

Does the NGO Sector Undermine National Health Systems?

How to Measure Migrations of Health Workers Between
Public and NGO Care Providers on a Cross-Country Basis

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Abstract

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This thesis reviews the question of whether the health services provided by Non-Governmental Organizations (NGOs) lead to internal brain drains of health workers out of public health systems, within individual countries. Studies that measure internal brain drains are reviewed in migration and public / global health literatures. Methods for measuring internal brain drains of health workers from public providers are considered, along with models to establish causal links between the recruitment of skilled workers by NGOs, and public sector employment levels. Existing secondary datasets are analyzed to reveal the absence of indicators that measure this study's key variables. The lack of proxies for variables of interest makes it impossible to determine whether internal brain drain processes are occurring on a cross-country basis, without collecting primary data. Looking beyond present constraints, this thesis considers alternative ways to measure internal brain drains, as well as directions for future research.

Keywords: global health, health systems strengthening, health workers, human resources for health, internal brain drain, non-governmental organization

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Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
CCSS	Center for Civil Society Studies – Johns Hopkins University
FTE	Full Time Equivalent
GAVI	Global Alliance for Vaccines and Immunization
GDP	Gross Domestic Product
GHED	Global Health Expenditure Database – WHO
GHO	Global Health Observatory – WHO
GHWA	Global Health Workforce Alliance
HIPC	Heavily Indebted Poor Countries – IMF & WB initiative
HIV	Human Immunodeficiency Virus
IHME	Institute for Health Metrics and Evaluation
ILO	International Labour Organization
IMF	International Monetary Fund
NGO	Non-Governmental Organization
NHA	National Health Accounts
NHS	National Health Service – Various Countries
NHSC	National Health Service Corps – United States
OECD	Organisation for Economic Co-operation and Development
SAP	Structural Adjustment Program
SDG	Sustainable Development Goals – UN
SHA	System of Health Accounts
UN	United Nations
WB	World Bank
WHO	World Health Organization

PREFACE

“Development means a capacity for self-sustaining growth. It means that an economy must register advances which in turn will promote further progress. The loss of industry and skill in Africa was extremely small, if we measure it from the viewpoint of modern scientific achievements or even by standards of England in the late 18th century. However, it must be borne in mind that to be held back at one stage means that it is impossible to go on to a further stage.”

Walter Rodney
How Europe Underdeveloped Africa (1972: 114)

“The NGOs that fight for the right to health care by serving the African poor directly frequently do so at the expense of the public sector. Their efforts too often create a local brain drain by luring nurses, doctors, and other professionals from the public hospitals, like the one in Lilongwe, [Malawi] to ‘NGOland,’ where salaries are better and the tools of our trade more plentiful. The chronic dearth of resources that undermines staff retention in the public sector is due not only to corruption, which is oft underlined, but also to the structural adjustment programs imposed by the international financial institutions staffed in part by people like us.”

Paul Farmer
Challenging Orthodoxies: The Road Ahead for Health and Human Rights
Health and Human Rights 10(1) (2008: 10)

My interest in internal brain drains stems from past intersections in my professional career, which include working in Seattle’s public health care sector, as well as engaging in anti-imperialist, labor organizing.

From 2004 to 2005, I worked as an hourly employee for Seattle’s main public hospital, Harborview Medical Center, which is owned by King County and run by the University of Washington. Harborview provides the greatest amount of charity care among any single hospital in the Northwestern United States. In 2008, I worked for two years for United Students Against Sweatshops, which seeks to form strategic global alliances between workers and citizens to build a stronger international labor movement. From 2010 to 2014, I had the opportunity to organize alongside Harborview’s health workers as an organizer in the hospital’s staff union. During this

time, Harborview's workforce prevented the closure of the hospital's primary care clinics, which are critical safety net resources providing health care services to the region's poor, low-income, indigent, and otherwise marginalized residents.

