether different subgroups (demographic and personal working experiences) put different values on different incentive policies, and how different the values are.

To fulfill the objectives, a discrete choice experiment was designed and administered to elicit the job preferences of 315 family doctors. Data collection took place in all the regions of Vietnam (north, central, and south), which allowed the study to address characteristics of family physicians from different regions.

An initial qualitative study identified three job attributes—income, career development, and government support for opening private clinic. Mixed logit regression was used for the statistical analysis of relative importance of job attributes and of individual characteristics.

The findings of this study suggest that increasing current income by 50 percent has the highest impact on job location decisions for many subgroups (participants aged under 50, assistant doctors, and those with exposure to rural areas). However, the effect of income incentives decreases at a certain threshold. Non-pecuniary interventions have greater impact on some specific subgroups (those already left CHSs to higher level health facilities, individuals currently working at the national level, and individuals working in a primary health care area). It is possible that financial incentive intervention could be complemented with other types of non-financial interventions while still positively impacting family doctors' deployment to rural areas. This research is the first attempt to provide quantitative information data regarding family physicians' job preferences and trade-offs between different job attributes in Vietnam. This study is also the first attempt at examining how individual characteristics interact with incentive policies, then which in turn influence family doctors' job location decisions in Vietnam setting. The findings of this study point out that it is critically important to customize incentive policies based on demographic and personal working experiences.

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# **CHAPTER 1**

## **INTRODUCTION AND BACKGROUND**

### **1.1 Background**

In 2015, the World Health Organization (WHO) reported that at least 400 million out of the 7.2 billion people on earth, about one-fifteenth of the global population, lack access to essential health services (WHO, 2015). One measure of health care access is having adequate health workers to provide regular services (Starfield, Shi, & Macinko, 2005). Alarms signaling a health workforce shortage are growing more urgent from the most developed to the poorest countries (T. D. Johnson, 2008). Another WHO report warns the current shortage of 7.2 million health professionals will increase to 12.9 million by 2035 (Truth, 2013). The three key causes for this shortage are an aging health workforce with staff leaving without being replaced, not enough young people entering the profession, and increasing risks of non-communicable diseases (Crisp, 2010; Truth, 2013).

The medical personnel shortage derives from many causes, which vary according to different health system context of each country. The resource and information limitations have been restricting national governments' capacity for designing and implementing appropriate intervention policies (Kinfu, Dal Poz, Mercer, & Evans, 2009). One recommendation by the WHO to alleviate the shortage of skilled health workers and to make frontline health services more accessible is to maximize the presence of health workers in primary health care and family medicine (FM) (Khayyati et al., 2011; Truth, 2013; Van Lerberghe, 2008). However, in developing and under-developing countries, it is the critical shortage of health workforce, including primary health care and FM health workers, in socioeconomically disadvantaged areas

that is considered as one of the greatest challenges in meeting the nationwide health coverage needs (Celletti, Holloway, De Cock, & Dybul, 2007; Dussault & Franceschini, 2006; Jerome & Ivers, 2010; Kober & Van Damme, 2004; WHO, 2014).

In this study, the factors that influence health workers' decision regarding job location, specifically within a developing country, are investigated empirically. More specifically, the perception of family doctors toward different job offers in Vietnam is scrutinized. This work is important for four main reasons. First, strategies to boost nationwide health coverage by attracting and retaining family physicians in socioeconomically disadvantaged areas vary according to different health systems of each country (Campbell, Braspenning, Hutchinson, & Marshall, 2002; Dieleman, Cuong, & Martineau, 2003; Dussault & Franceschini, 2006; Huicho et al., 2010; Mandeville, Lagarde, & Hanson, 2014; Mathauer & Imhoff, 2006; Willis-Shattuck et al., 2008).

The second reason this study is important is because in Vietnam, lack of access to primary health care is a widely acknowledged problem (G. Bloom, 1998; Duong, Binns, & Lee, 2004; Fritzen, 2007; Gien et al., 2007; Huong, Van Minh, Janlert, & Byass, 2006; Khe et al., 2002; Montegut, Cartwright, Schirmer, & Cummings, 2004). Physicians often complete training in urban medical schools and establish their initial practices in said urban locations. This further exacerbates the problem of healthcare shortages in rural and remote areas. However, according to government figures, the patient capacity rate in urban public hospitals ranges from 150 to 250 percent (Swenden, 2015). Extreme urban hospital overcrowding gives rise to competition for healthcare workers between urban and rural areas. Even in central hospitals where there is the



highest physician density, the shortage of health professionals is still severe enough to attract more medical personnel to come there, exacerbating the shortage situation in rural areas.

Third, the critically high turnover of family physicians and the reduction on continuity of care and lack of trust by patients. Given its expertise in outpatient clinical care across the life span of patients, FM, which has been a first-degree specialty since 2001, becomes an ideal fit to partially relieve the doctor shortage in underserved areas, which would positively impact overall primary health care in Vietnam. However, despite the gradual increase in number of FM trainees enrolled in recent years, the number of family physicians with rural working experiences remains small. Only a minor portion of FM graduates decide to return to community health stations after getting their degree (Le, 2011).

Fourth, the promulgated policies have been considered inefficient. Recent strategies implemented to develop human health resources in underserved areas in Vietnam can be categorized into four categories: (a) financial incentives, (b) professional support, (c) personal support, and (d) regulations. However, these policies have had very little impact on solving the critical health professional shortages in rural and remote areas. Moreover, currently, there is no specific policy to attract and retain family physicians to underserved areas.

Examining why family physicians in Vietnam have hesitated to take rural posts or proposing strategies to encourage them to take rural posts or to remain in rural settings is still an underexplored area in the literature. Health policymakers often find it daunting to select the most appropriate intervention(s) among a “laundry list” identified by qualitative studies. This dissertation provides a comprehensive and quantitative study to understand the determinants of

recruiting and retaining family physicians for rural practice in Vietnam. The findings of this dissertation can serve as a guide for more effective policy designs and implementations.

## **1.2 Dissertation Structure**

The dissertation contains five chapters.

Chapter 1 provides an overview of primary health care and family medicine in modern health systems. This chapter reviews the transformation of the Vietnam health care system, which goes hand in hand with political and economic improvement. This chapter also discusses the structure of health care system in Vietnam and provides an overview of Vietnam's medical education system, and the development of family medicine in Vietnam. This chapter identifies the problems of the primary health care workforce, legislative instrument related to health care workforce, and family doctor retention in Vietnam. The statement of problem section is followed by research questions and research significance.

Chapter 2 discusses the theoretical framework and connects the theoretical framework to the literature review of factors that influence health workers' decisions of job location in general and in the context of Vietnam. This chapter also brings an overview of discrete choice experiment and systematically reviews discrete choice studies that focus on attracting and retaining health workers to rural and remote areas. This chapter reveals the dearth in the literature and delineates the contribution of this study.

Chapter 3 discusses the design of the discrete choice experiment, including the selection of choice attributes and levels, the development of experimental design and supplement

questionnaire, and the construction of choice sets. Survey administration and data coding are also considered.

Chapter 4 provides the data analysis derived from discrete choice modeling with the whole sample and subgroups.

Chapter 5 discusses the key findings, policy implication, and the limitations.

### **1.3 Overview of Primary Health Care**

Health services have improved significantly over the last century; however, some issues persist. First, health inequity is a matter of concern. There is significant gap between developed and developing countries. Middle- and low-income countries lag well behind Organization for Economic Co-operation and Development (OECD) countries for coverage rates across all essential medical services (WHO, 2015). Inequities are also a factor within countries. For example, the median coverage in the poorest quintile of households is less than those in the richest quintile (WHO, 2015).

Second, the nature of disease is changing. The health problems of the twenty-first century, especially in high-income countries, significantly differ from those in earlier centuries. Generally, the chronic diseases such as cancer and diabetes have started to replace communicable diseases, becoming commonplace (Crisp, 2010). In order to deal with the changing nature of health problems, different interventions are needed, such as more outside hospital medical services, more integration into patients' living community, life style, education, and so on.

However, adjusting the international health care delivery system is challenging. In the book “Turning the World Upside Down: The search for global health in the 21<sup>st</sup> Century” written by Nigel Crisp, the former Chief Executive of the National Health Service, and the former permanent secretary of the UK Department of Health, based on his own experiences from the largest to the poorest health systems in the world, the author believes a major piece of this challenge is the deep-rooted features of western scientific medicine, including “scientific discovery, greater professionalism, commercial innovation and massively increased funding” that create a tremendously strong health system (Crisp, 2010, p. 3) but more problematically, have conditioned people’s mindsets of what good treatment must look like – latest equipment, drugs, best facilities, and best doctors, regardless of its necessity for particular health problems. The strong influence of the essential features amongst the public and the leaders prevents the evolution of a system with different but suitable features for chronic diseases (Collier, 2007; Crisp, 2010).

In this environment, the WHO considers primary health care as being able to respond effectively to the challenges of a changing world and to ensure an equitable health system (Starfield et al., 2005; Van Lerberghe, 2008). The support for a renewal of primary health care stems from the inability of current health care services to provide national coverage and the dangers of fragmentation of the health systems (Starfield et al., 2005; Van Lerberghe, 2008).

Primary health care reforms today are primarily defined by the social dynamics where people set a higher standard for health systems. There is increasing support for health services centered on people’s needs thereby “putting people at the center of health care” (WHO, 2007, p. 32). As a result, the current ways to implement primary health care substantially differ from

earlier attempts. For example, concentration on health moves from mother and child to the whole community, concentration on several specific infectious diseases turns into a comprehensive coverage at all levels (Van Lerberghe, 2008).

#### **1.4 Family Medicine on Modern Health Systems**

Family Medicine (FM) is at the center of primary health care and is the cornerstone of providing community-based care, aiming to reintegrate and personalize health care for patients. It is a move from traditional physician-centered to patient-centered models. The concept of FM evolved in the United States and the United Kingdom in the 1960s, from general practice to the fundamental core of health system (WHO, 2003). The World Organization of Family Doctors (WONCA), a global organization representing family physicians, was founded in 1972 and now has 118 member organizations in over 130 countries and territories from all regions of the world.<sup>1</sup> Though the nature of FM care might vary between countries, the essential concerns of the discipline are about broad care rather than disease-focus (WHO, 2003).

Family medicine is “concerned with providing comprehensive care to individuals and families and integrating biomedical, behavioral and social sciences” (WHO, 2003, p. 1). A family doctor is a physician who “provides health care services for all individuals regardless of age, sex or type of health problem; provides primary and continuing care for entire families within their communities; address physical, psychological and social problems; and coordinates

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<sup>1</sup> WONCA in brief – Global Family Doctor – WONCA online

comprehensive health care services with other specialists as needed” (WHO, 2003, p. 1). Unlike other medical specialists limited to providing particular treatment, family doctors provide comprehensive care for patients of all genders and age.

There is a unique set of attributes differentiating family physicians from other specialists. A family physician can (a) address all health problems that are presented to him or her from an entire population, (b) provide continuous and comprehensive medical care, and (c) equip patients with knowledge of disease prevention, health promotion, psychological support, and social support (WHO, 2003). In addition, a family physician knows patients through their context in their family, their relationships within the community, and their work. More broadly, the family physician looks at general medical problems through the context of the community at large (Montegut et al., 2007).

Given its expertise in comprehensive disease prevention, health promotion, and collaborative work with the resources of the local community, FM becomes an ideal fit to protect community health, especially in rural and remote areas. Moreover, having a proper FM system in underserved areas could reduce the workload on other health specialists and lower treatment fees. The WHO promotes FM as the core of health care system to achieve the goal of health equity and quality improvement (Khayyati et al., 2011). For example, in the United Kingdom, it is estimated that each additional family physician for every 10,000 people (about a 20 percent increase) is associated with a reduction of the mortality rate of nearly five percent after adjusting for chronic diseases and various demographic and social-economic characteristics (Gulliford, 2002).

## **1.5 Vietnam Health Care Profile**

Vietnam has a long history of being ruled by foreign powers and fighting for its independence. On September 2, 1945, Ho Chi Minh proclaimed the independent Democratic Republic of Vietnam free of French colonial rule. In 1954, the Geneva Accords temporarily divided Vietnam into North and South. The North, led by Ho Chi Minh, followed a socialist orientation, and the South was under the Bao Dai regime, then Diem regime in early 1955 after Prime Minister Diem won referendum over Emperor Bao Dai. Diem proclaimed the Republic of Vietnam which was immediately recognized, supported and influenced by the French government and the U.S. government.

The North-South divide and the associated ideological orientations within these two parts of Vietnam were reflected in the government policies enacted. For instance, while health care in the South followed a market system of operation, the communist ideology in the North called for equity as the top priority. Hence, government health care policies in the North were aimed at ensuring equal access to health care for everyone. The government in the North developed a comprehensive health care network that provided free health services to everyone (Ha, Berman, & Larsen, 2002). As a result, the government in the North not only invested heavily in its primary health care system but also boosted the accessibility of preventive and curative services (Fritzen, 2007).

After the fall of the South government in 1975, the North and South were reunited to form the Socialist Republic of Vietnam. After the reunification, the government continued its principal goal of providing free health services nationwide. Unfortunately, the health system in the South had been disrupted due to the civil war between the North and South and was barely

functioning. Its health care system was plagued with issues of a limited public health budget, thinly spread skilled health care workers, and serious shortages of basic equipment and drugs. However, the pursuit of free healthcare after the reunification meant increased access to health services for all (Ha et al., 2002).

In 1986, an economic reform was initiated with the goal of creating a market-driven economy after the abolition of the command economy. The *Doi Moi* reform marked the integration of Vietnam into the international political economic system after decades of isolation and led to dramatic social and economic changes (Dinh, 1999; Riedel, 1997). For instance, from the 1990s onward, Vietnam's economy experienced rapid growth (e.g. increase in GDP by 8.2 percent) and saw profound socio-economic impact (e.g. increased opportunities for business investments) (Riedel, 1997). However, at the same time, income disparities increased in what had historically been a remarkably egalitarian society (Dinh, 1999; Heo & Doanh, 2009). The privatization of services, including health care, drove up prices. Additionally, the public health service arena experienced several notable changes, including the introduction of service and drug fees at market rates (Segall et al., 2002). As a result, access to health care services dropped significantly. For example, outpatient visits per capita per annum decreased from 2.1 in 1987 to 0.9 in 1993 (Witter, 1996).

The transition from a centrally-planned economy to an open-market economy marked a significant improvement in health care services, but the improvement was not uniform. The intensity of health care services use varied considerably across different geographical regions, urban and rural areas, and amongst various population groups (Thuan, Lofgren, Lindholm, & Chuc, 2008; T. Tuan, Dung, Neu, & Dibley, 2005). While the high-income populations tended to



utilize central hospitals, low-income populations relied heavily on the use of commune health centers (Gien et al., 2007; Khe et al., 2002) or even self-treatment (Thuan et al., 2008). Health professionals, especially the most qualified physicians, tended toward urban well-to-do areas. Hence, the district and primary health centers in the rural areas were left mostly with paramedics (Witter, 1996). Meanwhile, overwhelming health problems such as infectious and parasitic diseases in the economically disadvantaged rural areas (Dinh, 1999) and increased number of chronic non-communicable disease since the late 1990s were difficult to tackle without qualified physicians (Harper, 2011; Pham et al., 2009).

Compared with the period right after *Doi Moi*, Vietnam's current health system has achieved significant and lasting improvements, such as a reduction in the infant mortality rate and improvement in age-specific death ratio (Tien, Phuong, Mathauer, & Phuong, 2011). These improvements are attributed to the positive policy reforms and consensus within the country to prioritize healthcare spending (Tien et al., 2011). Vietnam spends 6.4 percent of its GDP on healthcare. While short of WHO recommendations, is still more than many of its neighboring countries such as Cambodia (5.6 percent), Laos (4.5 percent), and Myanmar (2 percent). Also, per capita health expenditures in Vietnam doubled from \$66 in 2008 to \$142 in 2014 (World Bank, 2015; Tien et al., 2011; WHO, 2010). As a result, the health care delivery network has become more widespread with the expansion of national public health programs and the increase in skilled health professional population (Tien et al., 2011).

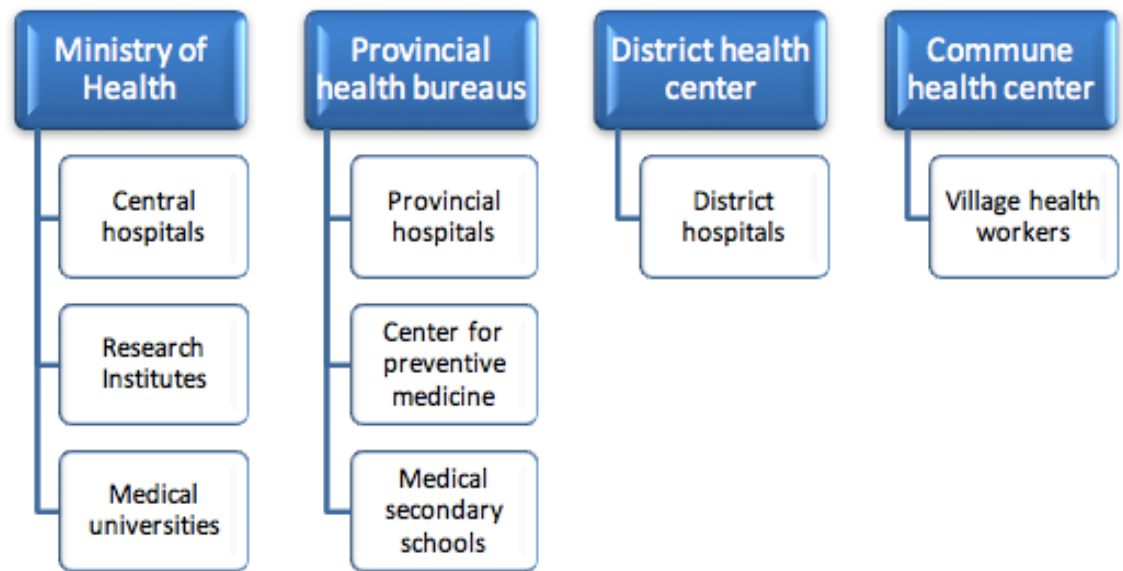
However, with an aging and diverse population (92 million people, 56 ethnic groups, and the population over the age of sixty growing at faster rate) coupled with the dynamics of a market driven economy, Vietnam has been struggling with chronic health care service

challenges, particularly with respect to two issues (Asia, 2014). First, there is the burden of increased medical cost because of the increased number of people diagnosed with treatable, chronic, and non-communicable diseases such as heart disease and cancers. According to the World Bank Report, Asia (2014), chronic and non-communicable diseases account for approximately two-thirds of mortality in Vietnam. Krakauer, Cham, and Khue (2010) reported about 150,000 cancer cases were diagnosed annually in Vietnam, of which 80 percent were in the advanced stages. Second, there is the widening divide between urban and rural areas in terms of access to health care services, quality health care, and affordability of health care services not covered by insurance. For instance, 53 percent of doctors are working in urban areas to serve only 28 percent of Vietnam's population (Vujicic, Alfano, Shengalia, & Witter, 2010). Ngoan, Long, Lu, and Hang (2006) reported about 50 percent of cancer patients in the wealthier, northern provinces survived more than one year, while in the rural areas, that number was only between 21-25 percent. Similarly, maternal and child mortality remain higher in economically disadvantaged areas. Under-five mortality rates are three times higher in the lowest economic quintiles than those in the highest quintiles, and the gap keeps increasing over time (Asia, 2014).

## **1.6 Structure of Health Care System in Vietnam**

Currently, Vietnam's health care services are delivered by both public and private health providers (WHO, 2012), with a primary goal of increasing access to quality health services nationwide. Since the 1990s, private practice has significantly contributed to Vietnam's health care delivery network. However, private medical centers are primarily located in urban areas (WHO, 2012).

The public medical operation corresponds to the four levels of government: national, provincial, district, and grass-roots level (Dinh, 1999; Duong et al., 2004; Tien et al., 2011; WHO, 2012) (see Figure 1.1).



**Figure 1.1. The Structure of Vietnam Healthcare System**

*Note.* Adapted from Central for Health System Research, Hanoi Medical University.

At the national level is the Ministry of Health (MOH). The responsibilities of MOH include designing, programming, budgeting, and executing health policies (Tien et al., 2011). The MOH is directly in charge of central hospitals, research institutes, and medical universities. The MOH leads 63 provincial departments of health (DOHs), representing the 63 provinces across the country. These DOHs are responsible for the supervision of health services at the provincial level. These DOH are directed by both the MOH and the Provincial People's

Committee<sup>2</sup>. Each provincial DOH is directly in charge of provincial hospitals, centers for preventive medicine, and medical secondary schools, and provides preventive and curative services for up to two million population.

At the district level are 713 district health bureaus; these supervise hospitals and regional polyclinics that provide basic and emergency care for about 100,000-200,000 people and prevent patient overload at higher levels. At the grass-roots level are 11,164 commune health stations (CHSs), as of 2015, that deliver most primary care services and national health programs to the population (P. Tuan, 2015). Each CHS is typically staffed by primary-level health professionals such as physician assistant, nurses and midwives. The CHSs are considered as the access points into the public health services, particularly for patients who use health insurance (Duong et al., 2004). Functionally, these CHSs implement national health programs, provide health counselling, screen treatment for common illnesses, and refer serious cases to a higher level of service (MOH, 2006). Most CHSs operate in rural and remote areas in Vietnam (WHO, 2012). They serve a relatively small and dispersed population of 5,000-10,000 people (P. Tuan, 2015). Table 1.1 describes the functions performed by the agencies within Vietnam's multi-tiered health care services.

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<sup>2</sup> The provincial People's Committee is an executive arm of a provincial government

**Table 1.1. Level and Type of Health Public Services Provided in Vietnam, 2015**

Level	Type of Service	Characteristics/Functions
National	Hospitals: 44	Provide curative care, sanatoria and traditional medicine services with intensive specialization and modern technologies. Provide technical support to services at lower levels and implement research.
Provincial	Hospitals: 376	General and specialized hospitals including traditional medicine and sanatoria. Each province has at least one hospital at this level.
	Specialty clinics: 47	Provide specialized outpatient services.
District	Hospitals: 615	Basic in-patient treatment, emergency care, and treatment of common diseases. Commonly have regional polyclinics to increase coverage and prevent patient overloads at higher levels.
	Regional polyclinics: 686	Deliver some primary care services and act as satellite facilities for some district hospitals.
	Maternity homes: 18	Deliver basic prenatal and delivery services.
Commune	Commune health centers: 11,164	Deliver most primary care services and national targeted health programs to the population, especially in rural and mountainous areas. Hygiene, vaccinations, antenatal care, safe delivery and health education. Also provide screening examination, treatment and referrals for outpatients. Collaborate in outreach activities with village health workers (VHW).

*Note.* WHO. (2012). Ministry of Health. 2012. *Health Service Delivery Profile Viet Nam 2012*.

### **1.7 Vietnam Medical Education System**

There are two ways to become a doctor in Vietnam. The first path is for a student to go directly to medical school after high school. There are 12 medical universities in Vietnam. These

are public universities overseen by both the Ministry of Health and Ministry of Education.

Acceptance into these medical schools is very competitive – the acceptance rate is about 1:13. A student becomes a general doctor after finishing a six-year medical curriculum. Annually, there are approximately 4,200 students graduating with a medical degree (H. Tran & Pretorius, 2007).

The second path is for a student to go to a physician assistant program in primary and secondary schools for three years, work for at least two years, and then attend medical school for four additional years. There are 70 training institutions from 63 provinces training these physician assistants. Annually, there are approximately 18,000 students graduating as physician assistants (H. Tran & Pretorius, 2007). The quality of physician assistant training, however, is controversial because these students usually are those who were not accepted into medical school.

## **1.8 Development of Family Medicine in Vietnam**

The first form of family physician practice in Vietnam was based on a Chinese model called “Barefoot doctors,” a term coined by an editor of *People’s Daily* in 1968 to describe the doctors working in rural China in the 1950s and 1960s (D. Li, 2016; Zhaoyang, 2008). Mostly, barefoot doctors provided medical duties based on the needs of people who lived close by (Wen, 1974). The majority of barefoot doctors were farmers who had graduated from primary medical schools with several months of training and basic medical knowledge. In Vietnam’s rural areas during the barefoot doctor period, most of primary health care were staffed with a barefoot doctor who provided both preventive and primary care services. For more serious cases, they transferred patients to higher-level health facilities.

Massive economic reform after 1986 brought rapid transformation to many socioeconomic aspects of Vietnam, including a health care system to which barefoot doctors were unable to adapt. Modernization, convenient transportation, new technologies, and social media crumbled the barefoot doctor health care system. More convenient means of transportation allowed the public access to more central hospitals and the new technologies housed there. Additionally, barefoot doctors lacked access to education about the new scientific and technological advancements and lacked training on the changing nature of health problems that connected with ecological environment and lifestyles. The boom of social media allowed patients to recognize the weakness of barefoot doctors (An Le, Family Medicine Program Director, personal communication, October 9, 2016, University of Medicine and Pharmacy at Ho Chi Minh City).

The government of Vietnam, therefore, committed to improving the quality of health workers through training and education. However, it wasn't until 1995, with the support of the China Medical Board, an independent American foundation that aims to advance health in Asian countries through strengthening public health research and education, that FM was successfully brought into Vietnam. Family physicians are specially trained to provide comprehensive care for the entire family, from prenatal care and the delivery of babies, to the care of children, parents, and grandparents. FM trained physicians also tend to adhere to clinic procedures better than control physicians. For example, an evaluation of FM program at the Hanoi Medical University shows that FM graduates have better clinical skills than non-FM graduates in terms of addressing patients' health problems from their community context, following up on patients, and so on (Montegut et al., 2007).

Additionally, great efforts have been put into the training of qualified family physicians. In 2001, MOH established FM as a first-degree specialty training program. Party Resolution No. 46-NQ/TW affirmed the orientation to FM, calling to improving CHSs at the grass-roots level (Montegut et al., 2007). The number of family physicians has increased from a total of 85 in courses 2003-2008 to 147 in course 2009-2010, and further increased six times to 516 in 2011 (Le, 2011). In 2015, it is estimated about 800 family physicians graduated. MOH recently announced a plan to further develop FM in the period 2016-2020, focusing on training thousands more family physicians to integrate family medicine services in existing primary health care networks, especially at the grass-roots level, to meet the nation's health care needs.

### **1.9 Statement of the Problem**

Vietnam's health care system faces many challenges in solving the geographical imbalance of health human resources. A number of government reports and studies reflect the issues of health human resources at the commune level in terms of both quality and quantity as well as the unresponsive policies related to recruitment and retention (MOH, 2008, 2009; Vujicic, Shengelia, Alfano, & Thu, 2011). This section identifies the three main problems which result in the divide between well-served and underserved areas in terms of access to health services and quality health services. They include: (a) the problem of primary health care workforce, (b) the problem of legislative instrument related to health care workforce, and (c) the problem of family physician retention.



### **1.9.1 Primary health care workforce**

In Vietnam, lack of access to primary health care is a widely acknowledged problem (G. Bloom, 1998; Duong et al., 2004; Fritzen, 2007; Gien et al., 2007; Huong et al., 2006; Khe et al., 2002; Montegut et al., 2004). The WHO estimates that fewer than 2.3 health workers per 1,000 people is insufficient to achieve nationwide primary health care coverage (Scheffler, Liu, Kinfu, & Dal Poz, 2008). In Vietnam, the ratio is 1.19 per 1,000 people as of 2013 (FactBook, 2013; GSOV, 2017).