Harborview's management considered closing the hospital's clinics in 2013, due to financial pressures that Harborview continually faces as a public sector health care provider. When I thought about the prospects of Harborview's clinics closing, I remember being deeply concerned about where marginalized patients would turn to for health care services. If the hospital's management had been able to shutter Harborview's clinics, such closures would have sliced deep cuts throughout the fabric of Seattle's regional health care safety net. The possibility of losing health resources offered by a hospital like Harborview is what crystallized the importance of public sector health providers in my mind.

My advisor first suggested the topic of internal brain drains for this thesis. Despite my personal preferences for robust networks of public health providers, I became curious about the different ways that Non-Governmental Organizations (NGOs) might impact public health providers in periphery countries, where national health systems may be more underdeveloped. Indeed, there are no guarantees that poorer, debt-burdened nations can construct strong welfare systems, in a world increasingly governed by regimes of neoliberalization. And in the absence of strong public sectors, the health services provided by NGOs may be citizens' best practical options for obtaining health care. I learned that the extent to which NGOs may impact public health

providers in the Global South, remains unknown empirically (at least from a systematic quantitative perspective) and is still an area of open inquiry for many, including me. The following offers a brief overview of this thesis, including the inability of this project to resolve its central research question.

Overview of Thesis

This study attempts to answer two key questions: 1) How can internal brain drain processes be measured? And 2) Do the employment practices of NGOs, as Paul Farmer suggests in the epigraph quoted above, affect the ability of public health providers to retain and recruit health workers?

Part 1 of this project contextualizes the problems of internal and external brain drains. This is accomplished by analyzing different models of health care systems and considering the roles played by NGOs in developing countries. The purpose of this chapter is to introduce the basic problem of brain drains, as well as present arguments for why it is important to measure these processes.

Part 2 engages in an extensive literature review, and also formalizes the two research questions of this thesis. Relevant works related to internal and external migration, public and global health, and other fields are considered, along with the paucity of studies that focus on internal brain drains.

Part 3 outlines methodologies for measuring internal brain drain processes. A variety of different quantitative methods and statistical models are evaluated for their abilities to measure internal brain drains. Additionally, this project's preferred approach of deploying a fixed effects model is discussed towards the end of this chapter.

Part 4 evaluates the significant limitations of existing secondary databases. Ultimately, I argue that it is impossible to use a fixed effects model to measure internal brain drain processes, without engaging in primary data collection (which demands a scaling up of international data collection and systematization that is well beyond the scope of an individual MA thesis). Despite deficiencies of existing cross-country data, alternative methods of measuring brain drains are presented as future directions of research. This study concludes by considering the implications of internal brain drains for key stakeholders, as well as some of the contributions of this thesis.

PART ONE: BRAIN DRAINS AND HEALTH SYSTEMS

There is a vast literature on the global migration of workers. There are also many studies that document health worker brain drains, especially international health worker migrations from the Global South to wealthy capitalist countries. However, there are few works that compare internal health worker movements within individual countries.

Despite a large literature on international brain drains, and some notable statements about parallel internal drains caused by competitive hiring practices of NGOs, such as the concerns expressed by Paul Farmer, a gap exists in determining whether and to what degrees internal brain drains are afflicting public health systems around the world. Measuring the possible effects of these types of brain drains in individual nations on a cross-country basis, is valuable to government decision-makers and NGOs who are genuinely committed to health systems strengthening.

Knowledge about possible transfers of health workers between providers in different sectors of a country's health industry, could be critical for policy-makers who want to retain skilled public employees. Likewise, NGOs that want to strengthen national health systems could benefit from knowing whether their organizational compensation practices may undermine public sector health providers. This chapter will introduce the problems of internal and external brain drains, review different countries' national health system models, and consider the roles played by NGOs in the fields of public and global health.

1.1 The Case Study of Mozambique & Problems of Internal Brain Drains

Among different studies that are considered more fully in Part 2's literature review, the work of Kenneth Sherr *et al.* (2012) stands out for its focus on internal brain drains. Sherr *et al.*'s study uses descriptive statistics to quantify shifts in the employment of doctors between Mozambique's public and NGO health sectors. Using a dataset of more than 700 Mozambican physicians, Sherr *et al.* find Mozambique's public health providers experienced a net internal brain drain of approximately 4.6 percent in 2008 (*Ibid.*). Specifically, Sherr *et al.* estimate that 5 percent of Mozambique's doctors (36 out of 709 physicians) left public sector jobs for employment with NGO providers in 2008, whereas only 0.4 percent (3 out of 709 physicians) returned to the public sector that same year (*Ibid.*).