The health professionals are concentrated in the economically better off regions. In terms of health workforce distribution by geography, the North delta region, which is the economically better off region in terms of per capita income, job prospects, and education opportunities, had the highest number of health staff compared with other regions (18.39 percent) (GSOV, 2017; M. P. Nguyen, Mirzoev, & Le, 2016). The Southeast and Mekong delta region had almost the same number (about 16 percent), followed by Central Coast and Central Highlands (7.74 percent and 5.07 percent, respectively). Conversely, Northwest had the lowest number of health staff (3.91 percent) (GSOV, 2017).

There has been a severe health professional shortage at the grass-roots level in the worse off areas. In Vietnam, the CHSs serve as a gatekeeper of the public health system (B. X. Tran, Van Minh, & Hinh, 2013). It is estimated that CHSs manage 80 percent of the local demands for health care promptly (B. X. Tran et al., 2013). However, there is a severe shortage of health workers at CHSs, especially CHSs in disadvantaged areas. It is estimated in the poorest 62 districts, only 30 percent of CHSs are staffed with a physician, which is below the government's target of staffing 80 percent of CHSs with physicians. This is partly due to the fact that less than

18 percent of the total health workers currently work at the commune level (Asia, 2014). The descriptive study by T. T. M. Oanh et al. (2007) reveals critical doctor shortages in two mountainous provinces in two worse off regions, Dien Bien in Northwest Highlands and Lam Dong in Central Highlands. Dien Bien and Lam Dong have significant lower ratios of doctor per 10,000 in comparison with the national average ratio, 3.7 and 5, respectively compared to national average ratio of 7.5. Moreover, there is disproportionate distribution of doctors compared to assistant doctors (6.6 percent and 45 percent) in CHSs. In Dien Bien, only 5.4 percent of CHSs having a doctor (T. T. M. Oanh et al., 2007).

The quality of these few health workers in these disadvantaged rural areas also comes into question. It has been noted that these health workers often lack the core competencies to perform primary health care services of maternal and child health services, elderly care, and early detection of common non-communicable diseases. For example, in an evaluation of health workers within rural, disadvantaged areas, physicians and physician assistants were not able to provide correct answers to more than 50 percent of the questions on internal medicine and cardiovascular diagnosis (Asia, 2014; Montegut et al., 2004).

Many midwives, nurses, and physician assistants function like doctors in CHSs. There are low utilization of the CHSs health care teams among citizens, likely due to people's lack of confidence in these teams. Meanwhile, it is estimated that 70 percent of patients being treated at the national level should and could be treated at the provincial level; about 82 percent of patients being treated at the provincial level should and could be treated at the district level, and about 68 percent of patients being treated at the district level should and could be treated at the commune level (T. Oanh et al., 2009).

Vietnam realizes that strengthening primary care means not only the construction of buildings and the purchase of equipment but the imperative to attract high qualified health professionals to provide primary care and enhance people's trust in primary care services in CHSs. Notably, the Vietnam health care system has expansive rural coverage (Segall et al., 2000), but patients largely neglect the grass-roots level in preference for the provincial and central levels, even though the former may be appropriate and the latter may be unnecessary (Ekman, Liem, Duc, & Axelson, 2008). Building family medicine networks in disadvantaged areas is considered the only way to build the public trust in primary care and reduce the overcrowding situation at high-level hospitals (Nguyen Van Chau, Director of Ho Chi Minh Department of Health, VN, 2015).

### **1.9.2 Legislative instrument related to health care workforce**

Currently, the National Strategy for People's Health Care and Protection focuses on health workforce development, especially at low levels. The National Assembly Resolution No11/2011/QH13 calls for (a) strengthening the health care services at the district and commune levels to alleviate hospital overload, and (b) improving human resources (Asia, 2014). This is similar to the government's National Benchmarks for Commune Health Care (2011-2020) which aims for achieving the goal that all CHSs have an adequate number of health workers, and all are continuously trained (Asia, 2014). Vietnam has promulgated several important policies and legislations aimed at improving quality and distribution of human resources at the grass-roots level. Summaries of the most significant policies among the legislative instruments are given:

**Decree 1816/QĐ-BYT:** In 2008, the Government of Vietnam launched Decree 1816, rotating doctors from central and provincial levels to commune level, in which three-month rural service is mandatory for all health professionals. Benefits include an increase in monthly salary (approximately 30 percent of basic wage, equivalent to 400.000 VND, about US \$20) and a certificate of merit. Though Decree 1816 is a high-level political initiative aimed at a reduction in physician shortage in rural and remote areas, several constraints exist. First, many doctors use unofficial ways to avoid mandated rotation. Second, a majority of rotated doctors have inadequate skills. Third, unattractive benefits fail to retain physicians in rural and remote areas.

**Decision 75/2009/QĐ-TTg:** Issued by the Prime Minister on May 11, 2009, the Decision entitles health workers in socioeconomically difficult communes to a monthly allowance (approximate 50 percent of basic wage, equivalent to 600.000 VND, about US \$30). The allowance, however, is considered not attractive enough to have a profound impact on physicians' decisions of job location.

**Decree 64/2009/NĐ-CP:** Issued by the Prime Minister on July 30, 2009, the Decree entitles health workers in 2,112 listed socioeconomically difficult communes in the Decree to the following benefits: a monthly allowance of 70 percent of current salary, subsidies for study visits, and professional training. However, the allowance was decreased by 40 percent recently due to no central budget allocation for the Decree.

**Decision 585/QĐ-BYT:** In 2013, the Ministry of Health operated a bonding program whereby new graduates were encouraged to work in worse off areas for a set number

of years (usually three years for male and two years for female). The benefits include a reserved postgraduate diploma course seat and a labor contract to a high-level health facility in an urban area. The bonding program has been expected to attract at least 500 medical students by 2016. Until June 2017, however, only 78 medical students had volunteered.

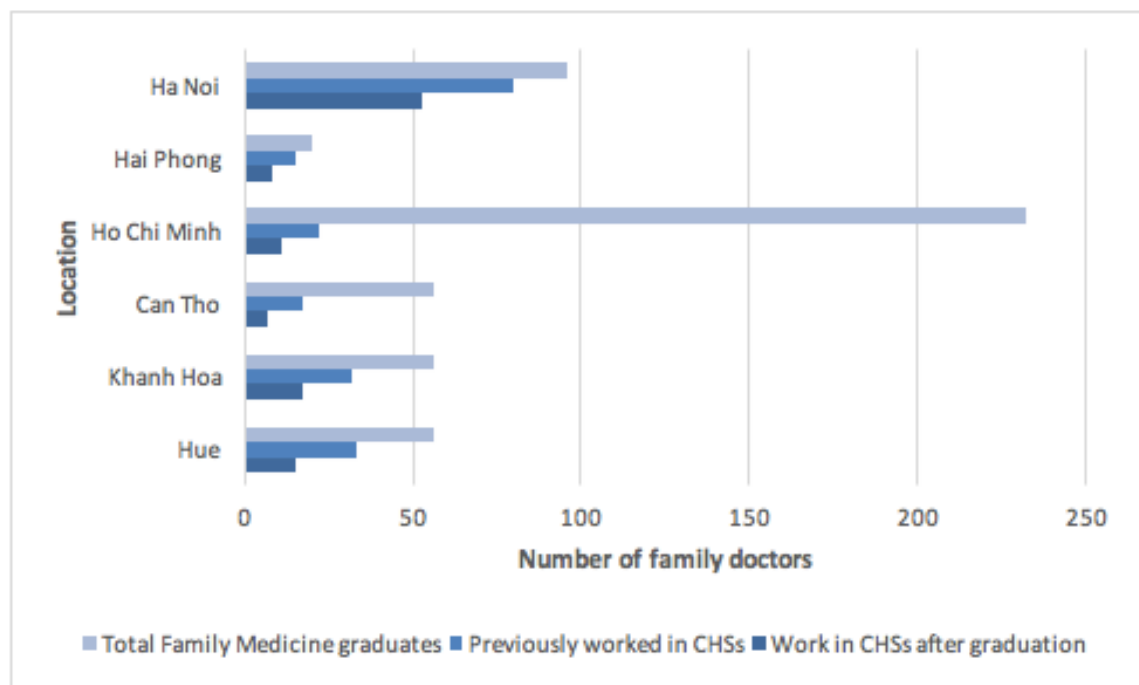
In sum, there is little evidence that appropriate interventions and favorable incentives to attract healthcare professionals to rural and remote areas have been promulgated. Currently, there is no incentive policy to attract family doctors to rural and remote areas rather than incentives for overall health workers.

### **1.9.3 Family doctor retention**

Even though family medicine is now an integral part of Vietnam's health policies, attracting and retaining family physicians to improve primary health care in rural areas present some challenges (Montegut et al., 2007). There has been a noticeable proportion of family physicians who have decided not to return to CHSs after earning their family medicine degree. Le (2011), in a report conducted by the Vietnam Center for Family Medicine in collaboration with Boston University Family Medicine, indicates a mass movement of family physicians from rural to urban areas after earning their specialty degree.

In 2011, there were six medical universities that offered a family medicine program. The number of family doctors who previously worked in CHSs was relatively smaller than the number of those who did not work at grass-roots level before seeking a family medicine degree. Moreover, there was a brain drain of family doctors to higher-level health facilities. The

retention rate of family doctors coming back to CHSs after earning their specialty degree was about 40-65 percent. The fact that a majority of family doctors was moving from CHSs to higher-level health sectors was considered due to more opportunities for family doctors in urban areas such as higher income, and a higher chance of working in/opening a private clinic (Thuc Pham, president, personal communication, September 19, 2016, University of Medicine and Pharmacy at Haiphong City). Figure 1.2 shows the retention of family doctors in CHSs.



**Figure 1.2. Retention of Family Doctors in Vietnam (as of 2011)**

### 1.10 Research Questions

This research evaluates the following questions:

1. How would the job choice of family physicians be influenced by individual characteristics and why?

2. How would family physicians trade off among different job-related attributes, including living condition, career development, and chance of opening a private clinic?
3. How would the choice of practice location of family physicians be influenced by job-related attributes?

### **1.11 Research Significance**

Family medicine development remains a top priority for the government of Vietnam. The Minister of Health, Nguyen Thi Kim Tien, implemented the family medicine scheme 2015-2020 with the aim of improving the quality of primary health care at the grass-roots level and reducing the patient overload at the provincial and the national levels. The strategy of Vietnam's Ministry of Health is to integrate family medicine services into the existing primary healthcare network which is considered to be well-organized. The findings of this research will benefit Vietnam's efforts to improve on its primary health care. The great demand for quality health services in rural and remote areas justifies the essential need for more appropriate interventions to attract and retain health professionals to these areas. The findings of this study serve as a framework to provide health administrators with more appropriate interventions. In Vietnam, health policy makers can use this information to support the implementation of family physician scheme 2016-2020. In other countries, especially where family medicine is still a new concept and getting family physicians to work in underserved areas has been a difficult task, this research serves as a guidance to explore determinants for recruitment and retention of family doctors for rural practice. For researchers, the study contributes to the limited literature on the attraction of family physicians to rural, underserved areas.

## 1.12 Conclusion

Vietnam health care is associated with an ideological orientation. From the centrally planned economy resulting from the reunion of the North and South of Vietnam in 1975 to a market driven economy initiated by the political and economic reform *Doi Moi* in 1986 through its current state, the Vietnam health care profile consistently reflects its political and economic transitions. However, though health services have improved enormously over the last century with political and economic improvement, health inequality is still a matter of concern. This is in large part due to wealth inequality and the changing nature of health problems. In the context of fragmentation of health system, primary health care and family medicine have been expected to promote equitable health care services.

A synoptic review of the Vietnam health care profile and family medicine has revealed several findings. First, there is a widening divide between urban and rural areas in terms of quality health care, access to health care services, and affordability. Second, there is a severe shortage of health professionals in commune health stations at the grass-root level, especially in worse off areas. Third, given Vietnam's resources, family medicine would become an efficient way to protect community health, especially at the grass-roots level, through improving health quality, saving cost, and ensuring health equity.

The main pitfall of the Vietnam health system is patient-preference for high-level health facilities and the neglect of efficient use of CHSs. The low utilization of the CHSs is likely due to people's lack of confidence in quality of health workers in CHSs. Though Vietnam's government has implemented policies and legislation aimed at improving the number of health professionals at the grass-root level, there is little evidence that these interventions have brought



a positive impact on the quantity and quality of health care services and staff at CHSs. Moreover, despite the Vietnam government's effort to integrate family medicine to a current commune health system, the turnover rate of family physicians in CHSs remains high.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The first part of Chapter 2 discusses Maslow's hierarchy of needs theory framework. Next is a literature review of factors that influence health workers' decision of job location and the connection of the Maslow theoretical framework to the literature. A brief overview of discrete choice experiment and systematic review of discrete choice experiment studies on health workers' decision of job location follows. Chapter 2 concludes with a literature review of studies in Vietnam, which reveals the dearth of the relevant literature and how this dissertation contributes to the field of study.

#### **2.2 Theoretical Framework**

In order to maximize the explanation of family doctors' intention to stay or leave rural posts, I used Maslow's hierarchy of needs theory to form the theoretical framework for this study.

##### **2.2.1 Maslow's hierarchy of needs theory**

Maslow's hierarchy of needs is a theory of motivation in which needs are divided into five categories, often depicted as hierarchical levels. First-level needs, or physiological needs, include the most basic elements for physical survival such as air, food, water, rest, and more.

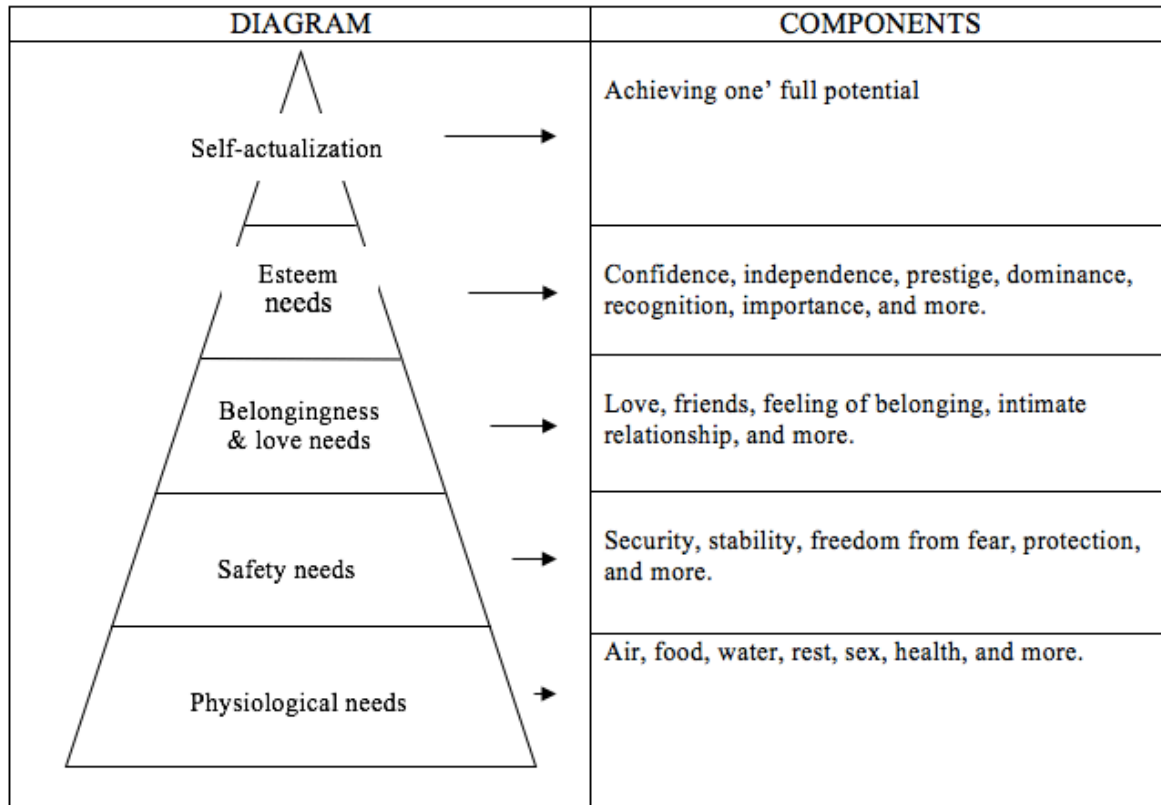
Second-level needs, or safety needs, include components for physical safety such as security, stability, freedom from fear, protection, and more. Third-level needs, or belongingness and love needs, include the need for feelings of belonging, love, friendliness, etc. Fourth-level needs, or self-esteem, include elements representing confidence, independence, prestige, dominance, recognition, importance, and so on. The highest level, fifth-level needs, or self-actualization, is associated with the desire to seek personal growth, get peak experiences, and develop one's capability to the fullest (Maslow, Frager, Fadiman, McReynolds, & Cox, 1970). The theory of motivation suggests that a person has to satisfy his or her lower-level need before desires the next higher-level need. Maslow's five-tier diagram of human needs is depicted in Figure 2.1.

Maslow's theory of motivation can be applied to employees' needs and motivations to work, ranging from the lowest-level needs to the highest-level needs.

***Physiological needs.*** Physiological needs are the starting point of Maslow's motivation theory. Maslow states that until all the physiological drives are satisfied, they will dominate human behavior, and push all other higher-level needs into the background. However, as soon as these needs are gratified, they stop motivating human behavior, and other higher-level needs emerge.

For most health workers, physiological needs such as food, water, shelter, and so on are easily satisfied through financial factors such as salary, reward, and allowances. According to the literature which will be discussed later, professional workers sometimes are motivated by higher-level needs such as education, development, promotion, and challenges than by higher salary alone. However, when a basic need such as a health issue arises, a professional worker still responds like all other human beings, which means he or she puts all efforts toward addressing

the basic need while ignoring all other needs. In order to satisfy this physiological need, the person needs to work harder to get more money to pay for it. This helps explain why a professional worker in many situations still puts the highest value on the physiological needs.



**Figure 2.1. Maslow's Hierarchy of Needs Pyramid Diagram**

***Safety needs.*** In terms of work, safety needs can link the work environment and also the work itself. Safety needs might not be achieved if an employee works in a dangerous and unstable environment or the worker is assigned to a non-proficient task. A safe working environment needs to ensure reasonable working hours, standard protection, well-planned

responsibilities, available assistance, etc. Also, any form of violence can inhibit people from moving to the next level of Maslow's needs.

***Belongingness and love needs.*** In terms of work, belongingness and love needs refer to the relationships between colleagues. Having sound relationships with colleagues, being accepted by co-workers, being a part of an organization, having some influence on colleagues, and receiving warmth and care from colleagues all contribute to the satisfaction of the need of belongingness and love (Cowin, 2002). Interpersonal dissatisfaction in the workplace is reported as one of the primary reasons resulting in the determination to leave their current work place. According to Maslow's theory, all human beings need to feel belongingness to a group and acceptance by a community. Health workers also have the need to be accepted within the workplace. Thus, in order to enhance the intention to stay, it is imperative to provide a friendly and supportive working environment in which workers feel they belong, feel they are being supported, and feel they are appreciated.

***Esteem needs.*** An individual is said to achieve esteem needs when he or she can feel or recognize their own confidence, independence, recognition, prestige, and importance.

In his study in 1970, Maslow divided esteem needs into two main categories: (a) the need for independence, and (b) the need for feeling confidence and appreciation by others (Maslow et al., 1970). In another study, Cowin (2002) divides esteem into two similar categories: (a) self-esteem – what a person values himself or herself, and (b) esteem from others – how a person is valued by others. Both positive self-esteem and positive esteem from others play a vital role in defining a person's behavior.

***Self-actualization needs.*** Self-actualization needs are the highest-level needs in Maslow's pyramid diagram and only emerge when all other lower-level needs are achieved. Fulfilling self-actualization needs means seeking personal growth and achieving one's full potential. In his study in 1954, Maslow explained self-actualization needs as when a person can "become everything that one is capable of becoming" (Maslow et al., 1970, p. 46). The four prominent characteristics of self-actualization needs are: (a) freedom – to be creative, (b) trust – to trust self and others, (c) honesty – be appreciate the real world and life, and (d) awareness – to experience limitless power and thus start to display moral standards (Maslow et al., 1970).

### **2.2.2 Exceptions to Maslow's theory**

The Maslow's hierarchy of needs has been popularly utilized in workplace disciplines to examine human motivation and needs. Specifically, health care workers, as all other workers, have hierarchy of needs. If the lower-level need is satisfied, the health care worker will move to the next level of needs. For example, after the initial motivation such as income is fulfilled, a health worker will move to the next higher level, safety needs. However, if one level of needs is not satisfied, the worker might consider leaving the workplace.

There are exceptions in Maslow's theory. According to Maslow, it is not necessary for a need to be fulfilled 100 percent before the next higher-level need emerges. Maslow explains that at the same time, an individual mostly feels partially satisfied and unsatisfied in all his or her basic needs. Also, according to Maslow, different individuals have different levels of satisfaction for different needs (Maslow et al., 1970). For example, a person who has never experienced

chronic hunger might look upon food as unimportant thing. Similarly, a person who is used to living in safe society is apt to underrate the freedom from fear.

## **2.3 Literature Review of Factors that Influence Health Workers' Decision of Job Location**

This section summarizes findings of the literature review on factors that influence health workers' choice of job location, specifically their decision to (re)locate to rural and remote areas. These factors can be grouped into different three categories for the purposes of analysis and policy making: (a) personal factors, (b) living condition factors, and (c) work factors. Personal factors refer to demographics and personal experiences such as age, gender, marital status, origin, and education background; living condition factors can include the local-living environment such as infrastructure, transportation, education, and entertainment; work factors encompass factors related to the working environment, such as labor relations, management styles, equipment, education opportunity, salary policy, promotion opportunity, and short-term contract. The literature mostly simplifies the interaction of these factors and examines the main impact of each factor group on a health worker's decision of job location (see Figure 2.2).

### **2.3.1 Personal factors**

Many studies have evaluated health workers' characteristics and location of practice choice. These studies are in agreement about the impact of demographic and personal experiences on health workers' decisions of job location.

First, many studies find a significant impact of the geographical origin of health workers on their choice of workplace (Chan et al., 2005; Curran & Rourke, 2004; Laven & Wilkinson, 2003; Rabinowitz, 1993). Rural-born physicians are more likely to practice rurally than the non-rural-born. Also, there is considerable agreement that rural upbringing increases the probability of opting for a rural post (Bellinger, 2009; Mullan & Frehywot, 2008). The rural upbringing characteristic is identified as a significant difference between those who plan and do not plan to practice in a rural area (Royston, Mathieson, Leafman, & Ojan-Sheehan, 2012).

Second, regarding marital status, J. P. Smith and Thomas (1998) identify the importance of the spouse in the choice of job location. Considering the role of entire household as well as the spouse, the authors concluded that not only spousal characteristics but also the attributes of other family members including parents, siblings and parents in-law all have a strong influence on the workers' mobility. B. Smith, Muma, Burks, and Lavoie (2012) conducted a nationwide cross-sectional survey of physician assistants that found that support of and for spouse and other significant ones is the most important factor in these health workers' choices of first job location in the United States. In terms of having children status, Serra, Serneels, Lindelow, and Montalvo (2010) indicate that married health workers with children below school age are more likely to work rurally in Ethiopia.

Third, studies show that health workers who previously studied in rural-located medical schools tend to work in rural areas (Rosenblatt, Whitcomb, Cullen, Lishner, & Hart, 1992; J Rourke, 1996). Thus, some countries such as Norway, Japan, and Canada have built medical schools in disadvantaged areas in order to entice these graduates from these schools to rural areas (Curran & Rourke, 2004). According to Longombe (2009), a descriptive study about distribution



of physicians in Congo, almost 100 percent of graduates in rural medical school work in the same province where their medical school located, of which 81 percent work in rural areas of the province. Meanwhile, the percent of graduates from urban-located medical schools who decide to work in rural areas is only 26 percent.

At the same time, there is an inconclusive relationship between decisions of job location and several other personal characteristics. First, the relation of gender and age to decisions of job location is inconclusive. While some studies conclude that there is not convincing evidence of a link between gender, age, and job location (Bellinger, 2009; Royston et al., 2012), other studies find scientific evidence that do support this relationship. Larson, Hart, Goodwin, Geller, and Andrilla (1999) and Wordsworth, Skåtun, Scott, and French (2004) are in agreement that it is easier to entice male than female workers to practice rurally. Kolstad (2011) reports that male workers are more responsive to monetary incentives than female workers. Second, the impact of rural-oriented medical curricula on the likelihood of health workers entering rural practice is also unclear. While some studies suggest that there is a significant correlation between rural-oriented medical curricula and physicians' choice of practice in rural areas (Chan et al., 2005; Curran & Rourke, 2004), other studies find that exposure to rural practice is insignificantly associated with overall choice of rural practice (Eley & Baker, 2006; James Rourke, 2010).

### **2.3.2 Living condition factors**

The literature is unanimous in indicating the profound impact of general living environment on decisions of job location. Health workers indicate local living environments such

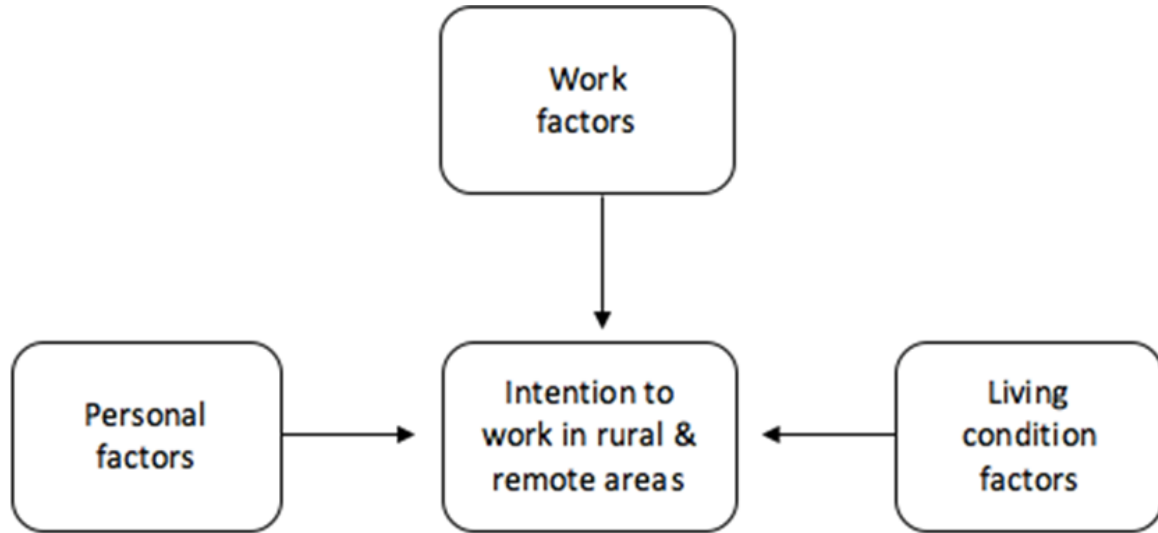
as schools, qualified teachers, electricity, drinking water, roads, transports, and entertainment as prominent factors that push them away from choosing rural areas. When health workers are asked what would attract them to urban areas, issues of general infrastructures, such as good schools and good drinking water, are the most common pull factors (Kim, 2000; Kunaviktikul et al., 2001).

### **2.3.3 Work factors**

Financial incentives and non-pecuniary incentives, such as salary policy, professional support, management styles, promotion opportunity, education opportunity, availability of equipment, and regulation, have been identified as essential factors to address the issue of health professional shortage areas. While higher salary is positively associated with increasing intention to remain (Ditlopo, Blaauw, Bidwell, & Thomas, 2011; Kunaviktikul et al., 2001), there are other deciding factors that influence health workers' decisions. For example, Awases, Gbary, Nyoni, and Chatora (2004) report only 24 percent of health workers cite pursuit of a higher salary as the main reason for leaving. Working environment such as professional support, management styles, availability of equipment, and appreciation by the community are other notable factors driving health workers to or away from disadvantaged areas (Awases et al., 2004; Buchan, 2004; Dieleman et al., 2003; Zurn, Dal Poz, Stilwell, & Adams, 2004).

The relationship between non-financial incentives and choice of rural practice varies in different contexts. For example, J. R. Bloom, Alexander, and Nichols (1992) find no correlation between opportunity for career advancement and willingness to serve in underserved areas. By

contrast, Awases et al. (2004) maintain that health workers readily deliver health care service in underserved areas for a time in exchange for additional subsidized professional training courses.



**Figure 2.2. Factors that Influence Health Workers' Job Location Decision**

## **2.4 Literature Review of Vietnam Context Studies**

Only few studies focus on healthcare providers in Vietnam. These studies have yielded mixed findings of effective interventions. The study by Dieleman et al. (2003) was the first to look at factors that motivate and discourage rural health workers in Vietnam. Using qualitative methodology, the authors conducted interviews and group discussions among policy makers, managers, and health workers in two Northern provinces, Bac Ninh, one of the most developed provinces and Lao Cai, one of the least developed provinces. The study showed that health workers are influenced by both pecuniary and non-pecuniary incentives. Dieleman et al. (2003) shed light on three deciding factors: appreciation by managers, salaries, and working conditions. Being recognized and respected by managers, colleagues, and community strongly improves

health workers attitudes, satisfaction, and performance. The study also points out that low salaries and an unstable job strongly discourage health workers to serve in rural areas. An unstable job and insufficient salary cause unhappiness among public sector workers, distract health workers from their regular job, and force them to find other income sources. However, the extent to which low salaries make health workers leave their rural job was not investigated in this study. Poor working conditions such as lack of equipment also discourage rural doctors to remain in CHSs. In terms of subgroup analysis, the study concludes that there are no differences between male and female health workers in terms of motivating and discouraging factors. However, this finding was not quantitatively tested because the study was qualitative; thus, potential statistically differences in gender is yet to be ascertained.

T. T. M. Oanh et al. (2007) uses focus group and key informant interview to reveal problems facing health human resources and factors informing health workers' decision to leave the CHSs in two mountainous provinces, Dien Bien and Lam Dong. These two provinces have significant lower ratios of doctor per 10,000 in comparison with the national average ratio. The findings indicated that the CHSs in the two provinces were experiencing human resources problems, manifesting prominently by the acute shortage of doctors and the high level of turnover among these doctors. While district health facilities have relatively balanced proportional distribution of doctors and assistant doctors (16.7 percent and 24.4 percent), CHSs experience disproportionate distribution of doctors compared to assistant doctors (6.6 percent and 45 percent). The findings from this study by Oanh et al. (2007) indicated that insufficient income discourages rural doctors to remain in CHSs. In comparison with their rural colleagues, urban health workers have lower basic salaries; however, their total income is much higher as a

result of additional income sources such as earnings from hospital profit-share, gifts from patients, income from dual job, and other advantages. Again, the decision to stay or leave the CHSs is based on other deciding factors such as opportunities to gain professional knowledge and clinical skills, better living conditions, provided houses, and gaining the recognition of government authorities. However, Oanh et al.'s (2007) study does not investigate the relative importance of these deciding factors and does not also test the relative impact of the factors within different subgroup population of health workers.

While Dieleman et al. (2003) and T. T. M. Oanh et al. (2007) delineate a “laundry list” of deciding factors, T. H. V. Nguyen, Thi Minh Hanh; Vu, Van Hoan (2011) find that salary is the most crucial factor encouraging doctors to remain at their designated posts. The study is a cross-sectional study which was conducted in five provinces with sample size of 3,200 respondents including policy makers related to allowance policies and health workers at all four levels. The key finding from this study was that although many allowance policies have been revised, they do not satisfy health workers. About 74 percent health workers stated that monthly income does not cover living expenses. The study therefore concluded that the disproportionate distribution in income leads to health workers’ dissatisfaction, insecurity and ultimately their decision to leave their health posts.

Similar to T. H. V. Nguyen, Thi Minh Hanh; Vu, Van Hoan (2011), Witter, Ha, Shengalia, and Vujicic (2011) find that salary is the most important factor that might encourage doctors to serve rurally. The qualitative study took place in Lao Cai and Thai Binh, the two provinces with low density of doctor. Key informant interviews and in-depth interviews with policy makers and doctors focused on doctors’ desirability of job attributes and policy makers’

perception of policy options motivating doctors' acceptance and retention in rural posts. The research concluded that for rural doctors, stable job and income, being close to their families, and living in their hometown are the main reasons keeping them at their rural posts. For urban doctors and rural doctors who may wish to leave to higher-level facilities, factors motivating them to move were ranked in the following order: salary, working conditions, training opportunities, promotion, living condition, and management. Policy makers also stated that payment inequality was the main factor driving doctors away from rural areas. The study also concluded that the three key deciding factors that influence health workers' decisions are pecuniary incentives, career development, and management factors. However, the small sample size (32 respondents) might lead to biases. Again, this study does not also provide subgroup population analysis.

The only quantitative study investigating health labor market dynamics in Vietnam, Vujicic, Alfano, Shengalia, et al. (2010) and Vujicic et al. (2011) took place in three regions including the mountainous Northern Uplands, Mekong Delta, and Hanoi; the first two are predominantly rural areas with low doctor density and Hanoi is the capital city of Vietnam. The research has sample size of 292 doctors and 105 final-year medical students. Though there are no differences between people at different age or of different gender between regions, rural doctors from Northern Uplands and Mekong Delta tend to live in rural areas before training as health professionals than their urban counterparts. The findings suggested that long-term education was the most effective intervention to entice medical students while workplace location was the most important job attribute for doctors (Vujicic, Alfano, Shengalia, et al., 2010). The results also indicated that doctors value non-pecuniary incentives less and pecuniary incentives more than

medical students (Vujicic, Alfano, Shengalia, et al., 2010). Among interviewed doctors, factors contributing to their job satisfaction included increased wage (the most highly cited), followed by training opportunities, adequate equipment, and relations with managers. According to these studies, wages of rural doctors are set higher than their urban counterparts, VND 3.1 million VND compared to VND 2.9 million, respectively. However, when other income sources such as allowances, gifts from patients, hospital profit-share, income from other jobs are taken into account, the total income of an urban doctor can double the income of a rural doctor (Vujicic et al., 2011). Also, as the level of health facilities increase, official income increases. Doctors at national level health facilities have the highest official income, VND 5.9 million, almost double doctors at CHSs, VND 3.1 million (Vujicic et al., 2011). In terms of subgroup analysis, the findings indicated that doctors who previously lived in rural areas value an urban job less than doctors who did not have rural living experience, and doctors with higher educated parents value an urban job more than doctors from worse-off families. Though there are not many subgroup analysis, the findings from these two studies showed considerable heterogeneity among doctors. In terms of methodology, these are the only quantitative studies that explored the labor market dynamics in Vietnam's health sector. The qualitative studies discussed above use convenient cross-sectional survey methodology, which is unable to reveal the relative importance of each job characteristics over each other as well as examine the impact of different job characteristics on different groups.

## **2.5 Connecting the Theoretical Framework to the Literature**

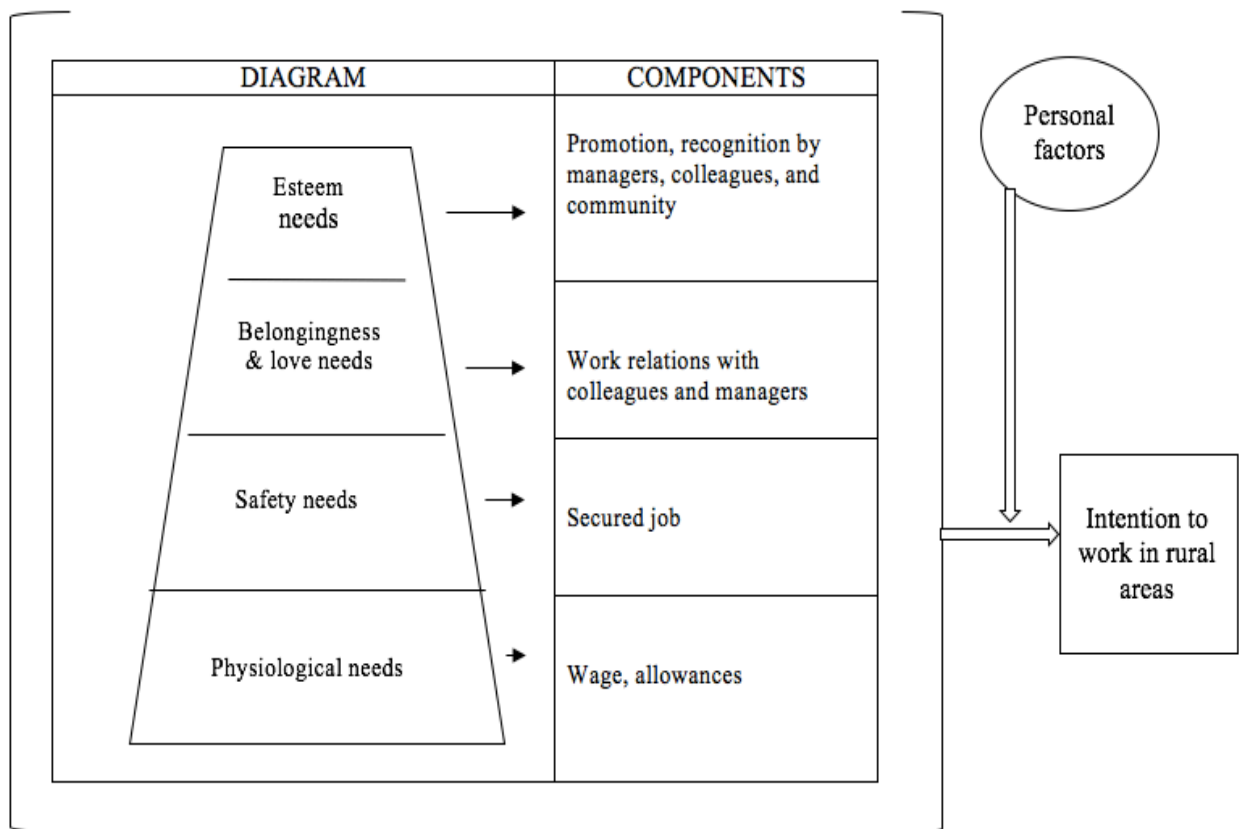
Few tools have been used to investigate the factors driving healthcare workers' job location decisions. In reviewing the literature, most studies focusing on factors influencing the attraction and retention of health workers to rural areas are qualitative, cross-sectional surveys. This popular methodology mainly estimates how personal factors, living condition factors, and work factors correlate with health workers' intention to stay or leave. These studies mostly simplify the complexities of interaction and ignore subgroup analysis. In other words, these qualitative, cross-sectional studies are unable to reveal the relative importance of the factors influencing health workers' job location decisions (Kolstad, 2011; Mandeville et al., 2014).

However, when attention is paid to Maslow's theorization, we observe that different individuals have different levels of satisfaction for different needs. As such, this dissertation draws from this theorization to contribute to the dearth in the literature about how individual characteristics (demographic and personal experiences) interact with living condition factors and work factors to influence health workers' job location decisions. To put it differently, this dissertation conducts theoretically-grounded examination into whether different subgroups of health workers (i.e. based on age, gender, place of residence, working experiments, etc.) put different values on different living condition factors and work factors, which in turn influence their job location decisions.

Based on the focus group discussions with family doctors as part of this dissertation and the literature reviewed, this dissertation relates Maslow's hierarchy of needs to the job location decision preferences of Vietnam family doctors. Physiological needs can relate to financial incentives such as wages and allowances. Safety needs can relate to the feeling of a secured job



in health sector. Belongingness and love needs can relate to work relations with colleagues and managers. Esteem needs can relate to career development such as promotion and being recognized and respected by managers, colleagues, and community. Self-actualization needs such as seeking ultimate personal growth and experiencing limitless creativity and power was neither mentioned in the six Vietnam context studies nor in the interview of family doctors conducted. Thus, self-actualization needs were excluded in the analysis conducted as an attempt to connect the Maslow's hierarchy of needs theory to the job location decision preferences of Vietnam family doctors (see Figure 2.3).



**Figure 2.3. Conceptual Framework**

In this study, I did not intend to examine the hierarchy of Maslow theory. What I sought to find with this study was support for Maslow's statement that different people have different evaluation standards for the different levels of needs. For example, this study examined if male doctors have higher evaluation for promotion than female doctors after their salary need is fulfilled. To be specific, if 50 percent income increases, would it have the same impact on both male and female health workers? Additionally, would an additional 50% increases have similar impact on male and female health workers as the impact of a promotion offer. If males put higher value on promotion, it means males have a higher need for self-esteem than females in terms of promotion. These findings are useful for managers and policies makers in terms of helping them design appropriate solutions for different subgroups of health workers (see Figure 2.3).

## **2.6 Research strategies for discrete choice experiment**

As noted, the popular cross-sectional survey tool is unable to reveal the relative importance of these factors over each other (Kolstad, 2011); Mandeville et al. (2014). Controlled experiment methodology is hardly to be used due to ethical and political reasons such as possible requirements of national policy changes and difficulties of implementing appropriate controlled conditions for proper evaluation (Blaauw et al., 2010; Mandeville et al., 2014; Mills, Gilson, Hanson, Palmer, & Lagarde, 2008). Another potential methodology was empirical studies using longitudinal "revealed preference" data on health personnel. The longitudinal study methodology goes beyond qualitative survey method in terms of providing relative importance of different factors shaping health workers' preferences (Antonazzo, Scott, Skatun, & Elliott, 2003; Shields, 2004). The longitudinal analysis is based on the actual labor market decision; however, there are

very few countries for which this longitudinal data exists. In many developing countries, weak information systems impede longitudinal studies (WHO, 2006). In light of this limitation, stated preference and its common type, discrete choice experiment (DCE), have become increasingly popular (Kjær, 2005). DCE can estimate the impact of each factor on intention to move to work in rural areas through WTP and take-up rate while dividing by subgroups to examine how different subgroups evaluate different factors.

In the next section, after providing a brief overview of stated preference, I discuss stages in conducting discrete choice experiment including: (a) identification of choice attributes and levels, (b) selection of experimental design, (c) development of questionnaire and data collection strategy, and (d) the relevance of modeling applications to this study.

### **2.6.1 Choice experiments in brief**

The increasing popularity of state preference (SP) methods can be explained by the advantages of SP over traditional qualitative survey and empirical studies. SP are the only methods that can measure economic value of hypothetical goods and services (Kjær, 2005). SP can measure the preferences of health workers toward different job attributes (M Ryan, Kolstad, Rockers, & Dolea, 2012). SP can calculate how the level of each attribute might change the uptake rates of a hypothetical job (Wordsworth et al., 2004). It also can observe the potential interaction among the attributes and identify how subgroups react differently to attributes. Two common types of SP used in human resources studies are contingent valuation method (CVM) and discrete choice experiment (DCE).

CVM is the most simplified stated preference technique since the respondents are typically asked whether or not they would be willing to accept a specific amount of monthly salary for a rural job with certain attributes that are explicitly described in the survey scenario (Champ & Welsh, 2006; R. M. Johnson & Orme, 1996; Mandy Ryan, Gerard, & Amaya-Amaya, 2007). The CVM approach is often seen as a “holistic approach, with a value being estimated for the good as a whole” (Mandy Ryan et al., 2007, p. 4). When the scenarios given to respondents differ in terms of attributes, CVM relies on comparing responses across subjects in order to infer the importance of these attributes. Though CVM is rarely used in the area of human resources, it is advantageous in some particular cases. Specifically, CVM is a frequently-used hypothetical approach to elicit information on private demand and willingness to pay (WTP) when there are no observable salaries to reflect employees’ evaluations of salary for which they agree to accept a particular job. For example, the CVM approach is used to assess medical graduates’ expected salary levels so that they are willing to work in rural areas. It has provided policy makers with economic evidences such as the potential uptake level of health workers at a given benefit level, especially when those medical graduates have not yet entered the labor market. CVM in this case can provide counterfactual choices (Serneels et al., 2010).

DCE has been adapted and applied to non-market valuation as an alternative or compliment to CVM (R. M. Johnson & Orme, 1996). DCE is a quantitative methodology used to elicit preferences (Mandeville et al., 2014). The assumption of DCE is an individual chooses a good or service depends on the attributes of that good or service (Hensher, Rose, & Greene, 2005). DCE evaluates the relative importance of the different attributes that influence individual behavior (Lagarde & Blaauw, 2009). DCE is similar to CVM on a theoretical basis and in terms

of its empirical preference elicitation process, but it employs a repeated measures approach while CVM typically asks participants to choose between a base option (status quo) and a single alternative. Thus, DCE provides researchers with tradeoff information among the attributes that helps infer what dynamics actually drive the respondents' choices, while CVM typically offers only a limited tradeoff information between a good or service in itself and its price (Stevens et al., 2000) and the probability of job uptake. These information cannot be obtained from survey components nor longitudinal study when new policies are being implemented since such data does not exist by that time (M Ryan et al., 2012). Some argue that the decision exercise in DCE is more realistic to the respondents and thus better simulates their behavior in real life (Hall et al., 2002). In addition, because DCE collects more information from each respondent than CVM, it often requires smaller sample sizes.

The DCE is based on random utility theory as well as is consistent with the work of Lancaster (1966). Random utility theory has been the foundation of discrete choice experiments (D. McFadden, 1986). The main content of random utility theory is that individuals act rationally and make choices that bring them the highest utility. Further, it is important that choice is a function of utility. The theory follows that the construct of utility is latent rather than systematic (Manski, 1977), meaning what constitutes individual utility can be neither observed nor measured. Though a researcher cannot obtain a true utility function, the researcher can reveal a significant portion of the latent utility based on the choices of respondents over a set of alternatives. Still, another portion cannot be explained. The researcher can therefore make a series of assumptions about unobserved variables to mathematically analyze respondents' utility function.

Lancaster's work proposes that the demand for good or service is the demand for a specific combination of characteristics of good or service (Lancaster, 1966). The main content is that the good or service has multiple characteristics, and it is the characteristics that bring utility to the consumer. Lancaster (1966) maintains that consumers assign weights to each characteristic. Consumers will choose a good or service that has combined attributes to bring the highest utility. As such, using random utility theory to examine what consumers derive from good or service attributes fits the context of family physician choice. Family physicians tend to choose the hypothetical job that combines the job attributes and attribute-levels that bring them the highest utility.

### **2.6.2 Stages in conducting the discrete choice experiment design**

Given that DCE data is revealed from hypothetical alternatives, each stage in conducting DCE design was carried out carefully in order to minimize any potential bias, which could result in lacking validity. The next section provides a brief overview about stages conducted in designing DCE.

***Identification of choice attributes and level.*** The first stage is to identify job attributes and assign associated levels to each attribute that would influence health workers' job decision (M Ryan et al., 2012). This stage can involve several extensive practices including: (a) literature review, and (b) qualitative techniques such as focus group, in-depth interview, one-on-one pretesting, and pilot study. Studies have discussed the importance of qualitative technique in deriving the attributes and attribute-levels (Coast & Horrocks, 2007; De Bekker-Grob, Ryan, &

Gerard, 2012; Kolstad, 2011; Kruk et al., 2010; Mangham, Hanson, & McPake, 2009; Rao, 2012). Literature review is quick and simple; however, the technique can omit important attributes because it does not address the specific context. Focus group and in-depth interview with participants and key decision makers can bring out important attributes that address the specific context of the study. Additionally, participants may give the interviewer information that cannot be found in available literature, while decision makers may confirm this if the attributes are feasible (M Ryan et al., 2012). The selected attributes and their levels should be relevant to answer the research question, motivate trade-off among job attributes, and be feasible in a management or policy context.

The number of attributes and attribute-levels is also an important factor. An acceptable number of attributes should be as few as possible to alleviate the cognitive challenge while still ensuring the comprehensiveness and quality of the data. De Bekker-Grob et al. (2012) and Clark, Determann, Petrou, Moro, and de Bekker-Grob (2014) both point out the trend of integrating fewer attributes of DCE studies in the area of human resources. The average number of incorporated attributes decreased from seven to five, and the proportion of studies with four or five attributes account for a third of studies as of 2012 (Clark et al., 2014; De Bekker-Grob et al., 2012). Given a constant number of choice cards and sample size, the decrease of number of selected attributes and attribute-levels increases the precision of estimated coefficients for each attribute (Witter et al., 2011).

***Selection of experiment design.*** After establishing relevant attributes and attribute-levels, the next stage is to construct the combination of attributes and their levels (M Ryan et al., 2012). Generally, if there are A attributes, and each attribute has L levels, then the number of possible

combination is  $L^A$ . More specifically, if there are four attributes, and each attribute has three levels, then the number of possible combinations is 81 ( $3^4$ ). If each choice set has two alternatives, then the number of possible choice sets increases dramatically, i.e. this example would have 3240 possible choice sets. A researcher can use a full fractional design if presenting all 3240 choice sets to participants. However, the task is usually impossible since there are many choice sets and the sample is limited. A manageable design can be derived using different design methods.

Fractional factorial design using main effect fractional factorial design method allows preferences for all hypothetical options to be identified. The design method ensures the following criteria of fractional factorial design: (a) Orthogonality – the correlation between different attribute levels should be minimized/ attribute levels should be statistically independent; (b) Level balance – the number of times each attribute level appears should be equalized/ equal chance of being chosen; and (c) Minimal overlap – same attribute levels of two options should not appear together in one choice set. The quality of orthogonality is important to avoid attributes blending together, so that the main effect of the attributes can be identified. However, orthogonality design may generate unrealistic attribute combinations, such as “low income – fast track promotion.” Fractional factorial design can generate a large number of choice sets; however, in this case, blocking design can be used to reduce the cognitive burden for respondents by dividing the generated choice sets into subsets.

Another design that can be used to derive manageable design is a statistically efficient design called “D-efficiency” design. The D-efficiency design sacrifices orthogonality criteria. Instead, the design aims to minimize the variation around parameters by minimizing the



estimated standard errors. Thus, D-efficiency design ensures a balanced utility (M Ryan et al., 2012). D-efficiency design can be generated using software such as SAS, Ngene, and Sawtooth. Each software uses underlying design characteristics to achieve the statistically efficient and balanced utility. In this study, I used Sawtooth software, which has been increasingly used in human health researches (Kruk et al., 2010; Rockers et al., 2013) due to its ability to produce statistically efficient design. The study is also received a partial grant from Sawtooth Software company.

***Development of questionnaire and data collection strategy.*** After attributes and their levels are identified and an experimental design is selected, an initial choice set is established. The combination of all selected attributes at different levels is termed a scenario. Several scenarios create a choice set. After that stage, the researcher usually conducts pretesting and a pilot test, in which respondents are asked to choose the most preferred hypothetical alternatives in choice sets.

The purpose of pretesting is to identify problems such as wording and content of the initial choice sets and supplemental questions. During a pretest, a research often uses verbal protocol technique to ask participants what they think about the content and wording of the questionnaire. The researcher can use this data to identify problems of the survey instrument. After the pretest, the choice cards and supplement questionnaire may be revised. Following the pretesting is usually a pilot test with the primary objective of verifying comprehension and coverage of job attributes and levels before the real test. This technique is useful in identifying any flaws of the survey instruments. Strategies for respondent recruitment into the pilot test

depends on the nature of the study, such as random sampling, stratified sampling, and cluster sampling.

In terms of sample size, Johnson, the author of Sawtooth Software's Choice-Based Conjoin (CBC) System, determined that "having each respondent complete ten tasks is as good as having ten respondents complete one task"; however, it does not make sense to compare "one respondent complete 1,000 tasks" with "1,000 respondents complete one task" (R. Johnson & Orme, 2010, p. 64). However, if a researcher obtains data from several hundred respondents, doubling the appropriate number of tasks a respondent completes is as good as doubling the sample size (R. M. Johnson & Orme, 1996). According to R. M. Johnson and Orme (1996), the rule-of-thumb for required sample size on the choice experiment is:

$$\frac{NTA}{C} \geq 500$$

where

N = number of respondents

T = number of tasks (choice sets) per respondent

A = number of scenarios per choice set

C = number of "analysis cells" to estimate main effects

There are several main data collection methods including mail survey, telephone interview, computer-based questionnaires, and face-to-face interview. Though the first two methods, mail and telephone, are cost-effective, they are potentially biased in the way that only respondents with some specific characteristics respond, and the completion rate is also relatively lower than other methods. Computer-based method is a convenient and relatively cost-effective method. However, it might not be feasible in some settings (e.g. rural and remote areas without

computers and internet). In contrast, face-to-face method potentially improves the data collection (e.g. interviewers can approach participants in disadvantaged areas) as well as the consistency of data (e.g. interviewers help to increase the completion rate among various respondents as well as ensure respondents are engaged in the interview). The method, however, is the most expensive. In order to improve the consistency of data by making respondents take the interview more seriously, the researcher can use a cheap talk script (M Ryan et al., 2012). The cheap talk script can be a few sentences or several paragraphs, underlining the importance of respondents' answers and should be read to respondents before the real survey. There is strong evidence supporting that the cheap talk script makes hypothetical alternatives more realistic and helps reduce unrealistic answers, thus reducing biased estimation (Ladenburg, Bonnicksen, & Dahlgaard, 2011).

### 2.6.3 Econometric considerations

As previously discussed, DCE is based on two important assumptions of consumer behavior: (a) random utility theory, and (b) Lancaster work. The random theory states that a rational individual makes choices that result in the highest utility for the individual. A researcher uses the utility equation:

$$U_i = V_i + \varepsilon_i$$

$$V_i = \alpha_1 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_m x_{mi} \quad (1)$$

in which  $U_i$  is the true but unobservable utility for alternative  $i$ .  $U_i$  is decomposed of  $V_i$  and  $\varepsilon_i$ .  $V_i$  is a utility function that depends solely on observable factors. The deterministic component  $V_i$  is

a function of  $m$  observable attributes  $(x_1, x_2, \dots, x_m)$ . For example, using the factors income, living condition, and career promotion for job option – each is valued at a certain weight  $(\beta_1, \beta_2, \dots, \beta_m)$ .  $V_i$  is the explainable proportion of the variance in choice.  $\varepsilon_i$  is a utility function that represents unobservable factors to researchers and is treated as a random component.  $\varepsilon_i$  is the unexplainable proportion of the variance in choice. According to D. L. McFadden (1974), the parameters of observable component  $V_i$  is linear and can be estimated using regression.

Assuming that an individual choose between two alternatives,  $i$  and  $j$ , the probability is:

$$P_i = \text{Prob}(U_i > U_j) = \text{Prob}(V_i + \varepsilon_i > V_j + \varepsilon_j) = \text{Prob}(V_i - V_j > \varepsilon_j - \varepsilon_i) \quad \forall i \neq j \quad (2)$$

By making assumptions of independent and identical distribution on  $\varepsilon_i$ , the equation (2) can be estimated using standard econometric techniques, given estimations of  $\alpha_1, \beta_1, \beta_2, \dots, \beta_m$  in equation (1).

There are several statistical models suited to analysis of choice data, which are discussed in the next section.