Although net transfers of doctors from the public sector to NGOs are one way to measure internal brain drains, the same processes can also be quantified by comparing annual numbers of physicians employed by health providers on a sectoral basis. From this perspective, Sherr *et al.*'s findings similarly suggest that physician employment by NGO providers increased, while employment levels in Mozambique's public sector, the National Health Service (NHS), declined.

In 2008, 135 physicians (19 percent) worked outside of Mozambique's public sector, of which 41 doctors worked for NGOs (*Ibid.*). By 2010, 181 physicians (25.5 percent) were working outside the Mozambican NHS, of which 75 doctors worked for

NGOs (*Ibid.*). The NGO sector's share of doctors employed in Mozambique grew by 4.8 percent (34 out of approximately 709 physicians) over two years (*Ibid.*). During the same time period, Mozambique's public sector shrank by 6.5 percent (46 out of approximately 709 physicians), with employment in the Mozambican NHS dropping from 574 doctors in 2008, to approximately 528 in 2010 (*Ibid.*). Sherr *et al.*'s work also seems to indicate that out of the 46 total physicians leaving Mozambique's public sector from 2008 to 2010, 34 of these doctors (74 percent) took up jobs with NGOs (*Ibid.*).

Sherr *et al.*'s evidence of internal brain drains in Mozambique's public and NGO sectors is important and deserves emphasis. Despite the authors deriving their results from descriptive statistics, Sherr *et al.* nevertheless did measure internal brain drains among Mozambican doctors on a sectoral basis. Internal brain drain measurements of 4.6 percent also matter if there are meaningful differences in health outcomes based on the quality of health care coverage delivered by the public sector, versus NGO providers. The converse to this is that an internal brain drain of less than 5 percent might be less consequential if citizens in a country such as Mozambique continue to receive the same health care coverage, regardless of which sectors are hiring doctors (and assuming the total employment of physicians does not decrease).

However, there is evidence suggesting that health services delivered by a given nation's public care providers are critical, and that a weakened public sector could undermine a country's overall national health system. As will be considered in greater depth later in Part 1 (see 1.9), two research studies point to the ability of public sector

health providers to make disproportionate impacts on certain health outcomes. An in-depth investigation by a team of researchers concluded that public sector doctors in the state of Tlaxcala, Mexico, delivered superior treatment to children who contracted diarrhea or had acute respiratory infections, compared to private sector physicians (Bojalil *et al.*, 1998). Similarly, another research project in Mozambique found that increases in public sector health workforce densities were strongly associated with reducing early childhood mortality (Fernandes *et al.*, 2014).

There is also a basis to question whether the recruitment of public sector doctors by NGO health providers will result in an equivalent substitution of health care coverage. Global health scholars such as Vinh-Kim Nguyen (2010) and Matthew Sparke (2017) highlight how NGO operations in developing countries can result in an enclaving of health services, where patients only receive care services by virtue of having certain diseases that fall within a given NGO's treatment specialties (see 1.3). From this perspective, the growth of NGO health providers at the expense of the public sector may not lead to greater health care coverage for a country's general population, especially if NGOs only focus on treating specific diseases. By contrast, the mission of public health providers is to treat any ailments of all citizens within an individual country.

If there are meaningful differences between the primary care services delivered by the public sector versus NGO health providers, then a sectoral brain drain could have big impacts on health outcomes for a country's population. Research by the Joint Learning Initiative (2004) shows that health coverage for measles immunizations and

live births both increase asymptotically as a given country's health workforce density also rises (see 1.9, Figure 5). Scaling down the Joint Learning Initiative's observations to the sectoral level within an individual country, it is possible that losses of physicians to NGOs could seriously weaken public health providers' coverage capacities. And if the NGO sector does not provide equivalent levels of coverage for every health worker who is recruited away from public providers, then this example of an internal brain drain could weaken a country's overall national health system.

There is another important finding within Sherr *et al.*'s case study. Sherr *et al.* estimate that of all the physicians working outside Mozambique's public sector who did not emigrate away from the country, over 36 percent of these doctors previously held senior-level management positions within the public sector (*Ibid.*). The authors do not break down what portion of Mozambican doctors working for NGOs previously held public sector leadership positions, but Sherr *et al.*'s estimate is still concerning.

Even if the recruitment of doctors by NGOs away from public sectors does not weaken public health providers, the possible existence of internal brain drain processes does not align with the objectives of a sub-set of NGOs, which seek to strengthen developing countries' public health systems (see 1.8). This project will show that instances of internal brain drains are very important to some stakeholders. And while Sherr *et al.*'s observations of a 4.6 percent net brain drain among Mozambican doctors might seem relatively small, these processes still have the potential to weaken national health systems.

In the case of Mozambique, the public sector employed more than 80 percent of the country's total physicians in 2008 (*Ibid.*). The loss of 46 doctors, 74 percent of whom were employed by NGOs in 2010, means that NGO recruitment practices could be the main driver of employment losses within Mozambique's NHS during this time frame. Understanding these dynamics is especially important for government decision-makers, such as officials who run Mozambique's NHS, which employed doctors responsible for providing primary care services to nearly 30 million people in 2016 (United Nations, 2017a).

The next section of this project will discuss the critical importance of measuring internal brain drain processes for a range of different countries over time.

1.2 The Importance of Making Cross-Country Comparisons

Sherr *et al.*'s findings of internal brain drains in Mozambique suffer from a key flaw, which is critical to address in this project's research design. Sherr *et al.*'s quantitative methods rely on descriptive statistics, which have limitations. Although descriptive statistics can yield valid measurements of internal brain drains, these measurements cannot explain why brain drains are occurring within a given country. Unless an internal brain drain investigation controls for other confounding variables that may be causing employment changes in a country's public health sector, it will be harder to conclude that an observed brain drain is happening due to the activities of other sectoral employers.

For example, it is unknown to what degrees public sector physician job losses in Sherr *et al.*'s study could be explained by lagged effects of the globalized 2008 Great Recession, or other demographic shifts that are particular to Mozambique. In other words, the influence of outside economic or demographic factors might be primarily responsible for an observed brain drain of doctors between Mozambique's public and NGO health providers, as opposed to the employment practices of NGO health providers.

Additionally, Sherr *et al.*'s work focuses on only one country's public and NGO health sectors. The study also does not control for possible changes in Mozambique's health care employment trends over a long enough time period. These characteristics of Sherr *et al.*'s internal brain drain investigation mean that the authors' findings could be unique to Mozambique as an individual country, or could be anomalous within a longer period of time.

Sherr *et al.*'s use of descriptive statistics warrants a further analysis of internal brain drain processes using different quantitative methods. A more robust investigation would use inferential statistics to measure whether sectoral human capital transfers exist across multiple countries, with appropriate controls, and over longer periods of time. A cross-country, controlled investigation that measures internal brain drains in individual nations, has not been identified in the social science or public / global health literatures.

There are many reasons why a cross-country approach that uses inferential statistics is more appropriate to investigate internal brain drains than case studies of individual countries. A cross-country study could analyze data points of multiple countries' public and NGO sectors on an annual basis. The unit of observation for this type of approach is a country/year (see 3.5). Designing an internal brain drain investigation with multiple years of data for a range of countries will increase the number of data points available for analysis. Having a larger number of countries and more years of data increases the statistical power of a cross-country study, which also lowers standard errors and raises the likelihood of measuring statistically significant results (Sprinthall, 2000).