***Pure conditional logit model.*** A researcher can use the pure clogit model in a discrete choice experiment. The utility  $U_{ni}$  that a person  $n$  obtains from choosing alternative  $i$  is:

$$U_{ni} = V_{ni} + \varepsilon_i = \beta x_{ni} + \varepsilon_{ni} \quad (3)$$

in which,  $x_{ni}$  is a matrix of attributes of the  $i^{\text{th}}$  alternative relative to individual  $n$ .  $\beta$  is the vector of parameters relative to the alternative  $x_{ni}$  to the utility of person  $n$ . The parameter is not subscripted by  $i$ , implying that there is only one coefficient on each attribute for all the possible alternatives. In other words, even though the value of attributes varies across all possible alternatives (represented by attribute-levels), the effect of each attribute is constant. The

probability that person  $n$  chooses the  $i^{\text{th}}$  alternative among  $K$  alternatives is presented in equation (4):

$$P_{ni} = \frac{\exp(\beta x_{ni})}{\sum_{i=1}^K \exp(\beta x_{ni})} \quad (4)$$

Any variable that doesn't vary across the choices will be cancelled out. For example, if the variable that measures gender does not change over the choice of an individual, the variable gender is dropped from the equation (4). In a pure conditional logit model, there is no constant because this variable does not vary over the alternatives.

**Multinomial logit model.** A researcher can also use the multinomial logit model (MNL) in a discrete choice experiment. The utility  $U_{ni}$  that a person  $n$  obtains from choosing alternative  $i$  is:

$$U_{ni} = V_{ni} + \varepsilon_{ni} = \beta_i x_n + \varepsilon_{ni} \quad (5)$$

in which,  $x_n$  refers to the characteristics of person  $n$  to his/ her utility for the  $i^{\text{th}}$  alternative.  $x_n$  is only subscripted by  $n$ , not  $i$ , which means the characteristics is individual-specific.  $\beta_i$  is the vector of alternative-specific parameters. For example, in this case, the parameter is subscripted by  $i$ . This is how MNL differs from pure conditional logit model. In the MNL, the effect of characteristics ( $\beta_i$ ) varies across all the alternatives. In other words, each characteristic has a separate coefficient for each possible outcome. For example, if gender of person  $n$  is a characteristic, then the effect of gender on choosing alternative  $i$  ( $\beta_i$ ) will differ from the effect of gender on choosing alternative  $j$  ( $\beta_j$ ). The probability that person  $n$  chooses the  $i^{\text{th}}$  alternative among  $K$  alternatives is presented in equation (6):

$$P_{ni} = \frac{\exp(\beta_i x_n)}{\sum_{i=1}^K \exp(\beta_i x_n)} \quad (6)$$

In sum, both MNL and pure conditional logit models analyze the choice of an individual among a set of  $K$  alternatives. The main distinction between the two models is that a pure conditional logit model focuses on the set of alternatives for each respondent and uses characteristics of alternatives as independent variables while MNL focuses on each respondent as a unit of analysis and uses respondents' characteristics as independent variables (Hoffman & Duncan, 1988).

**Mixed logit model.** Mixed logit model is a powerful model as it combines MNL and pure conditional logit model (K. E. Train, 2009). Mixed logit model can examine how respondent  $n$ 's characteristic (MNL) and characteristics of alternatives (pure conditional logit) influence the probability that respondent  $n$  chooses the  $i^{\text{th}}$  alternative. Thus, mixed logit model allows for heterogeneity of preferences for attributes among respondents (Lancsar & Louviere, 2008; Mandeville et al., 2014; Scott et al., 2013). The utility  $U_{ni}$  that a respondent  $n$  obtains from choosing alternative  $i$  in the mixed conditional logit model is:

$$U_{ni} = \beta_i x_{ni} + \varepsilon_{ni} \quad (7)$$

in which,  $x_{ni}$  refers to alternative-specific independent variables of the  $i^{\text{th}}$  alternative relative to respondent  $n$  and the individual-specific independent variable characteristics of respondent  $n$ .  $\beta_i$  is the vector of alternative-specific parameters and is subscripted by  $i$ . The utility coefficient estimate  $\beta_i$  is calculated from the mean utility estimate and the individual-specific deviation from that mean (Lancsar & Louviere, 2008).  $\beta_i$  for each attribute allows for the heterogeneity of individual preference among respondents. In comparison to MNL and pure conditional logit model, MXL can provide a higher degree of accuracy as it can accommodate individual-specific independent variables (Mandeville et al., 2014; D. McFadden & Train, 2000) as well as allow the

specified coefficients of attributes ( $\beta$ ) randomly distributed among respondents (Louviere, Hensher, & Swait, 2000). All of this helps to improve the realism of model estimation.

#### **2.6.4 Application of model results**

The responses given over choice tasks enable a researcher to indicate the relative importance of the attributes using regression technique. The coefficient obtained from the statistical models can be used for the following purposes. First, the significance and magnitude of the regression coefficients show whether or not the attributes statistically influence respondents and if yes, how. Second, the direction of the regression coefficients provides a check on the internal validity (M Ryan et al., 2012). For example, the direction of income attribute can check if the income attribute follows the economic theory that monetary incentives have positive impact on the probability of taking a job. Third, the ratio of the regression coefficient provides an evaluation of how trade-offs are made between various attributes, represented through willingness to pay (WTP). WTP is the amount of money that individuals are willing to forgo to obtain a higher level of a particular attribute (Vujicic, Alfano, Shengalia, et al., 2010). The ratio of any given coefficient divided by the negative coefficient of monetary proxy (salary, price, income, etc.) represents the WTP for various attributes (M Ryan et al., 2012). Fourth, in the context of this study, using the preferences estimated by the regression model, I simulated the potential job uptake. In the simulations, job posting with improved attributes was compared to a baseline job posting. Usually, the baseline job posting is the job with all attributes at their lowest levels, representing the current job situation in rural areas. Policy makers can utilize these predictions

since they show the estimated impact of hypothetical incentive policies on the health workers' job location decisions.

## 2.7 A Systematic Review of Discrete Choice Experiment Studies

This section presents a review of DCE looking at health workers' decisions of job location. I searched for DCE studies that examine health workers' preferences of job in urban versus rural areas. Using databases of Google Scholar with the scope including all health worker cadres in all country settings, no time restrictions, and all studies in English, a comprehensive review of the literature was performed with keywords including discrete choice experiment, stated preference, attraction, retention, recruitment, rural, attract to rural, rural preference. Twenty-seven studies were included (Table 2.1).

**Table 2.1. DCE Studies on Health Workforce's Location Decisions**

Number	Authors & publication date	Study setting	Health worker cadre(s)	Attributes
1	Chomitz 1998	Indonesia	Medical students (final year)	Location Total monthly income Length of contract Probability of subsequent appointment to the civil service Probability of subsequent specialist training
2	Mangham 2007	Malawi	Nurses	Location Net monthly pay Availability of material resources Workload Housing Opportunity to upgrade qualifications



3	Blaauw 2010	Kenya South Africa & Thailand	Nursing students (final year)	Facility type Salary Training Housing Promotion Additional Benefit Workplace culture
4	Hanson 2010	Ethiopia	Doctors Nurses	Location Net monthly pay Housing Equipment and Drugs Time Commitment Private Sector (for Doctors)/ Supervision (for Nurses)
5	Kruk 2010	Ghana	Medical students (fourth year)	Salary Children's education Infrastructure, equipment, supplies Management style Years of work before study leave Housing Transportation
6	Gunther 2010	Germany	Young physicians	Professional cooperation Income (net after tax) Career opportunities for partner Availability of childcare Leisure activities On-call duty
7	Vujicic 2010	Vietnam	Doctors Medical students (final year)	Location Equipment Official Income Skills development (short-term training) Long term Education (specialist training) Housing
8	Vujicic 2010	Liberia	Nurses	Location Equipment Total Pay Transportation Housing Workload

9	Kolstad 2011	Tanzania	Trainee clinical officers (final year)	Salary and allowances Education opportunities/ possibility of upgrading qualifications Availability of Equipment and Drugs Location Workload Housing Infrastructure
10	Huicho 2012	Peru	Nurses Midwives	Health facility Salary Time in post before getting permanent job Points when applying for training in Family and Community Health Specialization Free housing Work schedule Recognition for rural service
11	Lagarde 2012	Thailand	Doctors (<3 years graduated in rural service)	Hospital size Hospital location Salary Night shifts per month Presence of a consultant in the facility Number of years you have to wait to be promoted
12	Miranda 2012	Peru	Doctors (on short-term contracts)	Health facility Monthly salary Time in post before getting permanent job Points when applying for a residency in Community and Family Medicine after 3 years in post Free housing provided Work schedule Free days for continuous medical education

13	Rao 2012	India (Andhra Pradesh and Uttarakhand states)	Doctors Medical students (final year) Nurses Nursing students (final year)	Type of health Center Area Health center Infrastructure Staff Salary (including allowances, Rupees/ month) Change in location to city/town Professional development Job location
14	Rockers 2012	Uganda	Medical students Nursing students Pharmacy students Laboratory technician students (all final year)	Salary Housing Facility infrastructure and equipment Length of contract Manager support Tuition support Staffing level Opportunity for dual practice
15	Ageyi-Baffour 2013	Ghana	Midwifery students (final year)	Salary Children's education Infrastructure, equipment, and supplies Management style Minimum years of work before study leave Housing Transportation
16	Rockers 2013	Lao	Graduates Doctors Medical assistants Nurses Midwives Students	Salary Promotion to permanent staff Housing Duration of service before further study Transportation Performance-based financial award
17	Scott 2013	Australia	Doctors	Earnings Hours worked On-call arrangements Location Opportunities for social interactions Arranging a locum on short notice Practice team Average consultation length

18	Song 2013	China	Doctors Nurses	Monthly income Welfare benefits Essential equipment Career development Respect from the community Training opportunity
19	Holte 2014	Norway	Medical students (final year)	Practice size Location Opportunity to control working hours Opportunity for professional development
20	Li 2014	Australia	General practitioners	Income Locum relief guarantee Retention payments Rural skills loading Family isolation
21	Honda 2015	Mozambique	Non-physician health professionals	Place of work Monthly salary Housing Access to a loan for purchase of a house Opportunity for promotion Skills development Equipment and medicine Private practice
22	Rafiei 2015	Iran	Neurosurgeons	Location Income Dual practice Workload Proximity to family Clinical infrastructure Educational facilities Housing
23	Robyn 2015	Cameroon	Medical students Nursing students Generalist doctors State-registered nurses	Accessibility and connectivity of the workplace to the city Health facility infrastructure Lodging Career development Salary (including all bonuses) Job assignment in an urban area
24	Efendi 2016	Indonesia	Medical students Nursing students Midwifery students	Quality of facility Housing Length of commitment Study assistance Salary Management

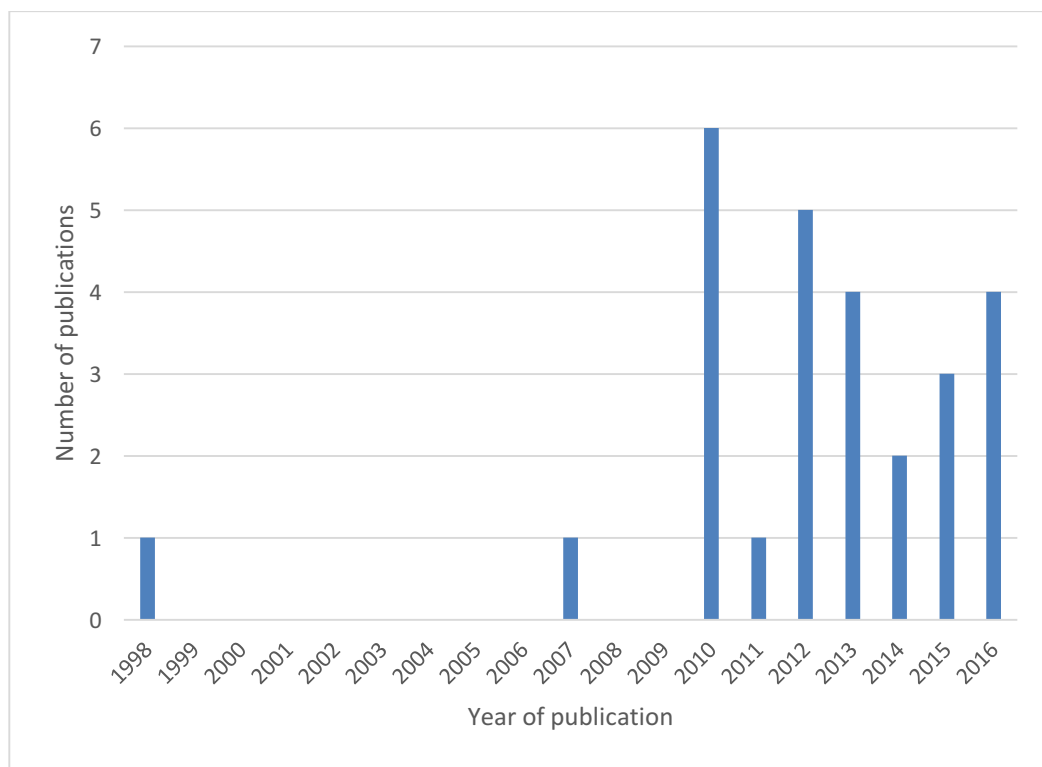
25	Keuffel 2016	Lao	Medical students	Housing Transportation Career promotion Additional training Facility Improvement
26	Smitz M-F 2016	Timor- Leste	Doctors Nurses Midwives	Wages Skill upgrading Location Working conditions Transportation Housing
27	Takemura 2016	Kenya	Clinical officers	Quality of facility Education opportunity Housing Monthly salary Promotion (number of years to be spent in facility until eligible for promotion)

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In sum, jobs in the health care fields are characterized by variety of attributes such as salary, location, private clinic, infrastructure, equipment, management style, training, promotion, workload, housing, and transportation (Blaauw et al., 2010; Honda & Vio, 2015; Huicho et al., 2012; Kolstad, 2011; Kruk et al., 2010; Mandeville et al., 2014; Miranda et al., 2012; Song, Scott, Sivey, & Meng, 2015). In these 27 DCE studies, the job attributes and attribute-levels are identified through literature and policy reviews as wells as qualitative work such as focus group and pilot study with target population and policy makers.

Of the 27 studies, only one study was published more than ten years ago (Chomitz, 1998). Of the 26 remaining studies, 18 studies were published between 2012 and 2016. Of the 26 studies, only four studies (Günther, Kürstein, Riedel-Heller, & König, 2010; Holte, Kjaer, Abelsen, & Olsen, 2015; J. Li, Scott, McGrail, Humphreys, & Witt, 2014; Scott et al., 2013) were carried out in developed countries (Australia and Norway), while the 22 remaining studies were carried out in developing and least developed countries (see Figure 2.4). Of the 27 studies,

doctors, nurses and medical students are the most studied cadres, of which studies focusing on doctor cadre account for nearly 50 percent of all DCE studies (12/26 studies). In contrast, only three studies looked at mid-level cadres, and one study focused on medical assistants (Rockers et al., 2013). The remaining two studies focused on clinical officers (Kolstad, 2011; Takemura, Kielmann, & Blaauw, 2016).



**Figure 2.4. Publication Date of Reviewed DCE Studies**

Results, which were pooled from heterogeneous samples, were extrapolated to a whole population (Lagarde, Pagaiya, Tangcharoensathian, & Blaauw, 2013; Rockers et al., 2013; Vujicic, Alfano, Ryan, Wesseh, & Brown-Annan, 2010). Only three of the 12 studies examined doctor cadre focused on the specific type of medical specialist (J. Li et al., 2014; Rafiei, Arab,

Rashidian, Mahmoudi, & Rahimi-Movaghar, 2015; Robyn et al., 2015). All other studies generalize findings pooled from heterogeneous samples to a whole population. Moreover, some studies oversample or undersample. For example, the characteristics of final sample of doctors in Vujicic, Alfano, Ryan, et al. (2010) differ from those of the health worker census because the district physicians are undersampled while provincial and national physicians are oversampled.

With few exceptions (Ageyi-Baffour, Rominski, Nakua, Gyakobo, & Lori, 2013; Vujicic, Alfano, Shengalia, et al., 2010), most studies carry out subgroup analysis to compare the influence of personal demographic and personal experience factors on the impact of different interventions on the odds of choosing a rural post. The findings differ for different study settings. Kolstad (2011) finds that male health workers are more responsive to financial incentives, and female health workers are more concerned with working condition. Hanson and Jack (2010) and Günther et al. (2010) conclude that young physicians place a higher value on less working hours and a higher value on training opportunity compared to older doctors, and there is no evidence that current location influences the job location decision of doctors. Meanwhile, Honda and Vio (2015) find that health workers aged above 40 value free basic housing less than those aged under 30 and those aged above 30 value skills development opportunity less than those aged under 30. In contrast, Blaauw et al. (2010) reports that age, gender, and marital status are not consistent predictors because the sample is too homogenous. However, rural originality significantly correlates with the choice of rural practice.

Generalization of target participants' incentives and findings beyond a single study and even beyond single subgroup is challenging. According to Campbell et al. (2002), findings of interventions may only be applied locally and internally. Lagarde and Blaauw (2009) and

Mandeville et al. (2014) point out that the relative importance of different incentives varies according to context and the skills of health professionals. In Blaauw et al. (2010), nurses' preferences for each intervention vary significantly among three countries – Kenya, South Africa, and Thailand. In Kenya and South Africa, education and income have the highest impact on nurses' decisions. In Thailand, nurses evaluate health insurance coverage the highest. Moreover, different subgroups in same study settings also hold different preferences. Vujicic, Alfano, Ryan, et al. (2010) found that doctors evaluate workplace location the highest while medical students value long-term education more.

## **2.8 Gap in the literature**

The literature review examines the different interventions enticing health workers to disadvantaged areas as well as to identify appropriate research tools to be able to reveal the relative impact of these interventions over each other. Although there are plenty of feasible incentive interventions, the literature review also finds that there is no consistent approach for correcting the geographic imbalance of health human resources. The impact of different incentive policies on health workers varies according to the country that they are based out of and the stage of life they are at. Thus, there is no specific lessons from other countries that should rigidly apply to the Vietnam context. Meanwhile, except the only DCE study by Vujicic, Alfano, Shengalia, et al. (2010) that focuses on the whole doctor population in general in Vietnam, there is no quantitative study examining the relative importance of interventions pooled from qualitative studies.



Literature suggests that interventions should vary according to the health professionals' age, experiences, and more. All the studies in context of Vietnam focus on healthcare workers in general and ignore their demographic, working experience, and specialties. Also, there have been no studies that provide subgroup analysis. However, it is particularly important to have interventions tailored to the personal needs of health workers, such as to determine how different gendered health workers may have different expectations (Honda & Vio, 2015). Studies that have a final sample representing medical personnel population rather than focusing on different subgroups such as specific specialty, different demographic characteristics, and different stages of life could lead to inappropriate incentive findings. The influence of individual characteristics on the impact of interventions needs consideration. This study adds to the dearth of research that focuses on factors that determine health workers' decisions of job location in the context of different countries and the findings of the quantitative research with family doctors in Vietnam.

## **2.9 Conclusion**

In developing countries, the prevalence of qualitative studies and lack of longitudinal data concerning health personnel daunt healthcare policymakers in selecting the most appropriate interventions among those identified. For that reason, the discrete choice experiment technique has emerged as an attractive methodology for health policy makers in terms of attracting healthcare workers to rural post, which goes beyond a traditional qualitative assessment. DCE is suitable to investigate the research questions established in Chapter 1. DCE provides a useful tool to identify appropriate attributes and attribute-levels that potentially have influence on

respondents' decision. DCE also presents trade-offs between attributes and potential take-up rates.

According to Maslow, different individuals have different levels of satisfaction for different needs. Since individuals of different personal demographic and working experience may hold different opinions about incentive policies, it becomes risky to generalize DCE findings from a heterogeneous sample to particular groups of health workers and the entire workforce. Instead, it would be more precise to examine a small, homogenous sample than a large, heterogeneous sample. Incorporated with a supplemental survey to get personal demographic and personal experience factors, this DCE study provides important information about how individual characteristics influence the impact of incentive policies on job decisions.

As shown in this literature review, there exists a gap in the literature of appropriate interventions enticing family physicians to economically disadvantaged areas in Vietnam. This study is the first attempt at examining how individual characteristics interact with incentive policies, which in turn influence family doctors' choice of job location in Vietnam setting. This research is also the first attempt to provide quantitative data regarding family physicians' job preferences and trade-offs between different job attributes.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Introduction**

The objectives of the study were to examine how choice of practice location of family physicians would be influenced by job attributes, to evaluate if individual characteristics interact with different job attributes to directly influence family physicians' decisions of practice location, and to estimate trade-offs between attributes and potential take-up rates. To fulfill these objectives, the study was designed to simulate a real choice situation where family physicians were asked to make decisions as to which hypothetical job scenario they would prefer. A scenario was created based on the combination of different attributes at different levels. Chapter 3 discusses the design of the discrete choice experiment, the survey administration, and econometric considerations.

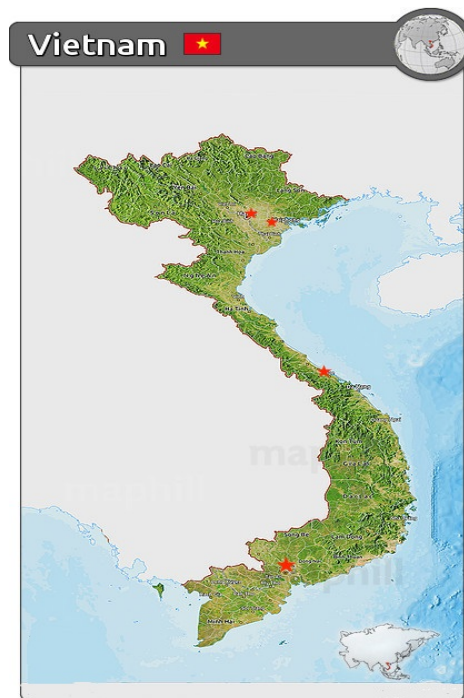
#### **3.2 Population and Setting**

This section provides an overview of sample design and quality of the sample size.

##### **3.2.1 Sample design**

There are nine universities in Vietnam that offer family medicine training programs. These are located in Ho Chi Minh, Ha Noi, Hai Phong, Thai Nguyen, Can Tho, Khanh Hoa, Tien Giang, and Hue. Four of these universities are located in southern Vietnam (Ho Chi Minh, Can

Tho, and Tien Giang), two are located in central Vietnam (Khanh Hoa and Hue), and three are located in northern Vietnam (Hai Phong, Ha Noi, and Thai Nguyen). The five universities selected for this study were (a) Haiphong University of Medicine and Pharmacy, (b) Ho Chi Minh University of Medicine and Pharmacy, (c) Pham Ngoc Thach University of Medicine, (d) Hue University of Medicine and Pharmacy, and (e) Hanoi Medical University. Haiphong University of Medicine and Pharmacy (HPMU) was a research sponsor for this study. The five universities selected for this study are considered the major medical training institutions in Vietnam and are located in the four largest cities in Vietnam. Additionally, the five universities chosen for the study are located in all the regions of Vietnam (north, central, and south) (see Figure 3.1), which allowed the study to address characteristics of family physicians from different regions.



**Figure 3.1. Vietnam map**  
*Note:* Adapted from Maphill

In health human resources DCE studies, the response rates are typically high (80-100 percent) because the research often directly benefits the respondents (Mandeville et al., 2014). For this study, respondents included both doctors and physician assistants who were studying family medicine specialty at one of these four sites. Because each site had a relatively small number of family physicians (about 70-120 family physicians per site) the Head of Department of Family Medicine at each university encouraged all their current family physicians take part in the study.

### **3.2.2 Sample size**

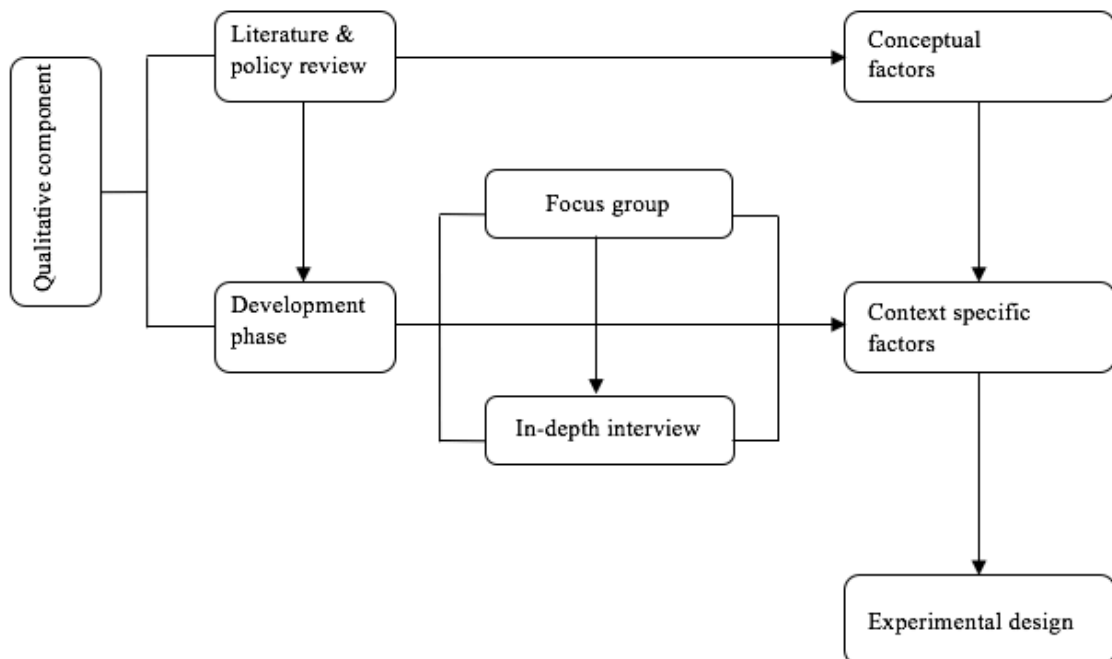
According to rule-of-thumb of R. M. Johnson and Orme (1996) presented in Chapter 2, the sample needs to include at least 75 respondents with 10 choice sets per respondent, two scenarios per choice set, and three analysis cells per choice sets ( $N \geq 500 \times 3 / 10 \times 2 = 75$ ). This study had a final sample size of 315 family physicians, which was sufficient to ensure the appropriate estimation of the main effects. In the study design, participants were offered two job alternatives along with a “status quo” alternative. Given the sample size and number of attributes and levels, 20 choice sets were created and assigned into two blocks. For each respondent, only one block was randomly assigned and 10 choice tasks from the block were given to each respondent in randomly-assigned order. This design is discussed in more detail in the DCE questionnaire design section.

The sample included individuals who all have medical practicing experience and were currently seeking a degree in some specialty. The subgroup divide was based on individual characteristics (demographic and working experiences) that might have influenced family

doctors' decisions as discussed in the literature review. These factors included gender, age, marital status, originality, professional types (physicians vs. physician assistants), rural internship experience, work experience, and current job level. The high response rates and the rich diversity of respondents ensured adequate size for subgroup analysis.

### 3.3 Selection of Choice Attributes and Levels

This section describes the progress and findings of the qualitative research. The findings were used to identify appropriate attributes and attribute-levels, which then fed into the design of the DCE questionnaires. Figure 3.2 illustrates the qualitative component used to elicit attributes and attribute-levels to construct DCE choice sets.



**Figure 3.2. Qualitative Component**

Attributes and attribute-levels were pooled from literature and policy reviews, a focus group with doctors who were currently studying or practicing family medicine specialty, and in-depth interviews that were conducted with key decision makers at national and provincial levels.

### 3.3.1 Conceptual attributes and levels

The first stage of the questionnaire-development phase involved literature and policy, the findings of which are discussed in Chapter 2. The scope of the review was DCE studies and studies specific to Vietnam that look at (a) job preferences of health workers, and (b) all legislative instruments including policy documents and government reports incentivizing health workers to rural areas in Vietnam. All the incentive policies were combined and used for the next stage of the study (see Table 3.1).