Likewise, investigating internal brain drain processes for a larger range of individual countries could give a cross-country study more external validity. If a cross-country approach yielded statistically significant findings of internal brain drains between public and NGO health providers, then these hypothetical results could be accepted with more confidence based on observing the same processes across more than one country (while also using appropriate control variables). By contrast, if inferential statistics were used to find statistically significant results of internal brain drains for one individual country, such results might be distinctive only for that specific nation. Additionally, investigations using inferential statistics to investigate brain drains within one country, would need many years of data to avoid problems associated with a lack of statistical power, or Type II error (Sprinthall, 2000; Smith, 2017).

Before resolving these methodological questions, it is important to contextualize the activities of NGO health providers in the Global South. The next section of this project will review criticisms of the roles played by NGO health providers in developing countries.

1.3 Broad Concerns Over NGO Activities in Developing Countries

Some public and global health studies highlight concerns with NGOs and so-called “health enclaves,” or what Vinh-Kim Nguyen refers to as “republics of therapy” (2010). Nguyen looks at how people with Acquired Immune Deficiency Syndrome (AIDS) and the Human Immunodeficiency Virus (HIV) receive treatment via republics of therapy in West African countries (*Ibid.*). Specifically, Nguyen observes how AIDS/HIV patients may face obligations to share particular stories or symptoms with NGOs, in order to receive what could be considered partial citizenship within a certain specialty clinic (*Ibid.*). Nguyen is more concerned with these forms of patient reciprocity and self-presentation (Sparke, 2017). But the critical accounts of Nguyen and other scholars, which focus on disease-specific investments in global health, raise important questions about the ways such republics of therapy displace or replace more universalistic forms of health services, as well as associated norms of public health citizenship (*Ibid.*).

In this context, AIDS/HIV patients only achieve partial citizenship by gaining access to health rights via NGO enclaves, which on focus AIDS and HIV-specific health care treatments. The charge of health enclaves is to provide targeted care to individuals

with specific pathologies. This is the opposite mandate of national health providers, which are generally meant to provide universal primary care for all citizens. The emergence and expansion of health enclaves may therefore come at the expense of defunding, or underfunding national health care providers in developing countries, which serve the majority of the world's poor (Sparke, 2014: 688).

The roles played by NGOs in the field of global health are extensively documented. Both studies of NGOs themselves, as well as foundations that fund NGOs, point to the meteoric rise of philanthropic organizations in funding global health care delivery services. This is especially true for developing countries (Sparke and Mitchell, 2016). The phenomena of sick people in developing countries gaining partial citizenship to new NGO-republics of therapy, showcases the increasingly post-national, privatized terrain of global health care delivery services.

The Gates Foundation awarded \$750 million to start the Global Alliance for Vaccines and Immunization (GAVI) in 1999. By 2013, GAVI had spent more than \$2.3 Billion on its own vaccine delivery initiatives, as well as other NGOs' vaccination programs, which bypassed government controls in more than 70 different recipient countries (Sparke and Mitchell, 2016: 742). The activities of GAVI-funded organizations illustrate how NGOs undertake certain health care functions, such as immunizations in developing countries, which may duplicate or supplant roles played by public health providers.

Against this post-national and privatized backdrop, but focused on privileged experiences of personalized diagnostics and interventions in more wealthy countries, Nikolas Rose and Carlos Novas (2005) look at the possibilities of individuals exercising what they call “biological citizenship,” by using technologies to manage their health in biosocial communities beyond the boundaries of nation states. Contrasting Rose and Novas’ sanguine ideas of global, biological citizenship, Matthew Sparke (2017) explores the embodied consequences of biological sub-citizenship, including the ways in which the benefits of biological citizenship for more privileged individuals in developed countries are dependent on the biological sub-citizenship of poorer people in the Global South. Such problems of biological sub-citizenship appear to be created by a wide range of embodied, global connections, which range from the organ and tissue trade, to transnational pharmaceutical companies’ drug trials that rely on human subjects in developing countries, and international health worker brain drains (*Ibid.*).