**Table 3.1. All Possible Attributes**

Attributes
Location
Net payment
Housing
Equipment and drugs
Private sector
Hospital size
Night shifts (call) per month
Number of years until get promotion

Presence of a consultant in the facility

Time to wait until getting permanent position

Free days for continuous medical education

Transportation

Performance-based financial award

Opportunities for social interaction (face-to-face, email, travel, etc.)

Presence of locum on short notice

Presence of a practice team

Workload intensity

Respect from the community

Short-term training (skills development)

Long-term education (specialist training)

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### 3.3.2 Context specific attributes and levels

The next step in the study was to reveal context specific attributes and levels from conceptual attributes.

***Focus group.*** Based on conceptual attributes revealed from the previous stage, a focus group with family doctors was conducted to refine factors which may influence job decision of family doctors in Vietnam. Six family doctors participated in the focus group to probe factors that might influence their job decisions (see Figure 3.3).





**Figure 3.3. Focus group with family doctors**

These six participants were chosen purposely. Three of them were currently studying the family medicine specialty in HPMU. Of these three, one was working as a general doctor in HPMU, one was working as a physician assistant in a district level health facility, and one was working as a physician assistant in a CHS in Haiphong. The other three participants were serving as family doctors in HPMU. Of these three, one was teaching family medicine specialty in HPMU, one was working as a normal family doctor in HPMU, and one was operating a private health facility. The focus group was conducted at HPMU.

The objective was to discuss what interventions would influence their decisions of job location. Almost all of the desired factors stated by the respondents mirrored the attributes generated from the first stage of the study (see Table 3.1).

Next, the participants were asked to rank the desired factors from the most preferred to the least. The participants were also asked to give their ideas on the appropriate levels of the top five preferred job attributes. After this stage, five attributes emerged as the most preferred by the participants, each at suggested different levels. Table 3.2 comprises top five ranked factors.

**Table 3.2. Ranked Attributes**

Rank (votes)	Factors
1 (6)	Net monthly income
1 (6)	Living condition
2 (5)	Process to start private medical practice
2 (5)	Career development
3 (3)	Equipment

The *income* attribute includes government salaries and allowances for health workers. The *income* attribute was defined in terms of percent changes. Respondents suggested many levels, ranging up to a 300 percent increase. The attribute for *career development* represents the number of years the doctors have to wait to be promoted. All participants agreed that the factor that might influence their decision was being promoted within one year. However, the attribute for *career development* essentially captures the possibility of promotion, and promotion involves monetary benefits such as management allowance. Thus, in the focus group discussion, the

*income* and *career development* attributes were clearly distinguished to avoid the possibility of overlap. *Income* attribute represents salary set by government for health workers regardless of their job title, including wages and allowances comprised of initial allowance, responsibility allowance, and experience allowance and more. Wage is calculated by multiplying basic salary (VND 1.15 million, equivalent to USD 50, as of 2017) and standard scale (depending on education attainment and working experience, for example, standard scale of 2.34 for a newly graduated bachelor medical student) together. Monetary benefits of promotion such as management allowance, meanwhile, are considered as benefits of getting promoted and is excluded from income.

The *process to start private medical practice* attribute is an important attribute. This incentive intervention was not included in Table 3.1, indicating that it has not been recorded in the literature of human resources for health. This finding partly distinguishes the family medicine specialty degree from those of other medical specialties in Vietnam. In Vietnam, the option of prohibiting private practice is not realistic for policy makers. However, only family doctors are allowed to open a private clinic that provides treatments from other medical specialties without hiring medical professionals of other specialties. Family doctors need to meet the documentary and regulatory requirements, which are considered a hindrance to opening a private medical practice. Two levels of this job attribute, *easy process* and *hard process*, were chosen.

The fourth attribute, *living condition*, is an umbrella factor encompassing living environments such as school, electricity, transport, entertainment, etc. This factor is represented in the description as the workplace of health workers. It could be CHSs in rural areas or districts, as well as provincial and national health facilities in relatively urban and urban areas. However,

all these aspects of life are implicitly present in the living condition factor. Based on focus group and in-depth interviews with key decision makers (which is discussed in the following section), it is clear that the core rural employment problem in Vietnam is a severe lack of health workers in sparsely populated areas in rural and remote areas. At the district level, though, the health facilities might be relatively smaller than those at provincial and national levels, the working environment is far different from that found in remote areas. Because the purpose of the study was to learn how to attract and retain family doctors to CHSs in rural areas, the location attribute had two levels – *rural* and *urban*. The rural location was designed to reflect the core rural areas. In Vietnam, there are areas that are more than an hour driving-distance from a main urban center that well developed and populous, and there are areas that are less than one hour driving-distance from a main urban center that are sparsely populated. To minimize any ambiguity, the interviewers were instructed to carefully explain to participants the definition of *rural* and *urban* areas. For the purposes of this study, a rural area was defined as: (a) a sparsely populated area with a population less than 10,000, (b) might be more than one hour driving-distance from a main urban center, and (c) has severe problems of attracting and retaining health workers.

The last attribute is *equipment in a health care facility*, including medical tools and facilities needed to support medical work. All participants agreed that this attribute should have two levels: (a) *adequate* – is at least equal to the government standard, and (b) *inadequate* – is lower than the government standard.

***In-depth interview.*** After the focus group with family doctors, in-depth interviews were conducted with key decision-makers from the national and provincial levels (see Figure 3.4). The purpose of the interviews was to capture their views relating to the top five suggested

interventions in Table 3.2. Interventions have to be relevant for policy makers because it is the policy makers who can alter or implement the interventions. The questions focused on: (a) identifying current health worker shortage problem, (b) providing insight into interventions, and (c) determining the feasibility of the top five interventions pooled from the focus group.



**Figure 3.4. In-depth interviews with key decision-makers**

*Equipment in health facility* was often mentioned by family doctors, but policy makers consider this intervention inappropriate due to two reasons: (a) the majority of CHSs are currently well-equipped with support from both national resource and foreign funding, and (b) MOH and provincial Departments of Health are implementing many projects to upgrade CHSs with all necessary medical equipment so that commune family doctors can perform diagnostic procedures without referring patients to hospitals. Since the characteristics of family medicine

are to provide primary care, perform simple diagnosis, and treat common diseases, little advanced equipment needs to be allocated to this level. Therefore, the attribute for well-equipped health facility was discarded. However, all interviewed policy makers considered the other four job attributes – *income*, *career development*, *living condition*, and *process to start private medical practice* –feasible. The suggested levels for the three job attributes: (a) *career development*, (b) *living condition*, and (c) *process to start medical practice* were also considered to be appropriate by policy makers. Each of the three attributes have two mutually exclusive levels, which helped to avoid any ambiguity for respondents. However, for the income intervention, the highest feasible level increase was 100 percent. Mangham et al. (2009) suggested the number of levels between job attributes should not exceed three for the case of cognition. However, in DCE, to get how the value of all the other attributes can be inferred from how they trade with the monetary attribute, the number of levels has to be set up so that a combination of attributes can lead to a trade-off (Vujicic, Alfano, Shengalia, et al., 2010). Assuming the marginal utility of income decreases, this study can show at which level income becomes relatively less important than *career promotion*, *living condition*, and *private clinic*. The level interval is also important to ensure trade-off. Too small of an interval may result in no trade-off while too large of an interval may result in a dominant preference for income (Scott, 2001). Therefore, four levels were chosen for the income attribute to provide for the whole range of the distribution of income in units small enough to favor trade-off: (a) *30 percent decrease*, (b) *50 percent increase*, (c) *no change*, and (d) *100 percent increase*. The relevance and appropriateness of the four income levels were then tested in the pilot stage (this is discussed in

more detail later). After the in-depth interview stage, three attributes, each at two levels and one attribute at four levels were identified as potentially implementable.

### 3.3.3 Defining attributes and levels

Table 3.3 summarizes the final attributes that showed the highest influence on family doctors' decision of job location and that were also considered feasible by policy makers.

**Table 3.3. Attributes and Levels**

Attributes	Levels	Definition
Income	30% decrease No change 50% increase 100% increase	Income includes: Government salaries for all doctors, calculated by standard scales. Allowances comprised of initial allowance, mobility allowance, and experience allowance.
Career development	Will not be promoted within one year = 0 Will be promoted within one year = 1	How long family doctors have to wait to be promoted.
Living condition	Rural = 0 Urban = 1	A rural area means a sparsely populated area with population less than 10,000 people, may locate more than one hour driving from a main urban center, and has severe problems of attracting and retaining health workers.

Process to start private medical practice	Hard = 0 Easy = 1	Process to start private medical practice (documentary and regulatory requirements).
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### 3.4 Experimental Design and Construction of Choice Sets

#### 3.4.1 Number of choice tasks

According to (Orme, 1998), previous empirical studies suggest the optimal number of questions or choice sets should be between 1.5 to 3 times the number of parameters to be estimated<sup>3</sup>. Thus, in this study, the recommended number of choice sets needed to be 10~20. However, since 20 choice tasks would have been bothersome to respondents, the sample was divided into two blocks with 10 choice tasks per block. Each respondent then only needed to complete ten choice tasks to estimate each respondent's response for the different hypothetical jobs. Ten choice cards were also on the lower end of this range. According to Mandeville et al. (2014), answering ten choice cards is within the cognitive burden for respondents who have finished at least post-secondary education. The 20 choice sets are shown in the Appendix 1.

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<sup>3</sup> The number of parameters to be estimated, when only main effects are considered, is calculated as: total number of levels - total number of attributes + 1. In this study, I have seven parameters in design (10-4+1).



### 3.4.2 Type of choice

Each choice set is comprised of a forced binary choice and a choice with an opt-out option. There is evidence that adding more alternatives may negatively impact quality of choice response (DeShazo & Fermo, 2002; Lancsar & Louviere, 2008). Yet labor markets for health workers are complicated (McPake et al., 2013). In real life, a health worker can choose to remain in their current job or withdraw from the health labor market. However, the target group for the study was doctors who were currently seeking a higher medical degree, and thus I determined the scenario of withdrawing entirely from the health labor market would rarely happen. According to Mandeville et al. (2014) the requirement of choosing among hypothetical alternatives might falsely report the strength of job attributes. The inclusion of opt-out options, meanwhile, helps enhance the realism of questions by avoiding forced choice and thus provides more valid results. An opt-out option can be included in two forms: (a) a *choose none* option or (b) a *choose my current job* option. The inclusion of a “status quo” option was more realistic in this study due to the nature of the target sample as well as the value of avoiding the risk of losing information as “choose none” option.

Since all respondents were active doctors, the information of the status quo scenario can be defined by constructing the status quo for each respondent based on their responses to the supplement questionnaire. In the econometric analysis, the status quo option is treated as the third alternative in the DCE choice card with appropriated attributes and attribute-levels (Scott et al., 2013). An accompanying supplement questionnaire helped ensure that no information was lost even if a majority of respondents chose the status quo scenario. I am aware of only one study

(Scott et al., 2013) that has used this approach of constructing the status quo on the individual level to prevent lost information.

### **3.4.3 Labelling**

The choice task profile was deliberately generic: Jobs were labelled *Job A* vs. *Job B* instead of *Rural post* vs. *Urban post*. The generic design has been used by many studies (Kolstad, 2011; Rao, 2012; Scott et al., 2013; Vujicic, Alfano, Ryan, et al., 2010). A labelled design can implicitly provide respondents additional job information associated with the labels that is not included in the choice set due to limited number of attributes; however, the drawbacks of the labelled design are that each respondent may hold different perceptions of the additional information (M Ryan et al., 2012). As the research objective was the trade-offs between different attributes rather than job preferences in a given market, generic design was more appropriate and thus was employed.

### **3.4.4 Design of choice tasks**

The total number of choice occasions was determined to ensure enough statistical power based on the chosen number of attributes and attribute-levels. Considered in pairs, the number of possible combination of attributes levels is 32 ( $2^3 \times 4^1 = 32$ ). Further, when choice sets are presented, with each choice set involving two scenarios, the total number of possible choice sets became larger. With 32 possible scenarios, there were 496 unique choice sets ( $[32 \times 31] / 2 = 496$ ). Because it was impossible to bring all the hypothetical sets, Sawtooth was used to generate a

manageable D-efficiency design where only a fraction of the possible alternatives was presented to the respondents.

To make the elicitation procedure statistically efficient, the combinations of attribute levels were created in every task using the popular conjoint-related technique called Choice-Based Conjoint (CBC) of Sawtooth. This program prohibited choice sets in which one choice was obviously better or worse in all attributes, as well as balanced the number of times each attribute-level appeared in the overall design. Finally, 20 choice sets (two blocks, 10 choice sets per block) were created. Among the 10 choice cards in each block, there were two choice cards with similar contents to serve as a test of reliability. Then, to evaluate the reliability of the information obtained from the respondents, interviews were based on the similarity of how participants answered two similar choice cards. The questionnaire was prepared in English and translated into Vietnamese. A sample choice set is translated and presented in Figure 3.5.

The order that the respondents completed the cards was chosen at random before the interview and marked on the survey form. The questionnaire package for each respondent included the survey form and a numbered supplement questionnaire. The numbered questionnaire packages were assigned randomly to each respondent.

Respondents were asked two questions for each choice set they viewed: First they were asked (a) which one of the two jobs they preferred, followed by (b) which job they would choose, including the option of remaining in their current job.

*Please read the following:*

- You are asked to state which of two jobs (A or B) is better.
- You are then asked which job you would choose, including the option of staying in your current job.
- Everything about the jobs you are comparing is the same, except for the characteristics shown below.

Job A	Job B
50% increase in income	100% increase in income
Be promoted within 1 year	Be promoted later
Urban living condition	Rural living condition
Hard process to start a private medical practice	Easy process to start a private medical practice

Which job do you think is better?

Job A ☐
Job B ☐

Which job would you choose?

Job A ☐
Job B ☐
Stay at my current job ☐

**Figure 3.5. Sample choice set for family doctors**

### 3.5 Supplement Questionnaire

The supplement questionnaire included a number of questions on personal demographics and personal experiences for two main reasons: (a) to enable the analysis of the impact of interaction of individual factors and incentive intervention on the decisions of job location, and (b) to get information for the status quo option (Honda & Vio, 2015). The supplement questionnaire was designed to gather information on (a) personal information of family doctors,

(b) current employment, and (c) work history. As a complement to the DCE, the questionnaire asked questions related to the probability family doctors might switch jobs. For example, job history (having experience working in CHS, having experience working at national level, etc.) or current employment (location of current institution, type of current situation, etc.) or background (age, gender, marital status, rural internship experience, etc.) are likely to influence the decision of job choice. The supplement questionnaire also included questions so that the levels of the four attributes of family doctors' current job could be inferred. The information was used to generate the "status quo" alternative that was discussed in more detail in the previous section. In general, the section *Questions about yourself* focused on personal demographics such as age, gender, marital status, place of residence before starting medical studies, and personal experiences such as reasons to choose family medicine specialty and rural internship experience. The section *Questions about current employment* obtained information on the current institutions and current work of the family doctors. The questions in this section included average monthly income, estimated number of years to wait until being promoted, and private work. *Questions about work history* obtained information on the history of the participants' transition between levels (commune, district, provincial, national, and private), their number of years of experience, and their status of being a doctor or a physician assistant.

***Construction of the status quo option.*** The third scenario was constructed based on information obtained from the supplement questionnaire.

For the *Living condition* attribute, question B3 "Where does your current institution locate?" was used. The two options (rural and urban) were identical to the attribute-levels of the choice cards.

For the *Career development* attribute, question B8 “Average number of years spent in your current until being eligible for promotion” was used to infer that if the number of years to be promoted is more than one year, the status quo level will be “will not be promoted within one year” of the DCE attribute.

For the *Process to start a private medical practice* attribute, question B10 “How would you rate government support you to open private clinic?” was used to derive the status quo level for each respondent. B10 provided two options (*high* vs. *low*) that matched the DCE levels *easy* vs. *low*.

The attribute *Income* was given attribute-level *No change* for the third alternative.

### **3.6 One-on-One Pretesting and Pilot Study**

After the initial DCE choice sets and supplement questionnaire were established, one round of *one-on-one pretesting* with four family doctors who were studying family medicine at HPMU was conducted. All four participants were debriefed following the DCE choice cards and the supplement questionnaire to elicit their thoughts about the survey. After this stage, the choice cards and general questionnaire were revised. The revision included: (a) the addition of more information in the supplement questionnaire, and (b) the changes of word choice in both the DCE choice cards and the supplement questionnaire to avoid word ambiguity as well as ensure appropriate use of medical terms.

A pilot study followed the one-on-one pretesting. The pilot study was conducted to test the comprehension and coverage of job attributes and levels. Six family doctors participated in this stage. As the real test aimed to include representatives from a variety of subgroups,

participants represented diversity in gender, age, and current job employment. The results of the pilot test revealed that respondents did not incline to a specific attribute level, thus the job attributes and levels did not require modification. Choice cards and the supplement questionnaire were considered easily understood with the appropriate medical words.

### **3.7 Interviewers Training and Survey Administration**

Under supervision of a discrete choice experiment expert, I spent three weeks in Vietnam developing the survey instruments (including experimental choice cards and supplement questionnaire) and training three enumerators. I also spent one month supervising the implementation of the fieldwork in Haiphong and Ho Chi Minh from July to August, 2016, and one month supervising the implementation of the fieldwork in Hue and Hanoi from December, 2016 to January, 2017.

Under supervision of a discrete choice experiment expert, I guided a team of three enumerators through a two-day training session for administering the DCE to family doctors (see Figure 3.6).

The content of the training session included: (a) Introduction of the aim of the DCE project so that the enumerators could explain it to the family physicians participating in the study; (b) Explanation of the fieldwork plan, including the plan of travelling to four cities and the survey administration; (c) Review of the introductory script – the script to be read to family physicians before the survey. Review of the consent form – the form to be read and signed by family physicians before the survey. Review of the cheap talk script – the statement underlining the importance of respondent's answers before the survey; (4) Explanation of the format of DCE

choice cards and the supplement questionnaire so that the enumerators could collect data as well as answer any questions that family physicians may have had later on.



**Figure 3.6. Enumerators training**

The survey mode was an interviewer-administered questionnaire in person. This format allowed respondents to individually discuss their choices with enumerators. In addition, the in-person interviews encouraged the family physicians to take the alternatives more seriously as a real choice. Before beginning the survey, the enumerator read the introductory script to the respondents to introduce them to the purpose of the project as well as to make them feel comfortable with the DCE format. The enumerator also read the cheap talk script and



encouraged family doctors to make their decisions as realistic as possible. Before beginning the survey, respondents signed the consent form. All general survey and DCE scenarios were presented in Vietnamese. After answering the supplement survey, each participant moved to a private room or private space with an interviewer for the DCE choice task (see Figure 3.7). Respondents gave their job choice for ten random-order choice cards.



**Figure 3.7. Survey Administration**

### 3.8 Data Coding

On completion of the survey, data was entered into Excel files and coded for analysis. All attribute variables (*living condition*, *career development*, and *private clinic*) were specified as random, except *salary* was specified as fixed. Although specifying *income* as a random component improved the model fit, it was still specified *income* as fixed. This allowed the assumption that all health workers prefer higher income, thus ensuring the right sign of the estimate of income utility (M Ryan et al., 2012).

The assumption of income as fixed component is preferred for calculation of willingness to pay (M Ryan et al., 2012). When adopting the MXL model, parameters of random variables (*living condition*, *career promotion*, *private clinic*) were allowed to vary, thus allowing for preference heterogeneity. DCE studies tend to assume these coefficients to be normally distributed (Blaauw et al., 2010; Kruk et al., 2010; Rockers et al., 2013). Again, the coefficients on the *income* attribute was assumed fixed.

All attribute variables were dummy coded, with the exception of *income* that was coded as a continuous variable. *Income* was modeled as a continuous variable with actual attribute-level values input (*-30 percent*, *no change*, *50 percent*, and *100 percent*). The estimate parameter of income was interpreted as the value of a percent change in income. For the dummy categorical attribute variables, preferences were modeled relative to some base cases. The base cases were coded as 0. The interpretation of the estimated parameters of dummy categorical variables is the marginal value of a movement from the base case to a defined level (M Ryan et al., 2012).

For example, the parameter *career promotion* showed the value of moving from *no fast track career promotion* to *fast track career promotion within one year*. Coded attribute variables are summarized in Table 3.4.

**Table 3.4. Coding of Job Attributes**

Attribute	Levels	Coding
Income	30% decrease	-30
	50% increase	50
	100% increase	100
	No change	0
Process of opening a private medical clinic	Hard	0
	Easy	1
Career development	More than 1 years	0
	Within 1 years	1
Living condition	Rural	0
	Urban	1

Alongside job attribute variables, demographic and personal experience data collected from respondents' supplement questionnaire about job history, current job, and respondents' characteristics were also coded. Coded demographic data are summarized in Table 3.5.

**Table 3.5. Coding of Respondents' Characteristics**

Variables	Coding
Gender	male = 0
	female = 1
Marital status	unmarried = 0
	married = 1

Health worker type	assistant doctor = 0 university doctor = 1
Rural born	urban born = 0 rural born = 1
Primary health care experience	no = 0 yes = 1
Rural internship experience	no = 0 yes = 1
Current job level	commune level = 1 district level = 2 provincial level = 3 national level = 4 private level = 5
Working experience	commune level = 1 district level = 2 provincial level = 3 national level = 4

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The final sample size is 315 respondents. Each respondent provided responses for 10 choice sets, of which two choice sets had similar content, reducing to 9 choice sets per respondents, resulting in 8505 observations (315 respondents x 9 choice set x 3 options for each choice).

The probability of choosing Job A was not expected to differ from those of Job B. As these hypothetical jobs were unlabeled and had no intrinsic meaning, I facilitated interpretation by simulating predicted probabilities over two alternatives, hypothetical jobs (Job A/ Job B) and current job (status quo). Thus, the alternate-specific constant (ASC), which represents unobserved aspect of the choice occasion, was coded as dummy, which is equal to 0 if the respondent chose hypothetical jobs, and 1 when the current job was chosen.

### **3.9 Conclusion**

A discrete choice experiment and a supplement questionnaire were developed to investigate factors that influence family doctors' decision of job location. Twenty choice cards with specific attributes and attribute-levels, each choice card comprised of two questions, one for a forced binary choice and the another for status quo option, were created. Alongside trade-offs between job attributes and potential job uptake, the study also investigated the impact of individual characteristics and incentive policies impact on job decision through the subgroup analysis. The data analysis is discussed in the following chapter.

## **CHAPTER 4**

### **RESULTS**

#### **4.1 Introduction**

This chapter presents the results of the discrete choice experiment that was developed to explore determinants for recruitment of family doctors for rural practice in Vietnam. The data was modeled from the DCE survey and supplement questionnaire using several econometric approaches. MXL models with and without interaction terms were then used to fit data for each investigated subgroup to estimate the main effects of incentive interventions and the impact of interaction of individual characteristics and incentive interventions on the family doctors' job location decision, respectively. The value that respondents placed on each job attribute was estimated as was the impact of each hypothesized incentive policy on the uptake rate of rural job.

#### **4.2 Descriptive Statistics**

Of 321 volunteered respondents, a total of six family physicians did not participate in the DCE test after taking part in the general survey, reducing the sample size to a total of 315 family physicians. Of the remaining 315 participants, none failed the test of reliability (that is, none chose the different options for the two similar choice cards presented in the questionnaire).

Of the 315 participants, 116 were studying family medicine in Haiphong, 99 were in Ho Chi Minh, 65 were in Hue, and 35 were in Hanoi. The number of male and female participants were approximately equal, and the average age was about 45 years. Additionally, half of the 315 respondents were born in rural areas, were assistant doctors, and had an average of 20 years

working in the health sector. The participants from Ho Chi Minh who were family physicians working in the primary health care area, as well as the number of family physicians having rural internship experience, was relatively lower than participants from the three other cities. Hue, meanwhile, had the highest number of family physicians working in the primary health care area and with rural internship experience. Hanoi and Ho Chi Minh had more family doctors working in high-level health facilities in urban areas than both Haiphong and Hue. In terms of monthly income, Ho Chi Minh family doctors had relatively higher income than other family doctors, about VND 11 million (approximately USD 500), followed by Hue family doctors (approximately USD 400), while Hanoi and Haiphong family doctors had an average monthly income of USD 300. Table 4.1 presents the descriptive statistics of the full sample.

**Table 4.1. Descriptive Statistics**

Variable	Description	Sample Mean (SD)				
		Total (N=315)	Haiphong (n=116)	Ho Chi Minh (n =99)	Hue (n =65)	Hanoi (n =35)
Age	Continuous (age in years)	45.11 (8.72)	44.5 (9.42)	45.91 (8.68)	45.79 (7.20)	43.91 (9.16)
Gender	1 if female, 0 otherwise	0.47 (0.50)	0.66 (0.47)	0.31 (0.46)	0.41 (0.49)	0.42 (0.50)
Marital Status	1 if married, 0 otherwise	0.92 (0.26)	0.93 (0.24)	0.90 (0.29)	0.93 (0.24)	0.91 (0.28)
Health worker type	1 if university doctor, 0 if assistant doctor	0.46 (0.49)	0.44 (0.49)	0.60 (0.49)	0.29 (0.45)	0.49 (0.50)
Rural born	1 if rural born, 0 if otherwise	0.48 (0.50)	0.46 (0.50)	0.35 (0.48)	0.70 (0.45)	0.57 (0.50)

Monthly income	Continuous (monthly incoming in dollar); including government salaries, experience allowances, and allowances of responsibilities, mobility, initial allowance, area shifting for health professionals in disadvantaged areas	8.33 (5.93)	6.66 (1.97)	10.86 (8.13)	8.40 (6.81)	6.74 (1.97)
Years working health sector	Continuous	19.89 (8.89)	18 (9.28)	21.12 (9.24)	20.40 (7.54)	18.40 (8.73)
Primary health care experience	1 if providing primary health care service, 0 otherwise	0.42 (0.49)	0.44 (0.49)	0.27 (0.44)	0.64 (0.48)	0.43 (0.50)
Rural internship experience	1 if having rural internship experience, 0 otherwise	0.72 (0.44)	0.79 (0.40)	0.51 (0.50)	0.84 (0.36)	0.83 (0.38)
Months in rural internship	Continuous	2.14 (2.13)	2.2 (1.86)	1.52 (2.17)	2.81 (2.27)	2.48 (2.13)
Job place type	1 if working at commune level, 2 if district level, 3 if provincial level, 4 if national level, 5 if private level	2.06 (1.10)	1.88 (0.88)	2.42 (1.27)	1.78 (1.09)	2.17 (1.01)
Work location	1 if urban, 0 otherwise	0.50 (0.50)	0.48 (0.50)	0.60 (0.49)	0.40 (0.49)	0.48 (0.50)



### 4.3 Choice Modeling with Choice Set Attributes

To predict the probability of choosing a job, a conditional logit model, a mixed logit model, and multinomial logistic regression were used. These models did not include individual-level covariates. All models estimated main effects. The reference group for regression for the current level of salary was a job with the following characteristics: (a) the job was in a CHS in a rural area, (b) the number of years spent in health facility until eligible for promotion was more than one year, and (c) the process to start private medical practice was hard due to no government support.

The coefficient on ASC was negative and significant in all models and specifications, which implied that the utility of keeping the current job (status quo option) was *less* than the utility provided by the hypothetical jobs (*Job A* or *Job B*). The high absolute value of ASC was consistent with the expectation that many family doctors who observed the benefits of hypothetical jobs were less likely to remain in their current job (see Table 4.2).

In the MNL model, parameters of attributes (*career promotion*, *private clinic*, *living condition*, *income*) proved significant at the one percent level. The sign of coefficients of job attributes showed positive preferences from family doctors toward the fast track career promotion, government support for private clinic, urban living condition, and higher payments as expected. The AIC and BIC were respectively valued at 10383.23 and 10425.52. The log likelihood was -5185.61. The MNL model was statistically significant with  $\text{Prob} > \chi^2 = 0.0000$  (see Table 4.2).

The conditional logit model performed well, with all the attributes statistically significant at the one percent level (see Table 4.2). The AIC and BIC respectively valued at 5879.03 and 5914.27, indicated that the model is statistically better than MNL model.

Under the mixed logit model, the draw technique was used. In a 2000 study by Train, it was found that Halton draws increase the stability of parameter estimation. According to the study, 500 random draws is considered enough to secure a stability of parameter estimates (K. Train, 2000). As MXL allows coefficients to vary across the family doctors, alongside with the mean of estimated coefficients of job attributes, a standard deviation was obtained to measure how each coefficient varied across individuals within the sampling framework. The standard deviations of all parameters were highly significant, indicating the effects of all attributes varied considerably across the respondents. The significant heterogeneity among the respondents indicated that MXL model performed significantly better than the other models, which assumed that the effect of all attributes were the same for all family doctors.

**Table 4.2. MNL, Conditional Logit Model, and MXL Model Estimates**

	Multinomial logit model	Conditional logit model	Mixed logit model	
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career Promotion	0.259***	0.276***	0.316***	0.378***
Be promoted in <1 year (ref: be promoted later)				
Living Condition	0.312***	0.374***	0.404***	0.829***
Urban (ref: rural)				
Chance of opening private clinic	0.32***	0.282***	0.317***	0.396***
Easy (ref: hard)				
Income (continuous)	0.007***	0.007***	0.008***	
Alternative-specific constant	-0.645***	-0.357***	-0.373***	
Constant	-1.09***			

Model diagnostics			
Number of respondents	315	315	315
Number of observations	8505	8505	8505
Log likelihood	-5185.61	-2934.51	-2880.84
Prob>chi2	0.0000	0.0000	0.0000
AIC	10383.23	5879.03	5775.938
BIC	10425.52	5914.27	5832.32

*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

The MXL model also showed that all attributes were highly significant and of the expected signs. Family doctors positively valued having a job in urban areas, getting promoted within one year, being assisted with starting a medical practice, and earning the higher income. The log likelihood was -2880.84. The AIC and BIC respectively valued at 5775.93 and 5832.32, which indicated that the model was statistically better than both MNL and conditional logit models (see Table 4.2).

Because the MXL model assumes random parameters follow a normal distribution, the output of the model can be used to calculate the proportion of respondents who consider a particular job attribute has a positive or negative effect on the utility of their job choice based on the equation:

$$100 \times \Phi \frac{\text{Mean Coefficient}}{\text{SD Coefficient}}$$

in which  $\Phi$  is the standard normal cumulative distribution (M Ryan et al., 2012). According to the MXL results in Table 4.2, for the career promotion attribute, the mean of the coefficient and the standard deviation were 0.316 and 0.378, indicating that 79.8 percent of the distribution of the coefficient was above zero and 20.2% was below zero. In other words, 79.8 percent of family doctors preferred a fast track career promotion. The MXL model also revealed that 68.7 percent

and 78.8 percent of family physicians preferred an urban job and a chance of opening private clinic, respectively.

#### 4.4 Subgroup Analysis

Subgroup analysis is common in DCE (M Ryan et al., 2012). In this section, the sample was broken into subgroups based on demographic and personal experience factors that might influence individual job decisions. This was done to examine the different effect size of each attribute in different subgroups. According to the literature review in Chapter 2, demographic factors such as age, gender, marital status, geographic origin, and personal experience factors such as rural internship experience and work experience were all shown to affect job choice. After that, family doctors' decisions were analyzed to find variance according to the interaction of these personal characteristics against hypothetical incentive policies.

**Subgroup analysis by age.** The age category was divided into two groups: (a) participants under age 50, and (b) participants age 50 and above (see Table 4.3) and included the interaction of incentive policies with dummy variables for each age subgroup to examine the effect of job attributes on family doctors by age (see Table 4.4). There was a larger effect size of *career promotion* for the relatively younger group than the older group, indicating a stronger desire for promotion among the younger physicians. Meanwhile, the *private clinic* attribute strongly influenced physicians aged 50 and above.

In Table 4.4, the reference group was family physicians under age 50. As shown, the interaction terms were positive for the provision of career promotion and negative for the

provision of private clinic. The findings suggest that family doctors aged 50 and above value a fast track career promotion less and a chance of starting a private clinic more than those under age 50. The finding was identical to the interviews where many family doctors showed preference for medical practice after retirement. Both findings of Table 4.3 and 4.4 support that incentive policies should vary according to different life stages of the health workers.

The data also revealed that the *living condition* attribute had a more profound and significant impact on the physicians under age 50. Though the interaction term was insignificant for the provision of living condition, the coefficient was negative. Doctors under age 50 were more likely to evaluate the inherent characteristics of a job in urban areas, including convenient transportation, good schooling and social activities, a good house, etc. Meanwhile, many older doctors mentioned in their interviews that they were more inclined to move to the countryside after retirement, citing reasons such as a less polluted environment, less family responsibility, and a stronger desire provide health services to rural residents.

**Table 4.3. Subgroup Analysis by Age**

	>50 years old		<50 years old	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career promotion	0.21***	0.418*	0.356***	0.328***
Be promoted in <1 year (ref: be promoted later)				
Living condition	0.276*	0.957***	0.452***	0.788***
Urban (ref: rural)				
Chance of opening private clinic	0.57***	0.646**	0.24***	0.252**
Easy (ref: hard)				
Income (continuous)	0.009***		0.008***	
Alternative-specific constant	-0.325***		-0.381***	

Model diagnostics

Number of respondents	79	236
Number of observations	2133	6372
Log Likelihood	-708.55	-2163.29

*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.4. Subgroup Analysis Including Interaction with Age**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.364***	0.351***
Career promotion * Aged 50 and above	-0.184*	
Living condition	0.463***	0.823***
Living condition * Aged 50 and above	-0.207	
Private clinic	0.247***	0.368***
Private clinic * Aged 50 and above	0.282***	
Income	0.008***	
Income * Aged 50 and above	0.0006	
Alternative-specific constant	-0.37***	
Model diagnostics		
Number of respondents	315	
Number of observations	8505	
Log likelihood	-2874.15	

*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by gender.** In the subgroup analysis by gender, the job attributes of *income* and *private clinic* had positive and statistically significant effects on both groups, with no differences among gender. Additionally, *career promotion* showed a strong and statistically significant positive effect for both male and female physicians. The effect size, however, was much larger for males than for females (see Table 4.5). The size effect of *living condition*, meanwhile, was far greater for female than male family physicians.

In Table 4.6, the interaction term for the provision of career promotion, though insignificant, was negative for the female group, while the interaction for the provision of living condition was positive and statistically significant. The result suggests that female family doctors value living condition higher and career promotion somewhat lower than male family doctors. The finding correlates to the interviews in which female respondents stated their difficulties to balance family responsibilities and job requirements as variables for job location choice. Female respondents with families also stated a reluctance to move to rural areas before their children graduated from school, while other female respondents indicated a desire to get married and settle down as their reasons for not desiring a rural job. Meanwhile, male doctors were more flexible in their location choice.

**Table 4.5. Subgroup Analysis by Gender**

	Male		Female	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career Promotion	0.381**	-0.1	0.223*	0.554***
Be promoted in <1 year (ref: be promoted later)				
Living condition	0.299**	0.916***	0.492***	0.747***
Urban (ref: rural)				
Chance of opening private clinic	0.297***	-0.176	0.32***	0.548***
Easy (ref: hard)				
Income (continuous)	0.007***		0.008***	
Alternative-specific constant	-0.31***		-0.469***	
Model diagnostics				
Number of respondents	165		150	
Number of observations	4455		4050	
Log Likelihood	-1512.04		-1359.29	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.6. Subgroup Analysis Including Interaction with Gender**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.362***	0.37***
Career promotion * Female	-0.094	
Living condition	0.288***	0.832***
Living condition * Female	0.241*	
Private clinic	0.315***	0.397***
Private clinic * Female	0.01	
Income	0.007***	
Income * Female	0.001	
Alternative-specific constant	-0.377***	
Model diagnostics		
Number of respondents	315	
Number of observations	8505	
Log likelihood	-2878.33	

*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by marital status.** Incentive policies had different impacts on the married and unmarried groups. Of the 315 respondents, the number of married physicians was significantly higher than the unmarried group, with only 23 participants being unmarried. Of these 23 unmarried participants, only two were older than 45 years old, and the remaining 21 participants were younger than 30 years old (see Tables 4.7 and 4.8).

*Income* influenced both groups but had a higher impact on the unmarried group. This is represented by the higher coefficient of income attribute for the unmarried group in Table 4.7 and the negative interaction term for the provision of income in Table 4.8. The greater size effect could be because the offered income represented a much larger proportion of a typical young health worker's total income relative to an older worker. The greater effect size for unmarried



doctors could be a result of the increase of income intervention representing a much larger proportion of a typical unmarried doctor's income relative to a married doctor's.

There was no significant difference among groups in terms of *career promotion* and *living condition*, though the interaction terms were negative (see Table 4.8). However, the size effect of *living condition* was far greater for the unmarried family physicians. This finding was identical to the field work. In the interviews, the unmarried family physicians cited a desire to get married and settle down for why they made a decision to stay in urban areas over rural.

The size effect of *private medical practice* was far greater for married family doctors than unmarried. During the interviews, unmarried physicians noted that they would not think of starting their own medical practice before settling down and having an established reputation. The incentive policy of *private clinic* showed no effect on the job decision of unmarried family physicians.

**Table 4.7. Subgroup Analysis by Marital Status**

	Married		Unmarried	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career Promotion	0.309***	0.403***	0.426**	-0.0005
Be promoted in <1 year (ref: be promoted later)				
Living condition	0.388***	0.845***	0.63**	0.714***
Urban (ref: rural)				
Chance of opening private clinic	0.337***	0.428***	0.093	-0.003
Easy (ref: hard)				
Income (continuous)	0.008***		0.011***	
Alternative-specific constant	-0.384***		-0.303*	
Model diagnostics				
Number of respondents	292		23	

Number of observations	7884	621
Log Likelihood	-2665.4	-211.44

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.8. Subgroup Analysis Including Interaction with Marital Status**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.396**	0.373***
Career promotion * Married	-0.086	
Living condition	0.637**	0.831***
Living condition * Married	-0.249	
Private clinic	0.083	0.39***
Private clinic * Married	0.251	
Income	0.011***	
Income * Married	-0.003	
Alternative-specific constant	-0.379***	
Model diagnostics		
Number of respondents	315	
Number of observations	8505	
Log likelihood	-2878.81	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by geographical origin.** *Income* influenced both groups, but it had a higher impact on rural born physicians than on urban born physicians (see Table 4.9 and Table 4.10). There was no significant difference between the two groups in terms of workplace, chance of opening a private clinic, and career promotion. However, the effect size of *chance of opening a private clinic* was considerably larger for rural born physicians (see Table 4.9). The finding was consistent with the interviews where rural born doctors listed “no wide circle of

acquaintances” and “lack of knowledge of opening clinic process” as significant obstacles to opening their own private clinics.

**Table 4.9. Subgroup Analysis by Geographical Origin**

	Rural born		Urban born	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career Promotion	0.324***	0.14	0.31***	0.466** *
Be promoted in <1 year (ref: be promoted later)				
Living condition	0.393***	1.104***	0.372***	0.539** *
Urban (ref: rural)				
Chance of opening private clinic	0.389***	0.473***	0.264*	0.33***
Easy (ref: hard)				
Income (continuous)	0.01***		0.006***	
Alternative-specific constant	-0.277***		-0.441***	
Model diagnostics				
Number of respondents	154		161	
Number of observations	4158		4347	
Log Likelihood	-1359.7		-1505.9	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.10. Subgroup Analysis Including Interaction with Geographical Origin**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.355***	0.372***
Career promotion * Rural born	-0.087	
Living condition	0.413***	0.826***
Career promotion * Rural born	-0.06	
Private clinic	0.278***	0.393***
Private clinic * Rural born	0.096	
Income	0.006***	
Income * Rural born	0.003**	
Alternative-specific constant	-0.376***	

Model diagnostics

Number of respondents	315
Number of observations	8505
Log likelihood	-2875.72

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*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by doctor title.** *Income* had a positive and significant effect on job choice, with the effect size for assistant doctors being larger than for university doctors (see Table 4.11). The interaction term for the provision of income was negative and statistically significant, suggesting that assistant doctors value income more than doctors do. The higher effect of income on job decision of assistant doctors occurred because a decrease of 30 percent to an increase of 100 percent of monthly income represented a much larger proportion of a typical assistant doctor's total income relative to a university doctor's.

*Career promotion* had a positive and statistically significant effect on the job choice for both groups. Though the insignificant interaction term for the provision of career promotion suggested there was no difference for the effect of fast track career promotion among groups, the effect size was considerably larger for the assistant doctors (see Table 4.12). One reason for this could be that the healthcare field is highly competitive, and assistant doctors are eager for career promotion.

Meanwhile, the effect size of the *living condition* attribute was considerably larger for the group of university doctors, and the interaction term for the provision of *living condition* was positive and statistically significant. Because a large number of the university doctors were already serving in urban areas, these results could reflect a reluctance to move away from their

established practices in the urban areas to CHSs in rural areas. The effect of *private clinic* on job decision was not different among groups.

**Table 4.11. Subgroup Analysis by Doctor Title**

	Assistant doctor		Doctor	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career Promotion	0.418***	-0.214*	0.229***	0.481***
Be promoted in <1 year (ref: be promoted later)				
Living condition	0.322***	0.942***	0.5***	0.667***
Urban (ref: rural)				
Chance of opening private clinic	0.384***	0.553***	0.269***	-
Easy (ref: hard)				0.051***
Income (continuous)	0.01***		0.006***	
Alternative-specific constant	-0.215**		-0.492***	
Model diagnostics				
Number of respondents	168		147	
Number of observations	4536		3969	
Log Likelihood	-1488.64		-1375.95	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.12. Subgroup Analysis Including Interaction with Doctor Title**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.336***	0.388***
Career promotion * Doctor	-0.061	
Living condition	0.245***	0.815***
Living condition * Doctor	0.289*	
Private clinic	0.36***	0.399***
Private clinic * Doctor	-0.076	
Income	0.009***	

Income * Doctor	-0.003**
Alternative-specific constant	-0.387***
Model diagnostics	
Number of respondents	315
Number of observations	8505
Log likelihood	-2872.49

*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by rural internship.** *Income* had a positive and statistically significant effect on the job choices of both subgroups, though the effect size was considerably larger for physicians with rural internship experience (see Table 4.13). The interaction for the provision of income was statistically significant and positive, suggesting that family doctors with rural internship valued a higher income more than those without rural internship (see Table 4.14). There was no significant difference between the two groups regarding *living condition*, *career promotion*, and *private clinic* incentive policies.

**Table 4.13. Subgroup Analysis by Rural Internship**

	Rural Internship		No rural Internship	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career Promotion	0.315***	0.377***	0.324***	0.369*
Be promoted in <1 year (ref: be promoted later)				*
Living condition	0.381***	0.893***	0.346**	0.667*
Urban (ref: rural)				**
Chance of opening private clinic	0.344***	0.466***	0.291***	0.157
Easy (ref: hard)				
Income (continuous)	0.009***		0.003***	
Alternative-specific constant	-0.309***		-0.497***	
Model diagnostics				
Number of respondents	227		88	

Number of observations	6129	2376
Log Likelihood	-2042	-828.5

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.14. Subgroup Analysis Including Interaction with Rural Internship**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.373***	0.371***
Career promotion * Rural internship	-0.088	
Living condition	0.388**	0.828***
Living condition * Rural internship	-0.026	
Private clinic	0.319***	0.4***
Private clinic * Rural internship	0.012	
Income	0.004***	
Income * Rural internship	0.005***	
Alternative-specific constant	-0.376***	
Model diagnostics		
Number of respondents	315	
Number of observations	8505	
Log likelihood	-2872.66	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by work experience.** Sixteen of the family doctor participants had national working experience. In Table 4.16, the excluded group was those who have commune working experience.

*Income* influenced three subgroups, except participants with national working experience, with the highest impact on family physicians with working experience at the lower level. All the interaction terms for the provision of income were negative, valued at -0.002, -0.006, and -0.012 for those with district, provincial, and national experience, respectively. Again, this indicates that *income* has a higher effect on those with working experience at the lower level.

The attribute of *workplace* strongly influenced family physicians who had national working experience, followed by those with district experience and those with commune experience. Meanwhile, the *workplace* attribute had the lowest impact on the job choice of the subgroup physicians with provincial working experience. The findings were identical to the interviews when family physicians who had national working experience highly evaluated an urban workplace in their job decision. Meanwhile, many participants with provincial working experience mentioned that they were inclined to take a post in rural areas due to high work pressure at provincial levels and the polluted living environment in cities. The interaction terms were insignificant, indicating there was no difference in terms of effect of living condition on those with commune working experience and those with working experience at the higher level.

The attribute of *career promotion* influenced all four subgroups. The interaction terms were insignificant, indicating that there was no difference in terms of effect of career promotion on those with commune working experience and those with working experience at the higher level.

Opening a *private clinic* showed a strong and statistically significant positive effect for all three subgroups, except those with national working experience. The effect size, however, was much larger for respondents who had either commune or district working experience. The interaction term was negative for the subgroup of those who had national experience, again indicating that those with commune working experience valued a private clinic more highly than those with national working experience. One of the reasons for this could be that commune and district family doctors find it difficult to start a private clinic. In the interview, two main



difficulties cited by the participants were (a) the lack of relations with people who can help, and (b) the complicated required documents to open a private clinic.

**Table 4.15. Subgroup Analysis by Work Experience**

	Commune Experience		District Experience		Provincial Experience		National Experience	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes								
Career	0.395	-0.239	0.268	0.389	0.239	0.452	1.381	0.48
Promotion	***		***	***	***	***	***	
Be promoted in <1 year (ref: be promoted later)								
Living condition	0.334	0.936	0.341	0.717	0.277	0.446	0.624	0.9
Urban (ref: rural)	***	***	***	***	***	***	*	**
Chance of opening private clinic	0.38	0.471	0.326	0.314	0.238	0.333	0.04	0.017
Easy (ref: hard)	***	***	***	**	***	**		
Income (continuous)	0.01		0.006		0.003		0.003	
	***		***		***			
Alternative-specific constant	-0.262		-0.414		-0.292		1.46	
	***		***		***		***	
Model diagnostics								
Number of respondents	182		123		112		16	
Number of observations	4914		3321		3024		432	
Log Likelihood	-		-		-		-	
	1621.5		1148.6		1079.2		130.2	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.16. Subgroup Analysis Including Interaction with Working Experience**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.334***	0.369***
Career promotion* District experience	-0.012	
Career promotion * Provincial experience	0.075	
Career promotion * National experience	0.002	
Living condition	0.344***	0.802***
Living condition * District experience	-0.032	
Living condition * Provincial experience	0.01	
Living condition * National experience	0.063	
Private clinic	0.332***	0.375***
Private clinic * District experience	0.072	
Private clinic * Provincial experience	-0.058	
Private clinic * National experience	-0.364*	
Income	0.011***	
Income * District experience	-0.002**	
Income * Provincial experience	-0.006***	
Income * National experience	-0.012***	
Alternative-specific constant	-0.365***	
Model diagnostics		
Number of respondents	315	
Number of observations	8505	
Log likelihood	-2852.65	

*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by current job level.** Table 4.17 presents the results of the impacts of the job attributes for different subgroups based on health workers' current job level. In Table 4.18, the excluded subgroup was those working at the commune level. Of the 315 participants, seven family physicians were currently working at the national level and 14 family physicians were currently working in private clinics.

*Income* had a positive and statistically significant effect on the job choices of family physicians in four subgroups, except those working at the national level. The effect size was considerably larger for commune doctors. The interaction terms for the provision of income were negative and statistically significant for the subgroups of those working at district and provincial levels, again indicating that income had higher impact on commune health workers than district and provincial levels. The greater effect could be because the increased income represented a much larger proportion of the total income of a health worker at the commune level. Health workers working at the high level had more income resources than just government monthly income.

All the non-pecuniary job attributes had no impact on the job decision of private doctors.

Except for the commune subgroup, *living condition* was the most important factor for national, provincial, and district subgroups. For the three subgroups, better location attributes improved the likelihood of a job being selected. The effect was the highest for the health workers currently working at the national level. Meanwhile, the coefficient estimates of the *living condition* attribute was insignificant for commune doctors (see Tables 4.17 and 4.18).

The effect size of *private clinic* and *career promotion* incentive policies was much larger for national family doctors than others. The interaction term was positive for the national family physician subgroup, indicating that these participants valued a private clinic and career promotion more highly than those working at the commune level. However, the limitation of the national subgroup analysis was that the number of national family doctors was seven, much smaller than the other groups, resulting in possibly biased findings.

**Table 4.17. Subgroup Analysis by Current Job Level**

	Commune		District		Provincial		National		Private	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes										
Career Promotion	0.303 ***	0.42 ***	0.16 *	0.096 *	0.342 ***	0.411 ***	2.175 ***	-0.002	0.085	-0.066
Be promoted in <1 year (ref: be promoted later)										
Living condition	0.078	1.147 ***	0.334 **	0.739 ***	0.633 ***	0.395 ***	2.328 **	1.717 **	0.12	0.002
Urban (ref: rural)										
Chance of opening private clinic	0.274 ***	0.521 ***	0.325 ***	0.422 ***	0.352 ***	0.228	1.017 **	0.006	0.111	0.298
Easy (ref: hard)										
Income (continuous)	0.011 ***		0.005 ***		0.007 ***		0.004		0.006 *	
Alternative-specific constant	-0.436 ***		-0.343 ***		-0.561 ***		0.27		0.572 ***	
Model diagnostics										
Number of respondents	133		63		98		7		14	
Number of observations	3591		1701		2646		189		420	
Log Likelihood	-1136		-594.1		-915.4		-53.39		-139.2	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.18. Subgroup Analysis Including Interaction with Current Job Level**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.306***	0.357***
Career promotion * District level	-0.172	
Career promotion * Provincial level	0.087	
Career promotion * National level	1.432***	
Career promotion * Private level	-0.242	
Living condition	0.135	0.806***
Living condition * District level	0.18	
Living condition * Provincial level	0.533***	

Living condition * National level	2.011***	
Living condition * Private level	0.288	
Private clinic	0.266***	0.395***
Private clinic * District level	0.061	
Private clinic * Provincial level	0.093	
Private clinic * National level	0.953***	
Private clinic * Private level	-0.142	
Income	0.01***	
Income * District level	-0.005***	
Income * Provincial level	-0.002*	
Income * National level	-0.005	
Income * Private level	-0.004	
Alternative-specific constant	-0.412***	
Model diagnostics		
Number of respondents	315	
Number of observations	8505	
Log likelihood	-2852.53	

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*Note:* \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by leaving CHSs to higher level health facilities.** Of the 315 family doctors, 56 family doctors previously worked at CHSs before leaving to higher level health facilities. Table 4.19 presents the results of the impacts of job attributes for family doctors previously worked at CHSs before moving to higher level health facilities. All job attributes had a positive and statistically significant effect on the job choices of family physicians. The ASC in the model was insignificant, indicating that for these family doctors, the utility of getting the hypothetical jobs was not higher than the utility provided by their current job. The standard deviations of the coefficients of the *career promotion* and *living condition* attributes were not statistically significant, indicating that the preferences were identical across these family doctors.

**Table 4.19. Subgroup analysis by leaving CHSs to higher level health facilities**

	Rural born	
	<i>Mean</i>	<i>SD</i>
Attributes		
Career Promotion	0.425***	0.002
Be promoted in <1 year (ref: be promoted later)		
Living condition	0.475***	0.309
Urban (ref: rural)		
Chance of opening private clinic	0.505***	0.437***
Easy (ref: hard)		
Income (continuous)	0.006***	
Alternative-specific constant	-0.157	
Model diagnostics		
Number of respondents	56	
Number of observations	1512	
Log Likelihood	-532.02	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Subgroup analysis by primary health care area.** Different job attributes impacted primary health care physicians and other specialists (see Tables 4.20 and 4.21). Income had a relatively higher impact on health workers working in the primary health care area than those working in different fields.

The two non-pecuniary job attributes, *career promotion* and *private clinic*, exerted a stronger influence on primary health care physicians than those working on other fields. Primary health care physicians stated that usually, primary health care brought lower official income than other fields. Thus, running a private clinic and getting promotion potentially might be more tempting for primary health care doctors. The standard deviation of attribute for *career development* was negative and statistically significant indicating that the preferences of being

promoted may be heavily heterogeneous across those primary health care health workers. The two subgroups had no difference in preferences for the *living condition* attribute.

**Table 4.20. Subgroup Analysis by Primary Healthcare Area**

	Primary health care- related Job		No primary health care- related Job	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Attributes				
Career Promotion	0.502***	-0.329**	0.191***	0.416***
Be promoted in <1 year (ref: be promoted later)				
Living condition	0.455***	1.3***	0.3***	0.418***
Urban (ref: rural)				
Chance of opening private clinic	0.563***	0.515***	0.156***	0.235*
Easy (ref: hard)				
Income (continuous)	0.01***		0.007***	
Alternative-specific constant	-0.38***		-0.336***	
Model diagnostics				
Number of respondents	135		180	
Number of observations	3645		4860	
Log Likelihood	-1153.9		-1702.5	

Note: \* indicates significance at the 10% level; \*\* at the 5% level; \*\*\* at the 1% level

**Table 4.21. Subgroup Analysis Including Interaction with Primary Health Care Area**

	<i>Mean</i>	<i>SD</i>
Attributes		
Career promotion	0.205***	0.372***
Career promotion * Primary health care	0.261**	
Living condition	0.338***	0.829***
Living condition * Primary health care	0.121	
Private clinic	0.165**	0.371***
Private clinic * Primary health care	0.37***	
Income	0.007***	
Income * Primary health care	0.002**	

Alternative-specific constant	-0.37***
Model diagnostics	
Number of respondents	315
Number of observations	8505
Log likelihood	-2872.77
<i>Note:</i> * indicates significance at the 10% level; ** at the 5% level; *** at the 1% level	

## 4.5 Willingness to Pay

This section shows the willingness to pay (WTP) estimation. In this study setting, WTP is the value that family doctors place on job aspects. In other words, WTP represents the amount of money that family doctors will forgo each month in order to achieve a higher level of job attributes (Vujicic, Alfano, Shengalia, et al., 2010). The WTPs are calculated by dividing the gain/ loss of indirect utility of an alternative on top of the status quo utility by the negative of the mean coefficient of income variables. The mean coefficients and the corresponding standard deviations in the MXL models were used to estimate the WTPs for job attributes.

### 4.5.1 Willingness to pay for the entire sample

Table 4.22 presents WTP for the whole sample, deriving from the coefficient estimates in Table 4.2. Overall, family doctors valued the location of workplace the most. The WTP for career promotion and private clinic incentives are approximately equivalent. For the entire sample, family physicians were willing to forgo 48.36 percent of their monthly income to locate in urban areas. Having government support to start a private practice was valued at 38.04 percent, followed closely by a fast track career promotion at 37.91 percent of monthly income.



The average amount of monthly income of the whole sample, VND 8.33 million - equivalent to USD 366 (Table 4.1), was used to calculate the WTP estimates for family doctors in dollar amounts. For the entire sample, family doctors were willing to pay monthly USD 177 to work in an urban area. Being promoted within one year and having the easy process to start a private clinic were valued equally at USD 139.