In considering how biological sub-citizenship impacts the relationship between NGOs and poorer, biological sub-citizens in the Global South, certain theoretical perspectives on inequality are relevant. For example, Didier Fassin (2009) analyzes Michel Foucault’s theory of biopolitics, or the control of populations, through a review of courses given by Foucault in France from 1978 to 1979 (2009: 49). Complicating Foucault, Fassin looks at how biopolitics can also produce bioinequalities, or differences in the ways that individuals and groups are treated with respect to accessing health care and public health systems. An example of bioinequalities can be seen in the South African apartheid regime’s exclusion of black communities in the collection of vital

statistics, which resulted in institutionalized racist gaps of mortality data, as well as unequal health outcomes for the vast majority of the country's population (2009: 55). From this perspective, the poaching of health workers from public systems into the NGO sector would seem to represent another way in which the inclusive kinds of biopolitics described by Foucault, become downgraded by bioinequalities into various forms of weakened services, increased vulnerability, and in the worst cases, of exclusion from care and rejection into death, including necropolitics.

To the extent that NGO activities fall in the realm of biopolitics, the decisions of NGOs working in health enclaves to treat specific diseases could produce unintended bioinequalities for anyone who is sick, but whose ailments do not gain them access to a republic of therapy. If investing in public health systems helps to reverse bioinequalities, then the phenomenon of NGO-triggered internal brain drains that undermine public health providers, has serious political consequences including deadly necropolitical outcomes.

Whether it is appropriate or not for NGO providers to deliver health services to people in developing countries is muddied by a history of neoliberal policies in international development, which has acted to inhibit development in the Global South (Peet, 2007; Wainwright, 2011). While international and domestic NGOs do fill sizeable gaps in the provision of health care in the Global South, public health systems have been shredded and stunted by over 40 years of neoliberalization policies.

The terms of a Structural Adjustment Program (SAP), Poverty Reduction Strategy Paper, and austerity provisions imposed by lenders such as the International Monetary Fund (IMF) or European Central Bank, attach neoliberal strings to loans and other forms of financial support for an indebted country (Kim *et al.*, 2002; Gloyd, 2004; Sparke, 2017). Included in these tradeoffs are typically violent restructurings within the public sectors of countries that are the recipients of international loans. In return for providing individual countries with financing, international lenders can proscribe deep cuts to public services and social welfare budgets, such as funding for national health care providers. The rollback of national health care services in the Global South (as a result of neoliberal conditions in international lending), is also correlated with making poor people more susceptible to disease, ill-health, and higher rates of mortality (Schrecker and Bamba, 2015; Sparke, 2017). These viewpoints all highlight problematic roles played by NGOs and non-governmental health providers in developing countries.

The next section of this project will look at more developed nations' reliance on foreign health workers, as well as the lack of adequate health workforce densities in developing countries.

1.4 Health Workforce Disparities Between Rich & Poor Countries

Instances of so-called “external” brain drains in health care, which include the movement and transfers of skilled human capital between different nations, are explored in greater depth in the literature review (see 2.1-2.4). However, it is useful to consider overarching patterns in health workforce coverage between richer and poorer nations, as well as the extent to which wealthy countries rely on health workers from the Global South.

According to a 2014 report of the World Health Organization (WHO), 83 of 186 WHO member states are estimated to have health workforce densities of less than 2.28 skilled health care professionals per 1,000 people (WHO, 2014: 17). Of the 83 WHO members with low workforce densities of 2.28 skilled health workers per 1,000 people, 69 nations (83 percent) were low or lower-to-middle income countries according to World Bank (WB) classifications (*Ibid.*: 20). The WHO originally viewed the standard of 2.28 skilled health workers per 1,000 people as “a threshold to achieve relatively high coverage for essential health interventions” (*Ibid.*: 18). While subsequent research has questioned whether it is necessary for countries to have a minimum of 2.28 health workers for every thousand residents, other studies find strong evidence linking health worker density with a range of positive health outcomes (*Ibid.*).

Setting aside which workforce density standards are more appropriate to assess the strength of countries’ health systems, WHO density data does highlight a significant disparity in health workforce coverage between wealthier and poorer countries. Findings

from the WHO's 2014 report on individual countries' workforce densities, based on the wealth of different nations, are recreated in Table 1 below.