**Table 4.22. Willingness to Pay for the Entire Sample**

How much are you willing to pay for . . .	Percent of Monthly Income			Amount of Monthly Income		
	WTP (%)	95%	Confidence Interval	WTP (USD)	95%	Confidence Interval
A job in urban area	48.36	33.16	63.56	177	122	233
Being promoted within 1 year	37.91	25.77	50.06	139	94	184
Easy process to start a private practice	38.04	25.93	50.14	139	95	184

#### 4.5.2 Willingness to pay for subgroups

The magnitude of salary family doctors willing to trade-off differed depending on different groups. In other words, WTP became higher or lower depending on the subgroup division. This implies that the WTP estimates may be heterogeneous across the respondents with different demographic and personal experience factors. Table 4.23 provides WTP estimates for each incentive policy of different subgroups. The MXL models in the subgroup analysis section provides coefficient estimates for each subgroup.

**Table 4.23. Willingness to Pay for Subgroups**

Subgroup	% of Income Per Month (95% Confidence Interval)					
	Job in Urban		Career promotion within one year		Easy chance to open private clinic	
Age						
Below 50	56.16		44.19		29.83	
	(38.56	73.77)	(30.02	58.37)	(16.76	42.89)
Above 50	29.39		22.39		60.68	
	(-1	59.79)	(-0.25	45.04)	(32.98	88.38)
Gender						
Female	56.84		25.77		36.92	
	(36.45	77.23)	(7.02	44.53)	(18.67	55.18)
Male	38.4		48.87		38.09	
	(14.7	62.09)	(31.98	65.75)	(21.59	54.58)
Marital Status						
Unmarried	55.8		37.73		8.25	
	(16.94	94.67)	(7.25	68.21)	(-20.88	37.39)
Married	47.62		37.96		41.41	
	(31.31	63.94)	(24.85	51.08)	(28.11	54.69)
Rural Born						
Yes	36.72		30.33		36.34	
	(16.25	57.19)	(17.54	43.12)	(22.26	50.41)
No	60.34		50.41		42.88	
	(36.78	83.9)	(25.88	74.95)	(20.04	65.72)
Rural Internship						
Yes	38.17		31.55		34.52	
	(22.36	53.98)	(19.44	43.67)	(22.29	46.74)
No	90.15		84.55		75.91	
	(30.06	150.25)	(17.58	151.53)	(11.44	140.37)
Doctor Type						
Assistant Doctor	29.62		38.44		35.29	
	(11.72	47.52)	(26.01	50.86)	(21.47	49.12)
Doctor	82.11		37.63		44.32	
	(53.03	111.19)	(12.52	62.75)	(21.56	67.09)

Working Experience					
Commune	33.07		39.06		37.55
	(14.84	51.29)	(26.24	51.87)	(23.83 51.27)
District	54.47		42.75		52.06
	(24.57	84.37)	(16.69	68.8)	(25.66 78.47)
Provincial	79.06		68.03		68
	(28.26	129.86)	(11.41	124.65)	(10.41 125.58)
Current Job Level					
Commune	7		28.2		25.47
	(-18.83	33.33)	(12.33	44.06)	(9.95 40.98)
District	64.76		31.01		63.14
	(12.47	117.04)	(0.14	71.18)	(13.02 113.26)
Provincial	84.78		45.82		47.15
	(58.98	110.59)	(21.85	69.79)	(23.78 70.52)
Leaving CHSs to higher level health facilities	72.39		64.8		76.97
	(37.61	107.1)	(26.42	102.19)	(30.54 123.4)
Primary health care- related					
Yes	43.72		48.21		54.07
	(18.19	69.25)	(32.07	64.35)	(36.71 71.44)
No	44.33		28.27		23.12
	(25.46	63.21)	(9.19	47.35)	(5.9 40.34)

*The value family doctors placed on location varied considerably by demographic factors such as age, gender, marital status.* Family doctors under age 50 appeared to value highly a job in urban areas with a WTP of 56 percent of income per month compared to individuals aged 50 or above who were only willing to pay 29 percent of monthly income to work in an urban area. Again, the interviews with family doctors during the DCE provided some insights. For example, many family doctors under age 50 were apprehensive that a job in CHSs in rural areas meant lower quality education, inconvenient infrastructure, and more. These family

doctors also worried that they would lose their autonomy due to fewer challenging tasks and less responsibility in rural areas. In general, family physicians under age 50 were more concerned with the job location when compared to fast track career promotion and private clinic. Women family physicians evaluated an urban job higher than men physicians (willing to pay 57 versus 38 percent of monthly income). Unmarried participants placed a higher value on an urban job than married participants; they were willing to pay 56 percent of income per month compared to 48 percent of monthly income by married family doctors. Again, the findings were identical to the interviews with family doctors during the DCE. These unmarried physicians wanted to settle down in urban areas more than married individuals did.

*The value family doctors placed on location varied considerably by personal working experience factors such as doctor title, previous job experience, and current job experience.*

WTP values for doctors were much higher than for assistant doctors in absolute terms for the workplace, 80 and 30 percent of income per month respectively. This was consistent with the findings from the fieldwork, in which university doctors were more highly concerned with their workplace in comparison to assistant doctors.

WTP values for an urban job increased with higher-level job experience. For individuals who had commune working experience, the WTP was 33 percent of monthly income, much lower compared to those with no such experience. For family doctors without commune experience, the largest value was for not having to take a job in CHSs in rural areas. The respective figures for individuals who had district and provincial working experience were 54 percent and 79 percent of income per month, respectively.

The results for family doctors currently working confirmed this trend. WTP values for an

urban job increased with the higher-level of the current job. For individuals who work at CHSs, the WTP was only 7 percent of income per month compared to the respective figures for individuals were working at district and provincial levels (65 percent and 85 percent of income per month, respectively). The WTP values for individuals working at the commune level varied to a greater extent than other physicians. At the five percent confidence level, the range of the WTP to get an urban job was from negative 19 to 33 percent of monthly income. The negative WTP implied that commune family doctors would need to be compensated up to 19 percent of monthly income to move from rural to urban areas. A plausible explanation for this discrepancy was that commune doctors' preferences were more heterogeneous than other physicians. Meanwhile, there was a big jump of WTP between commune physicians and district physicians. WTP of district physicians to obtain an urban post was more nine times higher than those of individuals at the commune level. Interestingly, for individuals working at the provincial levels, job location was extremely important. These respondents expressed a WTP of almost all income per month to remain in urban areas.

***Individuals with exposure to rural areas – birth place, rural internship, and current rural job, except those leaving rural CHSs to higher level health facilities – valued an urban job the least.*** Exposure to rural areas seemed to have a significant impact on decision of job location. For respondents born in urban areas, job location seemed to be more important. These urban-born respondents expressed a WTP of 60 percent of income per month compared to 37 percent of income per month among physicians who were born outside of urban areas. Interestingly, for family physicians who had rural internship experience, the WTP was 38 percent of income per month compared to 90 percent for those that had no rural internship

experiment – less than half. Family physicians who were currently employed at the commune health level had the lowest WTP to obtain an urban job when compared to those with no commune working experience. Meanwhile, family physicians who already left CHSs to higher level health facilities valued urban job highly with WTP of 72 percent of their monthly income.

***Male family doctors, family doctors under 50 years old, assistant doctors – valued fast track career promotion the most.*** The WTP for men was higher than for women (49 percent and 26 percent of income per month, respectively) for *fast track career promotion*. Family physicians under age 50 were willing to forgo 44 percent of monthly income compared to 23 percent of monthly income for those aged 50 or above. Assistant physicians placed a high value on being promoted within one year – 38 percent of income per month compared to urban location (29 percent of monthly income) and private clinic (35 percent of monthly income).

***Primary health care-related family doctors, family doctors aged 50 or above, university doctors, family doctors currently working at district level, family doctors leaving CHSs to higher level health facilities – valued a chance of opening a private clinic the most.*** Primary health care-related family doctors valued private clinic more than none primary health care-related participants. The figures for the WTP for primary health care-related family physicians and the other family physicians were 54 percent and 23 percent of income per month, respectively. For individuals who aged 50 or above the WTP was 61 percent compared to 30 percent of income for those under age 50. For those who left CHSs to higher level health facilities the WTP was 77 percent of their monthly income. University doctors also placed a higher value on the chance of opening a private clinic; they were willing to pay 44 percent against 35 percent of income for assistant doctors. Family doctors who were currently working at

the district level were willing to forego 63 percent of income for an opportunity of opening a private clinic, much higher compared to those with no such working experience. The fact that district family physicians valued private clinic most likely reflects the fact that there has been an increased demand for health services at the district level due to the low quality of CHSs and overcrowding at the provincial and national levels. In the fieldwork, many health workers at the district level stated they plan to work in the dual job after earning a family medicine degree.

#### 4.6 Proportion of Uptake Job

This section presents the effect of different incentive policies on the uptake rate of rural jobs for family doctors. The proportion of uptake was predicted for the whole sample and each subgroup. The departure point was a job in CHSs in remote areas where there is no change for income, no fast track career promotion, and rated as difficult to start a private clinic. This may appear as a bad scenario, but it is real for many CHSs in rural areas in Vietnam. The baseline scenario for rural job was based on the available data and on this study's qualitative findings.

##### 4.6.1 Effectiveness of incentive policies for the entire sample

Table 4.24 presents the data from the impact of incentive policies for the entire sample when each attribute improves by level while all else remains equal.

<b>Table 4.24. Proportion of Uptake job for the Entire Sample</b>	
<b>Simulated Scenario</b>	<b>All Family Doctors</b>
30% decrease in salary	-13% (-15% to -11%)

50% increase in salary	20%
	(17% to 24%)
100% increase in salary	39%
	(33% to 45%)
Being promoted within 1 year	16%
	(10% to 21%)
Easy process to start a private practice	16%
	(11% to 21%)

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For the whole sample, the probability of family physicians willing to take a rural job increased for the “relatively better” job and decreased for the “inferior” job. The result is plausible in the sense that there is no reason for them to take the “worse” job if they knew that there was a “better” job available in the choice scenario.

Table 4.24 also depicts how the regulation of wage and allowances is a powerful intervention. Increasing wages and allowances seems to be the most efficient way to attract and retain family doctors to rural areas. Raising total wages and allowances per month 50 percent increased the probability of taking a CHS job by 20 percentage points, and raising it by additional 50 percent increased the probability by an additional 19 percentage points.

Simulations show that a fast track career promotion and easy process of opening a private clinic similarly contributed to the willingness of participants to work in rural areas as both incentive interventions increased the probability of taking a CHS job by 16 percentage points. In comparison, the increased probability of taking a rural job by providing a fast track career promotion and facilitating process of opening a private clinic was less than the monetary instrument, these policies still help to correct the geographical imbalance of health human resources. Moreover, these policies save the government funding as well as produce some



positive externalities. In the focus group, family doctors mentioned that being promoted made them feel more confident, more willing, and more capable to dedicate service to the health facility because they would have authority to improve the working environment and transfer their knowledge to others.

#### 4.6.2 Effectiveness of incentive policies for subgroups

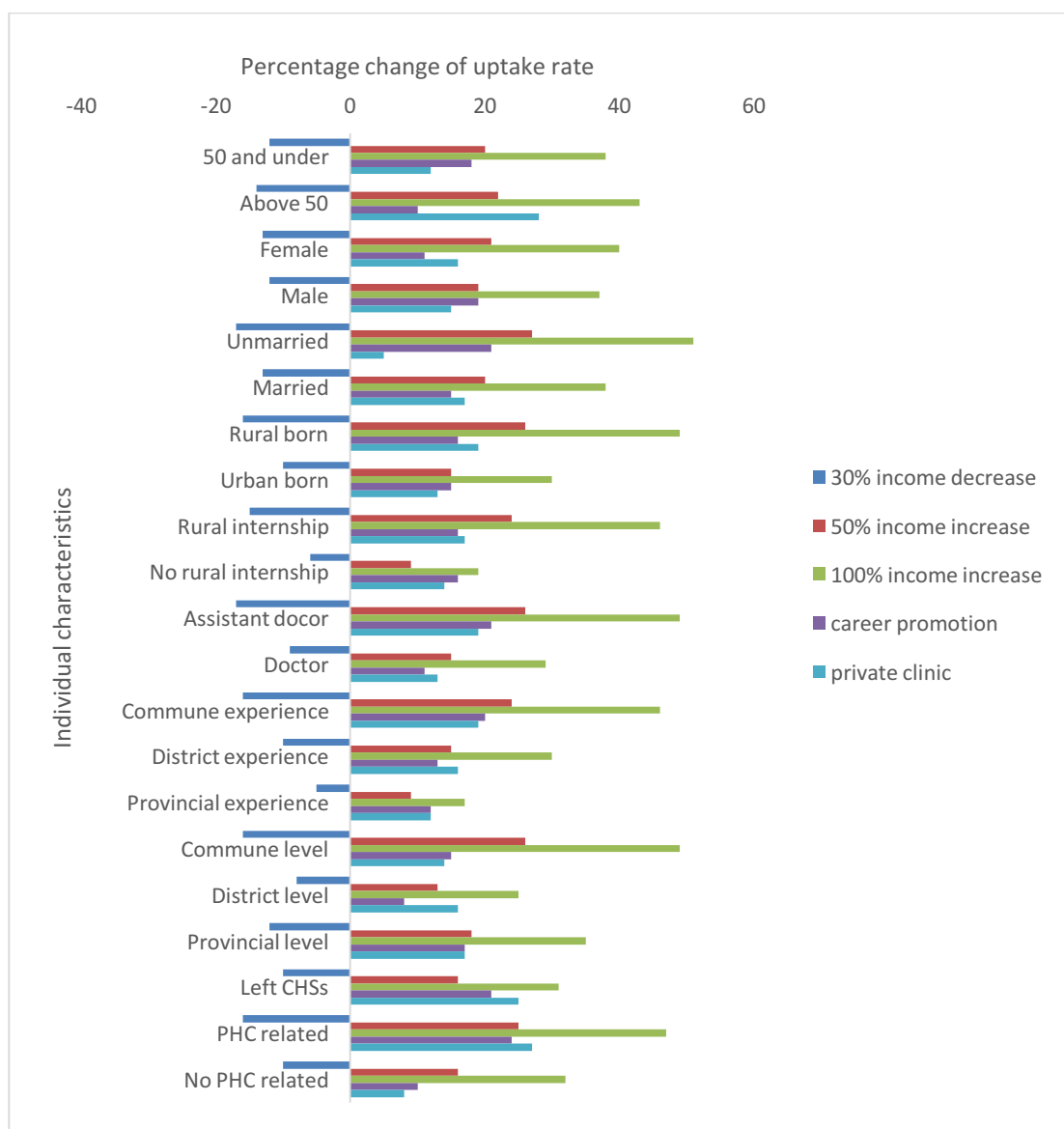
Each kind of policy has different impact on different subgroups. Table 4.25 displays the policy impact on each subgroup.

**Table 4.25. Proportion of Uptake Job for Subgroups**

Subgroup	Changes in Probabilities (%)				
	30 % decrease in salary	50% increase in salary	100% increase in salary	Career promotion within one year	Easy chance to open private clinic
Age					
Below 50	-12	20	38	18	12
Above 50	-14	22	43	10	28
Gender					
Female	-13	21	40	11	16
Male	-12	19	37	19	15
Marital Status					
Unmarried	-17	27	51	21	5
Married	-13	20	38	15	17
Rural Born					
Yes	-16	26	49	16	19
No	-10	15	30	15	13

Rural Internship					
Yes	-15	24	46	16	17
No	-6	9	19	16	14
Doctor Type					
Assistant Doctor	-17	26	49	21	19
Doctor	-9	15	29	11	13
Working Experience					
Commune	-16	24	46	20	19
District	-10	15	30	13	16
Provincial	-5	9	17	12	12
Current Job Level					
Commune	-16	26	49	15	14
District	-8	13	25	8	16
Provincial	-12	18	35	17	17
Leaving CHSs to higher level health facilities					
Primary health care-related	-10	16	31	21	25
Yes					
No	-16	25	47	24	27
No					
	-10	16	32	10	8

Figure 4.1 displays the percentage change, over baseline, in uptake rate of family doctor subgroups willing to accept a rural job in the presence of specific job attributes.



**Figure 4.1. Percentage change (over base) in job uptake of family doctor subgroups willing to accept a rural job in the presence of a defined level**

**Policy impact by age.** Family physicians aged 50 or older had a higher response to pecuniary incentives than those under age 50. My analysis shows that decreasing wages and allowances per month to 30 percent decreased the respective probability of taking a rural job by 14 percentage points for the older group and 12 percentage points for the younger group. Raising

wages and allowances per month to 50 percent and 100 percent increased the respective probability of taking a rural job by 22 and 43 percentage points for the older group and 20 and 38 percentage points for the younger group.

Table 4.25 depicts that for both subgroups, the monetary incentive became less effective as salary increased. For the group of individuals aged 50 and older, raising monthly income to 50 percent increased the probability of taking a rural post by 22 percentage points, and raising it by additional 50 percent increased the probability by an additional 21 percentage points. For the group of individuals under age 50, the probability was 20 and 18 percentage points. Thus, after raising wages and allowances over a certain level, it would be reasonable to focus on other kinds of policies.

My analysis shows that a fast track promotion had a similar impact as monetary incentive on job decision of respondents under age 50. If authorities ensured a fast track career promotion within one year, the probability of taking a remote job in CHSs would increase by 18 percentage points, which is equal to the increased proportion of uptake when an additional 50 percent of income per month is offered.

As expected, individuals age 50 and older were less responsive to career promotion. However, an offer of ensuring a chance to open a private clinic was highly valued. There was a significant difference between the preferences of individuals aged 50 and older and individuals under 50. While the younger group was less responsive to opening a private clinic (12 percentage points increase), the older group had much a higher response (28 percentage points).

**Policy impact by gender.** Women tended to be more responsive to monetary incentive than men: Both decreasing and increasing salaries had higher impact on female workers’

decisions of job location. Meanwhile, men were more concerned with fast track career promotion. The offer of being promoted within one year more positively increased their probability of take a rural job. Both men and women were highly responsive to the opening a private clinic offer. For women respondents, opening a private clinic contributed more than career promotion to their utility. A chance of opening a private clinic increased the take-up rate for women respondents by 16 percentage points, while the fast track career promotion was 11 percentage points.

**Policy impact by marital status.** There were significant differences between the preferences of unmarried individuals and married individuals. The unmarried subgroup was more responsive to monetary policy at all levels. Fast track career promotion proved to have the second largest effect on the probability of taking a remote job, as it increased the probability by 21 percentage points, followed the effects of raising wages and salary to 50 percent and to additional 50 percent, which were 27 and 51 percentage points. In comparison, the career promotion offer only increased the probability of taking the rural job by 15 percentage points for married individuals. However, unmarried physicians tended to be significantly less concerned about opening a private clinic when compared to those who were married (5 versus 17 percentage points).

**Policy impact by rural exposure.** In most aspects, policies seem to have higher effect on all individuals with exposure to rural areas – rural born, rural internship, rural working experience, and current rural job - than others. More specifically, among all incentive policies, monetary regulation was the most powerful intervention for individuals with exposure to rural areas compared to others.

For family physicians who were born in rural areas, raising total wages and allowances per month to 50 percent increased the probability of taking a CHS job by 26 percentage points, and raising it by another 50 percent increased the probability by 23 percentage points. For urban born family physicians, the number was 15 percentage points and 15 percentage points respectively. Meanwhile, the offers of fast track career promotion and private clinic only increased the take-up rate by 16 and 19 percentage points. For urban born physicians, the probability was 15 and 13 percentage points, respectively. The subgroups of family physicians with and without rural internship experience had the same patterns as the subgroups of rural and urban born physicians.

For subgroups by working experience, generally, the willingness to work in rural areas decreased with greater working experiences. In response to monetary incentives, for the family physicians with commune working experience, decreasing wages and allowances per month to 30 percent decreased the probability of taking a rural job by 16 percentage points, and raising wages and allowances per month to 50 percent and 100 percent increased the respective probability of taking a rural job by 24 and 46 percentage points. For individuals with district and provincial experience, the probability of taking a CHS job was 10 percentage points decreased, 15 percentage points increased, 30 percentage points increased and 5 percentage points decreased, 9 percentage points increased, 17 percentage points increased, respectively.

For subgroups by current job level, pecuniary intervention was still the most powerful instrument for participants with exposure to rural settings compared to others. The offer of fast track career promotion resulted in an increase of the take-up rate in CHSs by 17 percentage points for provincial physicians, 15 percentage points for commune physicians and 8 percentage

points for district physicians. Physicians currently working at the provincial and district levels tended to be more responsive to the offer of opening a private clinic (17 percentage points and 16 percentage points, respectively), which was higher than the impact of the additional 50 percent income increase offer. Again, the finding was identical to the in-depth interviews with participants where district and provincial doctors clearly showed their interest of moving to rural areas provided there was some support from the government. Moreover, in comparison, the impact of pecuniary incentive on the probability of taking a rural job decreased at a certain level where the increase of income became equal or less than the impact of non-pecuniary incentives. Thus, after raising wages to a certain level, the recommendation would be to focus on another kind of policy to increase the utility of physicians in a better way.

**Policy impact by doctor title.** Assistant doctors were more responsive to all incentive policies. For assistant doctors, decreasing wages and allowances per month to 30 percent decreased the probability of taking a rural job by 17 percentage points, and raising wages and allowances per month to 50 percent and 100 percent increased the respective probability of taking a rural job by 26 and 49 percentage points. For doctors, decreasing wages and allowances per month to 30 percent decreased the probability of taking a rural job by 9 percentage points, and raising wages and allowances per month to 50 percent and 100 percent increased the respective probability of taking a rural job by 15 and 29 percentage points. Ensuring a fast track career promotion and opening a private clinic over baseline scenario increased the proportion of assistant doctors who took a rural CHS job by 21 and 19 percentage points, respectively. The impact of career promotion and private clinic incentives on the doctor subgroup was much smaller, 11 and 13 percentage points, respectively.

Again, the effect of raising salary to a certain level will decrease and become equal to other kinds of policy. For doctors, raising total income by 50 percent increased the take-up rate by 15 percentage points, while raising it an additional 50 percent increased the rate by 14 percentage points, which was close to the increase of 13 percentage points made by opening a private clinic offer.

**Policy impact by leaving CHSs to higher level health facilities.** Family doctors who left CHSs to higher level health facilities tend to value career promotion and opening a private clinic offer higher than financial incentives. Ensuring a fast track career promotion and opening a private clinic over baseline scenario increased the respective probability of these family doctors taking a CHS job by 21 and 25 percentage points, much higher than the impact of raising total income by 50 percent, which was 16 percentage points. However, raising total income by 100 percent had the largest effect on the probability of taking a remote job, as it increased the probability by 31 percentage points.

**Policy impact by primary health care area.** Family doctors whose job related to primary health care tended to value both pecuniary and non-pecuniary offers more highly than the others. Ensuring a fast track career promotion and opening a private clinic over baseline scenario increased the respective probability of primary health care-related doctors taking a CHS job by 24 and 27 percentage points, while the impact of these non-pecuniary offers on physicians not working in primary health care area was much smaller, 10 and 8 percentage points, respectively.

This makes sense as the provision of opening a private clinic is an important motivation for health workers earning a family medicine degree. In the interviews with physicians working



in primary health care area, many of them mentioned that opening a private clinic was one of main motivations to earn a family medicine degree. In comparison to all other policies, opening a private clinic offer also had the highest impact for primary health care-related physicians.

#### **4.7 Conclusion**

In this chapter, MXL models were used to estimate parameters using the main data. The results showed that family doctors had a strong preference for pecuniary incentives. The other kinds of policy, career promotion and opening a private clinic, could also bring effective interventions for correcting the geographical imbalance of health human resource distribution. The effect of incentive policies also depends on different subgroups by demographic and personal working experience. Moreover, the effect of monetary intervention on uptake rate that decreased at certain level of increase of wages and allowances and became less than the effect of the other non-pecuniary interventions, suggests that after raising wages and allowances to a certain level, it is better to focus on other kinds of non-pecuniary interventions. The policy implications of these observation are discussed in Chapter 5.

## **CHAPTER 5**

### **DISCUSSION**

#### **5.1 Introduction**

This research project is the first known study to quantify family doctors' preferences for job attributes in Vietnam. In the first part of this chapter, I discuss specific incentive policies to attract and retain family doctors to work in rural areas in Vietnam based on the outcomes of the study. Each incentive policy is tailored to different subgroups that were established from demographic factors and personal working experience factors. Next, I discuss the methodological and theoretical contributions of this study. Finally, I explore the limitations of the study.

#### **5.2 Discussion**

It is not surprising that pecuniary policy has the highest impact on family doctors' job location decisions in Vietnam. It is clear from the study's findings that in general, family doctors value increasing income the highest. Almost all respondents expressed a sense of being underpaid given their education, effort, workload, and risks taken. This outcome was identical to the findings from focus groups and in-depth interviews with family physicians and policy makers. It is important to note Vujicic et al. (2011) study that points out that in Vietnam, when all income streams are taken into account, total income of rural health workers is still lower than those in urban areas.

Interestingly, the findings of this study indirectly deny the efficacy of simply using income to attract and retain health workers to rural areas in Vietnam. Currently in Vietnam the pecuniary policies aimed at correcting the geographical imbalance of health human resources such as Decree 64/2009/ND-CP and Decision 75/2009/GD-TTg, which entitle health workers in rural areas to a monthly allowance of 50 percent of basic salary or 30 percent of current salary, have not been considered attractive enough to have a profound impact on health workers' job location decisions. The study finds that while raising wages and allowances is a powerful incentive, the effect of income incentives actually decreases at a certain threshold. The findings of this study suggest that, after raising wages and allowances to a certain level, it is necessary to complement financial incentive policy with other types of non-pecuniary incentive policies to encourage family doctors' deployment to rural areas.

The findings of this study also demonstrate how different subgroups hold different preferences in job attributes. It would be misleading, difficult, and costly to generalize one incentive policy to the entire workforce. For that reason, the recommendations from the outcome of this study go beyond providing a "laundry list" of suggestions to encourage job choice to rural areas. Instead, the findings of this study provide guidance for feasible incentive policies by responding to the specific and varied needs specific to different subgroup population of health workers.

Beyond tailoring incentives to a rural area's culture and context, the findings of this study indicate that it is critical to customize incentive policies based on health care workers' individual characteristics. Health workers in general and family doctors in particular hold preferences that vary significantly depending on demographic and personal working experience factors. In this

study, individual characteristics are proved to interact with living condition factors and work factors, thus influencing family doctors' job location decisions. The findings of this study also show how different subgroups (age, gender, originality, working experience, etc.) put different values on different incentive policies, as well as how different subgroups have different proportions of uptake rates for the preference of same job attribute levels. Policy makers may find the following findings helpful when designing both pecuniary and non-pecuniary interventions to attract a certain number of family physicians to rural areas.

First, increasing current income by 50 percent had the highest impact on family doctors' job location decisions for many subgroups (participants aged under 50, those with rural internship experience, assistant doctors, and those with working experience at commune level). For some subgroups (those leaving CHSs to higher level health facilities, individuals currently working at the national level, and individuals working in a primary health care area), ability to open a private clinic and career promotion had higher impact on their job location decisions (compared to pecuniary policy). The Decree 64/2009/ND-CP, which entitles health workers in rural areas to benefits of a monthly allowance of 70 percent of current salary, was proven to be efficient. When the allowance was decreased to 30 percent it was not considered attractive enough. The findings of this study suggest raising income by 50 percent of current income rather than 70 percent to bring the highest effect compared to other incentives for many subgroups.

In the limited budget scenario, it is possible that financial incentive intervention could be complemented with other types of non-financial interventions while still positively impacting family doctors' deployment to rural areas. Moreover, as the effect of increased income decreases after a certain threshold, it is reasonable to combine both pecuniary and non-pecuniary policies

to achieve a certain number of family physicians to rural areas within a limited budget. Especially, for the subgroup of those leaving CHSs to higher level health facilities, a fast track career promotion and opening private clinic had a significant greater impact to increase the proportion going back to CHSs than monetary policies. Thus, the remedy to these family doctors to return to CHSs should be the non-pecuniary incentives rather than the monetary incentives. Moreover, non-pecuniary incentive policies can bring indirect benefits to the rural health care system. For example, respondents in the study mentioned how being promoted would allow them greater authority to improve the working environment at CHSs. Another example might be a private clinic in a rural area. The family doctor could earn the trust of patients in primary health care services at the grass-roots level, which would reduce patients' need to seek unnecessary services at the higher levels clinics, thus reduce the overcrowding situation at high-level hospitals.

Second, the findings of this study support the growing literature indicating that rural-born health workers are more inclined to accept rural jobs than urban counterparts (Honda & Vio, 2015; Rao, 2012). In the subgroup analysis by geographical origin, pecuniary intervention is the only policy to have statistically greater effect on job decisions of family doctors. Additionally, using the same increased payment, the proportion of uptake job for a rural area is higher for rural-born family doctors. Thus, strategies for recruiting family doctors to a rural setting should consider the candidate's origin. With this in mind, one feasible policy strategy is that Vietnam Ministry of Health and Ministry of Education could give some preferential admission for rural-born family medicine applicants to medical universities, in order to improve family doctors' deployment to rural settings.

Third, family physicians who have rural internship as a part of their training in medical university hold the same trend as those born rurally. With the same increased payment, individuals who have rural internship experience indicate more inclination to get a rural job. Those without rural internship experience are willing to pay 90 percent for an urban job, compared to their counterparts who are willing to spend 38 percent – less than half. Again, only pecuniary intervention has statistically greater impact on these family doctors' job decisions in the subgroup analysis by rural internship. Thus, a policy implication the Vietnam Ministry of Health and Ministry of Education could adopt is to make rural internship a requirement in medical school curriculum to encourage more doctors to choose a rural post.

Fourth, as it is more likely that family doctors working in primary health care area will take a rural post, Vietnam Ministry of Health could support these family doctors while studying family medicine by providing more benefits to attract and retain them in rural areas. The findings of this study point out that incentive policies such as career promotion and private clinic have higher effect on family doctors working in primary health care area. Currently, the Vietnam Ministry of Health has no policy related directly to career development or support for opening a private clinic.

Last, it is obvious from the findings that family doctors currently working at provincial and national levels and university doctors favor a job in urban settings over rural areas. Urban living conditions play a critical role in job decisions for these family doctors compared to their other counterparts. Pecuniary incentive policy has smaller impact on these subgroups. Though career promotion and private clinic have relatively higher impact on national family doctors compared to commune family doctors, the finding of the qualitative fieldwork is that many city

family doctors mention they want to work in rural areas after retirement. Pollution and population density in big cities emerge as the main reasons for their future plan. Thus, it is not the pull factor of incentive policies to pull them to rural areas, it is the push factor of living conditions in big cities that draw them to rural areas. Though both pecuniary and non-incentive policies might not be the main drivers of these family doctors' job choices, both have statistically significant positive impact on their decisions, and can be used to motivate these family doctors to rural areas. At the same time, the remarkable lower proportion of uptake among university doctors and provincial doctors highlights the great reluctance of these family doctors to practice rurally. In the challenging context to incentivize these health professionals, in order to achieve adequate coverage of family doctors in rural areas, it is wise to focus on attracting assistant doctors, district doctors, and retired doctors, as well as retaining commune doctors currently working in CHSs to minimize their moving to higher-level health sectors.

The last finding of this study is from qualitative fieldwork. Many respondents mentioned doubt that the authorities would keep promises for the more tempting incentive offers. In reality, there might be fewer family physicians choosing the job if they do not trust the authorities. Thus, the proportion of uptake rate may be overestimated. Therefore, besides pecuniary and non-pecuniary incentive interventions, it is necessary that authorities prove credible by keeping their commitment to providing the offered incentives.

### **5.3 Contributions**

There is a significant gap in the empirical analysis of health workers' behavior when faced with job location decisions (see Chapter 2). Literature suggests that interventions should

tailor to country setting and must vary according to health workers' stage of life. Though there are more recent quantitative studies on health human resource behavior from developing country settings, to the author's knowledge, very little is known about the relative importance of interventions on health professionals' job location decision in the Vietnam setting. Also, there have been no studies that provide subgroup analysis to examine how factors interact with each other to influence the family doctors' job location decisions. This study is an effort to fill the gap in empirical studies regarding attraction and retention of family doctors to rural areas in low- and middle- income settings. Employing discrete choice experiment methodology, this study sheds light on the complexity of the interaction between factors that influence health professionals' choice behavior. One of the findings of this study, which points out that different subgroups value incentive policies differently, provides empirical evidence for Maslow's theory, which states that different individuals might hold different levels of satisfaction.

This study also contributes to discrete choice experiment design. It included a "status quo" option. Construction of the status quo option for each respondent using a supplement questionnaire helped to prevent the overestimation of the strength of job attributes by eliminating forced hypothetical alternatives, as well as avoiding the risk of losing information with a "choose none" scenario (see Chapter 3).

## **5.4 Limitations**

This work has some shortcomings arising from the methodology. First, the data of this study is drawn from surveys, which means respondents did not demonstrate their willingness to take the hypothetical jobs in real life. Though the stated preference data goes beyond data drawn



from qualitative survey methods in terms of providing relative importance of job attributes and of factors shaping respondents' preferences, it could not anticipate the eventual decisions made by respondents in reality. Only revealed preference data achieved by following respondents along time allows actual labor market decision analysis. Second, this study focused on the impact of different incentive policies on labor market decisions rather than on the costs of implementing them. Thus, though the findings of this study provide guidance on feasible incentive policies, it is necessary to thoroughly analyze cost to implement different interventions, given budget constraints. Finally, limited sample sizes of some subgroups limit the statistical analysis of labor market decisions of family doctors belonging to those groups.

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## APPENDIX 1

### DISCRETE CHOICE EXPERIMENT CHOICE SETS

#### Block 1 \_ Card 1

**Ghi chú:**

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>giảm 30%</b> (30% decrease)	Thu nhập <b>tăng 100%</b> (100% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 1 \_ Card 2

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>không thay đổi</b> (Monetary sources no change)	Thu nhập <b>giảm 30%</b> (30% decrease)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐



### Block 1 \_ Card 3

**Ghi chú:**

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 100%</b> (100% increase)	Thu nhập <b>giảm 30%</b> (30% decrease)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

### Block 1 \_ Card 4

**Ghi chú:**

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 100%</b> (100% increase)	Thu nhập <b>tăng 50%</b> (50% increase)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

### Block 1 \_ Card 5

**Ghi chú:**

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>không thay đổi</b> (Monetary sources no change)	Thu nhập <b>tăng 100%</b> (100% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 1 \_ Card 6

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>không thay đổi</b> (Monetary sources no change)	Thu nhập <b>giảm 30%</b> (30% decrease)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 1 \_ Card 7

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>không thay đổi</b> (Monetary sources no change)	Thu nhập <b>tăng 50%</b> (50% increase)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 1 \_ Card 8

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>giảm 30%</b> (30% decrease)	Thu nhập <b>tăng 100%</b> (100% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐



## Block 1 \_ Card 9

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>không thay đổi</b> (Monetary sources no change)	Thu nhập <b>tăng 100%</b> (100% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 1 \_ Card 10

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 50%</b> (50% increase)	Thu nhập <b>không thay đổi</b> (Monetary sources no change)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐



## Block 2 \_ Card 11

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 50%</b> (50% increase)	Thu nhập <b>không thay đổi</b> (Monetary sources no change)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)  
 Công việc A ☐ Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)  
 Công việc A ☐ Công việc B ☐ Công việc hiện tại ☐

## Block 2 \_ Card 12

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>giảm 30%</b> (30% decrease)	Thu nhập <b>tăng 50%</b> (50% increase)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)  
 Công việc A ☐ Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)  
 Công việc A ☐ Công việc B ☐ Công việc hiện tại ☐

## Block 2 \_ Card 13

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 100%</b> (100% increase)	Thu nhập <b>giảm 30%</b> (30% decrease)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 2 \_ Card 14

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>giảm 30%</b> (30% decrease)	Thu nhập <b>tăng 50%</b> (50% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)	Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)  
 Công việc A ☐ Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)  
 Công việc A ☐ Công việc B ☐ Công việc hiện tại ☐

## Block 2 \_ Card 15

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>giảm 30%</b> (30% decrease)	Thu nhập <b>tăng 50%</b> (50% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 2 \_ Card 16

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>giảm 30%</b> (30% decrease)	Thu nhập <b>không thay đổi</b> (Monetary sources no change)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## Block 2 \_ Card 17

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>không thay đổi</b> (Monetary sources no change)	Thu nhập <b>tăng 100%</b> (100% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)  
 Công việc A ☐ Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)  
 Công việc A ☐ Công việc B ☐ Công việc hiện tại ☐



## Block 2 \_ Card 18

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 50%</b> (50% increase)	Thu nhập <b>không thay đổi</b> (Monetary sources no change)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)  
 Công việc A ☐ Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)  
 Công việc A ☐ Công việc B ☐ Công việc hiện tại ☐



## Block 2 \_ Card 19

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 100%</b> (100% increase)	Thu nhập <b>tăng 50%</b> (50% increase)
Được thăng chức <b>ngay</b> (Be promoted immediately)	Được thăng chức <b>sau</b> (Be promoted later)
Làm việc tại <b>nông thôn</b> (Rural living condition)	Làm việc tại <b>thành thị</b> (Urban living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)  
 Công việc A ☐ Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)  
 Công việc A ☐ Công việc B ☐ Công việc hiện tại ☐

## Block 2 \_ Card 20

### Ghi chú:

A và B là 2 công việc với các giả định khác nhau về: thu nhập, cơ hội thăng tiến, địa điểm làm việc và khả năng mở phòng khám tư.

Anh/ chị hãy đánh dấu vào 2 ô bên dưới để trả lời 2 câu hỏi:

- Giữa công việc A và B, lựa chọn nào anh/ chị mong muốn hơn?
- Công việc nào anh/ chị sẽ lựa chọn trong thực tế: A, B, hoặc công việc hiện tại của anh/ chị?

Sự lựa chọn A	Sự lựa chọn B
Thu nhập <b>tăng 50%</b> (50% increase)	Thu nhập <b>tăng 100%</b> (100% increase)
Được thăng chức <b>sau</b> (Be promoted later)	Được thăng chức <b>ngay</b> (Be promoted immediately)
Làm việc tại <b>thành thị</b> (Urban living condition)	Làm việc tại <b>nông thôn</b> (Rural living condition)
Khả năng mở phòng khám tư <b>cao</b> (High chance of opening private clinic)	Khả năng mở phòng khám tư <b>thấp</b> (Low chance of opening private clinic)

Giữa A và B, công việc nào anh/ chị mong muốn hơn? (đánh dấu) (Which job you prefer?)

Công việc A ☐

Công việc B ☐

Trong thực tế, nếu chỉ lựa chọn một, anh/ chị sẽ chọn (đánh dấu) (Which job would you choose?)

Công việc A ☐

Công việc B ☐

Công việc hiện tại ☐

## APPENDIX 2

### SUPPLEMENT QUESTIONNAIRE

#### A. BẢN THÂN (QUESTIONS ABOUT YOURSELF)

A1. Anh/ Chị bao nhiêu tuổi (Age)

\_\_ \_\_ tuổi (years old)

A2. Giới tính (Gender)

Nam (Male) (1) ☐

Nữ (Female) (2) ☐

A3. Tình trạng hôn nhân (Marital status)

Chưa kết hôn (Not married) (1) ☐

Đã kết hôn (Married) (2) ☐

Li dị (Divorced) (3) ☐

Ở góa (Widowed) (4) ☐

A4. Khi học trung học phổ thông trước khi theo học y khoa, anh/ chị cư trú tại đâu?

(Where did you reside before starting your medical studies)

Nông thôn (Rural) (1) ☐

Thành thị (Urban) (2) ☐

A5. Đó có phải nơi sinh của anh/ chị trước khi theo học y khoa không?

(Was the above place of residence the place you were born?)

Có (Yes) (1) ☐

Không (No) (2) ☐

A6. Công việc hiện tại của vợ/ chồng của anh/ chị là gì?

(Spouse's occupation?)

Viên chức nhà nước (Government officials) (1) ☐

Tư nhân (Non-government officials) (2) ☐

Làm tự do (Self-employed) (3) ☐

Nghỉ hưu (Already retired) (4) ☐

Chưa kết hôn (Not married yet) (5) ☐

Khác (Other) \_\_\_\_\_ (99) ☐

A7. Chọn 3 lý do chính anh/ chị học Y học gia đình (theo thứ tự: 1-đúng nhất, 3-ít đúng hơn)?

(Three main reasons why you choose to study family medicine specialty in the order: 1- the most relevant)

Thu nhập cao hơn (Higher payment) ☐

Thăng tiến (Promotion) ☐

Cơ hội làm tại phòng khám tư (Work as a private doctor in a private clinic) ☐

Mở phòng khám tư (Open own private clinic) ☐

Giúp đỡ mọi người (Help people) ☐

Khác (Other) \_\_\_\_\_ (99) ☐

A8. Anh/ chị có kinh nghiệm thực tập tại nông thôn khi đang theo học tại đại học y không?

(During your medical undergrad, did you practice in a rural facility?)

Có (Yes) (1) ☐

Không (No) (2) ☐

A9. Nếu có, anh/ chị đã thực tập tại vùng nông thôn trong bao lâu (tháng)

(If yes, how long was the internship?)

\_\_ tháng (months)

A10. Anh/ Chị có sử dụng mạng xã hội không?

(Do you use social media tools such as Facebook, Twitter?)

Có (Yes) (1) ☐

Không (No) (2) ☐

A11. Nếu có, anh/ chị có sẵn lòng sử dụng mạng xã hội để hỗ trợ khám chữa bệnh không?

(If yes, are you willing to communicate with/ provide service to your patients via the social media tools?)

Có (Yes) (1) ☐

Không (No) (2) ☐

## B. CÔNG VIỆC HIỆN TẠI (QUESTIONS ABOUT CURRENT EMPLOYMENT)

B1. Số năm đã công tác tại cơ quan hiện tại tính đến trước thời điểm theo học Y học gia đình?

(Number of years in your current facility before seeking family medicine specialty?)

\_\_ năm (years)

B2. Loại hình của cơ quan hiện tại?

(Type of the current facility)

Cơ sở y tế tuyến xã, phường (Commune health center) (1) ☐

Cơ sở y tế tuyến quận, huyện (District health facility) (2) ☐

Cơ sở y tế tuyến tỉnh, thành phố (Provincial health facility) (3) ☐

Cơ sở y tế tuyến trung ương (Central health facility) (4) ☐

Cơ sở y tế tư nhân (Private health facility) (5) ☐

B3. Vị trí cơ quan hiện tại?

(Where does your current facility locate?)

Nông thôn (Rural) (1) ☐

Thành thị (Urban) (2) ☐

B4. Anh/ Chị đánh giá trang thiết bị của cơ quan hiện tại?

(How would you rate the equipment in your current facility?)

Đầy đủ (Adequate) (1) ☐

Không đầy đủ (Inadequate) (2) ☐

B5. Loại hình công việc hiện tại của anh/ chị? (chọn hết nếu phù hợp)

(Type of your current employment, you can choose multiple options)

Dự phòng (Preventive) (1) ☐

Điều trị (Curative) (2) ☐

Quản lý (Administration) (3) ☐

Giảng dạy (Academic) (4) ☐

B6. Mức thu nhập trung bình trong một tháng (bao gồm tất cả lương, thưởng)

(Average income per month, including salary and allowances)

\_\_\_\_\_ triệu (million VND)

B7. Yếu tố nào sẽ làm tăng sự hài lòng của anh/ chị với công việc hiện tại?

(What is the factor that improves your job satisfaction the most?)

Thu nhập cao hơn (Higher income) (1) ☐

Thăng tiến nhanh hơn (Faster promotion) (2) ☐

Giảm cường độ công việc (Less workload intensity) (3) ☐

Nâng cao chuyên môn (Higher education opportunity) (4) ☐

Củng cố trang thiết bị (Improved equipment and drugs) (5) ☐

Mối quan hệ với đồng nghiệp, cấp trên (Better relationship with colleagues and employers) (6) ☐

Khác (Other) \_\_\_\_\_ (99) ☐

B8. Anh/ Chị dự đoán mình sẽ tham gia công tác quản lý tại cơ quan hiện tại trong khoảng bao nhiêu năm tới?

(Average number of years spent in your current facility until being eligible for promotion)

\_\_ \_\_ năm (years)

B9. Anh/ Chị có làm thêm tại phòng khám tư nhân không?

(Do you work in a private clinic besides public facility if you currently work at a public facility?)

Có (Yes) (1) ☐

Không (No) (2) ☐

B10. Anh/ Chị đánh giá khả năng mở phòng khám đa khoa tư nhân của mình sau khi có chứng chỉ bác sỹ y học gia đình như thế nào?

(How would you rate government support you to open private clinic?)

Cao (High) (1) ☐

Thấp (Low) (2) ☐

### C. QUÁ TRÌNH CÔNG TÁC (QUESTIONS ABOUT WORK HISTORY)

C1. Anh/ chị đã làm việc bao nhiêu năm trong ngành y?

(How long have you been working in health sector?)

\_\_ \_\_ năm (years)

C2. Anh/ chị trước đây có phải bác sỹ chuyên tu không?

(Were you a physician assistant previously?)

Có (Yes) (1) ☐

Không (No) (2) ☐

C3. Anh/ Chị đã bao giờ công tác tại tuyến cơ sở (xã, phường) chưa?

(Have you ever worked in a commune health center?)

Đang công tác (Currently work) (1) ☐

Trước đây (Previously worked) (2) ☐

Chưa bao giờ (Never until now) (3) ☐

Nếu đã/ đang thì trong bao nhiêu năm (If currently/ previously, how long?) \_\_ \_\_ năm (years)



C4. Anh/ Chị đã bao giờ công tác tại tuyến quận, huyện chưa?

(Have you ever worked in a district health facility?)

Đang công tác (Currently work) (1) ☐

Trước đây (Previously worked) (2) ☐

Chưa bao giờ (Never until now) (3) ☐

Nếu đã/ đang thì trong bao nhiêu năm (If currently/ previously, how long?) \_ \_ năm (years)

C5. Anh/ Chị đã bao giờ công tác tại tuyến tỉnh, thành phố chưa?

(Have you ever worked in a provincial health facility?)

Đang công tác (Currently work) (1) ☐

Trước đây (Previously worked) (2) ☐

Chưa bao giờ (Never until now) (3) ☐

Nếu đã/ đang thì trong bao nhiêu năm (If currently/ previously, how long?) \_ \_ năm (years)

C6. Anh/ Chị đã bao giờ công tác tại tuyến trung ương chưa?

(Have you ever worked in a central health facility?)

Đang công tác (Currently work) (1) ☐

Trước đây (Previously worked) (2) ☐

Chưa bao giờ (Never until now) (3) ☐

Nếu đã/ đang thì trong bao nhiêu năm (If currently/ previously, how long?) \_ \_ năm (years)

C7. Anh/ Chị đã bao giờ công tác tại cơ sở y tế tư nhân chưa?

(Have you ever worked in a private health facility?)

Đang công tác (Currently work) (1) ☐

Trước đây (Previously worked) (2) ☐

Chưa bao giờ (Never until now) (3) ☐

Nếu đã/ đang thì trong bao nhiêu năm (If currently/ previously, how long?) \_ \_ năm (years)

**Thank you very much! One more question**

Anh/ Chị có sẵn sàng tham gia phỏng vấn trong tương lai không?

Are you willing to be re-interviewed in the future?

Có (Yes) (1) ☐

Không (No) (2) ☐

**APPENDIX 3**  
**CONSENT FORM**

Title of Research Project: Exploring Determinants for Recruitment and Retention of Family Doctors for Rural Practice in Vietnam: Lessons from a Discrete Choice Experiment

Investigators:

Contact Number

Principal Investigator: Pham, Anh, Thi Cam, Graduate student, UTD      469-664-1890

Faculty Sponsor: Dohyeong Kim, PhD, UTD      972-883-3512

Purpose: The purpose of this study is to examine why family doctors in Vietnam have hesitated taking rural posts and to propose a strategy to encourage them to remain in rural settings.

Description of Project: The purpose of this interview is to better understand perspectives on job expectations and career plan of medical students who are currently studying family medicine specialty in Vietnam. Participants will be asked about how satisfied they are with their previous jobs, their expectations about working as a family doctor, their willingness to work in rural areas, and factors that affect their motivation and willingness such as remuneration, working conditions, career development, and workload. The interview includes descriptive questionnaire such as age, gender, place of residence, spouse's occupation; and discrete choice experiment

questionnaire includes 10 pair of job descriptions, each job has advantages and disadvantages and participants need to trade-off these advantages and disadvantages in choosing which of the two they prefer. Each job description is hypothetical, and participants are asked to imagine what it would be like to have such a job. The job descriptions are intended to represent a range of employment choices for family doctors in Vietnam. All the information in this interview will remain confidential. The interview will last about 45 minutes. The interview will not be audio or video taped.

Number of Participants: About 200 - 250 participants will be involved in this study

Possible Risks: There is no risk expected in this study except the possibility that participants may become tired in the 45-minute interview. If that is the case, the interviewer will ask if participants need a rest or if they want to stop the interview.

Possible Benefits to the Participant: Participants will have a chance to express their desired job. The findings of this study may help health policy makers in deciding what factors have impact on family doctors' decisions to work in rural areas.

Alternatives to Participation: Individuals may choose not to participate

Payments to Participate: Participants will not receive any reimbursement for participation in this study.



Voluntary Participation: All individuals have the right to agree or refuse to participate in this study. Individuals who consent to participate also have the right to change their minds at any point during the experimental procedure. Participants may tell the investigator that they no longer wish to participate.

Records of Participation in this Research:

Information Stored at the University of Texas at Dallas

All of the information participants provide to investigators as part of this research will be protected and held in confidence within the limits of the law and institutional regulation. My provisions to maintain confidentiality of data including: first, a de-identified database: I won't ask information of personal identifiers such as name or address. Quasi-identifiers such as age, marital status will be asked but I won't report it; second, I am the only investigator and the only one will keep data. I plan to secure data in my locked filing cabinet at my TA office on university's campus. Data will be destroyed after I am done with data analysis.

Information Available to Others:

Members and associated staff of the Institutional Review Board (IRB) of the University of Texas at Dallas may review the records of your participation in this research. An IRB is a group of people who are responsible for assuring the community that the rights of participants in research are respected. A representative of the UTD IRB may contact you to gather information about

your participation in this research. If you wish, you may refuse to answer questions the representative of the IRB may ask.

Publications Associated with this Research: The results of this research will appear in publications and dissertation but individual participants will not be identified.

#### Contact People:

Participants who want more information about this research may contact the investigator listed at the top of page 1 of this document. Participants who want more information about their rights as a participant or who want to report a research related injury may contact:

The University of Texas at Dallas Institutional Review Board

UTD Office of Research

972-883-4579

#### Signatures

A participant's signature indicates that they have read, or listened to, the information provided above and that they have received answers to their questions. The signature also indicates that they have freely decided to participate in this research and that they know they have not given up any of their legal rights.

## **BIOGRAPHICAL SKETCH**

Anh Pham was born in Haiphong, Vietnam. After completing her schoolwork at Tran Phu Gifted High School in Haiphong in 2005, Anh entered Foreign Trade University in Hanoi, Vietnam. She received a Bachelor of Science with a major in economics from Foreign Trade University in August 2005. During the following two years, she was employed as a lecturer at Foreign Trade University. In August 2011, she entered the Master of Public Affairs program at Indiana University, Bloomington, completing her MPA in May 2013. In August 2013, she entered The University of Texas at Dallas as a doctoral student in Public Policy and Political Economy.

## **CURRICULUM VITAE**

### **ANH PHAM**

#### **CONTACT INFORMATION**

Public Policy and Political Economy Program  
School of Economic, Political and Policy Sciences  
The University of Texas at Dallas  
800 West Campbell Road, Richardson, TX 75080

#### **EDUCATION**

Ph.D. in Public Policy and Political Economy, August 2017, School of Economics, Political and Policy Sciences, The University of Texas at Dallas, TX, USA,  
Major field of study: Public Policy and International Development.

M.A. in Public Affairs, May 2013, School of Public and Environmental Affairs, Indiana University, IN, USA,  
Major field of study: Policy Analysis and International Development.

B.A. in Economics and International Business, Aug 2009, Foreign Trade University, Hanoi, Vietnam.

#### **EMPLOYMENT**

Research Associate:

- Center for Geospatial Research in Global Health Policy, Dr. Dohyeong Kim  
The University of Texas at Dallas, TX, USA (January 2015 – present)

Research Assistant:

- Dr. Murray Leaf, The University of Texas at Dallas, TX, USA (Fall 2013 – Fall 2014)
- Dr. Clint Peinhardt, The University of Texas at Dallas, TX, USA (Fall 2014)
- Dr. Vito D'Orazio, The University of Texas at Dallas, TX, USA (Fall 2016 – Summer 2017)

#### Teaching Assistant:

- Theories and Issues of Development, Dr. Murray Leaf, The University of Texas at Dallas, TX, USA (Fall 2013, Fall 2014)
- Ethics, Culture, and Public Policy, Dr. Murray Leaf, The University of Texas at Dallas, TX, USA (Fall 2014)
- Politics of International Finance, Dr. Jonas Bunte, The University of Texas at Dallas, TX, USA (Fall 2015)
- Political Economy of Developing countries, Dr. Jonas Bunte, The University of Texas at Dallas, TX, USA (Spring 2016)
- Political Economy of Natural Resources, Dr. Jonas Bunte, The University of Texas at Dallas, TX, USA (Spring 2016)

#### Lecturer:

- International Trade, Faculty of Economics & International Business, Foreign Trade University, Hanoi, Vietnam (Fall 2009, Spring 2010)
- International Trade Negotiation, Faculty of Economics & International Business, Foreign Trade University, Hanoi, Vietnam (Spring 2010)

### **WORK IN PROGRESS**

Kim, D., Anh P., “A meta-analysis for reduction of malaria prevalence by insecticide-treated nets,” in preparation for *Tropical Medicine & International Health*.

Anh P., Kim, D., “Exploring determinants for recruitment and retention of family doctors for rural practice in Vietnam: Lessons from a discrete choice experiment,” in preparation for *Social Science and Medicine*.

### **CONFERENCE PRESENTATION**

Anh P., “A meta-regression analysis of the effectiveness of mosquito nets for malaria control,” Annual UT Southwestern Global Health Student Conference, Dallas, TX; January 2015.

Anh P., “Exploring determinants for recruitment and retention of family doctors for rural practice in Vietnam: Lessons from a discrete choice experiment,” APPAM Conference; November 2016.

## **HONORS, AWARDS AND GRANTS**

Best Student Presentation Prize, 2015 UT Southwestern Global Health Student Conference Competition, Dallas, TX, USA; January 2015

The University of Texas at Dallas, School of Economic, Political and Policy Sciences Doctoral Research/ Teaching Assistants fellowship; August 2013 - present

Vietnam Young Leader Awards and School of Public and Environmental Affairs, Indiana University Scholarship (VYLA); July 2011

Japanese Ministry of Education, Culture, Sports, Science, and Technology Scholarship (MEXT); June 2011

Foreign Trade University Scholarship for best graduation thesis; Aug 2009

## **LANGUAGE AND SOFTWARE**

Languages: English (fluent), Vietnamese (native)

Software: STATA, R, SAS, Nvivo