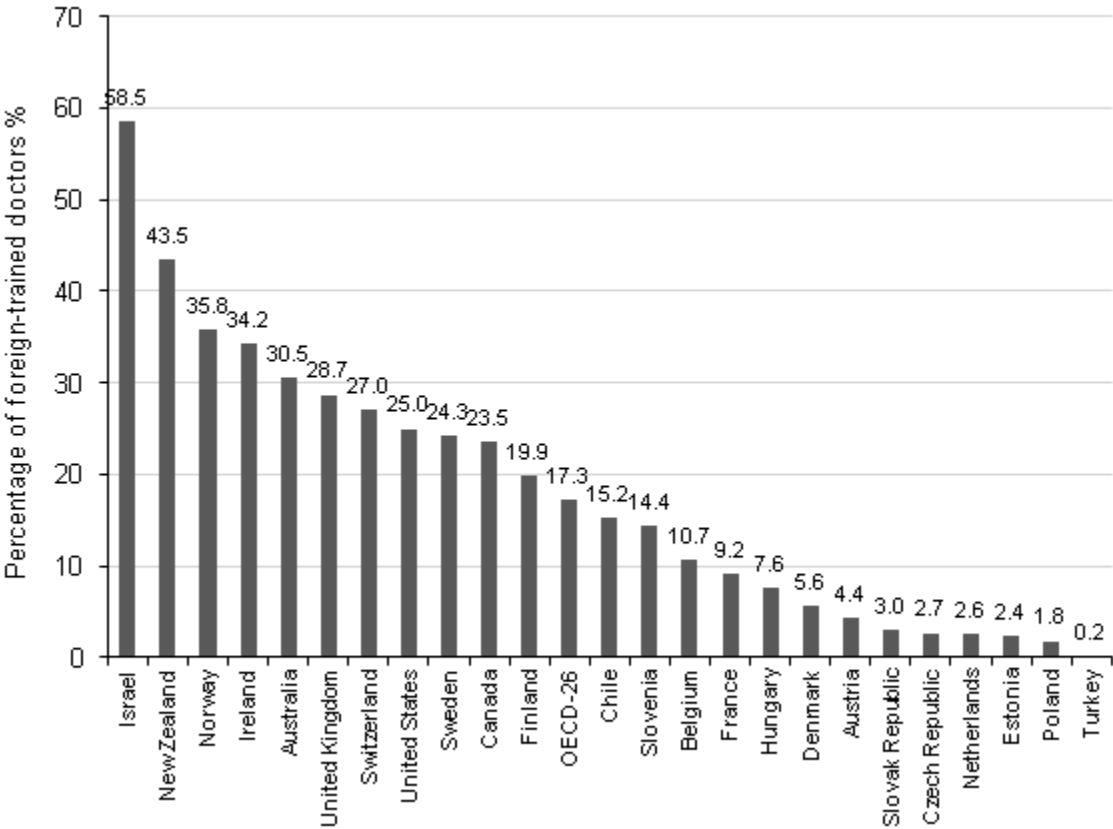
Table 1. Skilled Health Workforce Density Levels By National Wealth

Density Level of National Skilled Health Workforces	Low Income Countries (41 Nations)	Lower-Middle Income Countries (51 Nations)	Upper-Middle Income Countries (41 Nations)	High Income Countries (33 Nations)
< 2.28 skilled health workers per 1,000 people	39 countries (47% share of density level)	30 countries (36% share of density level)	12 countries (15% share of density level)	2 countries (2% share of density level)
≥ 2.28 skilled health workers ≤ 3.44 per 1,000 people	2 countries (12% share of density level)	6 countries (35% share of density level)	7 countries (41% share of density level)	2 countries (12% share of density level)
≥ 3.45 skilled health workers ≤ 5.93 per 1,000 people	0 countries (0% share of density level)	7 countries (39% share of density level)	6 countries (33% share of density level)	5 countries (28% share of density level)
≥ 5.94 skilled health workers per 1,000 people	0 countries (0% share of density level)	8 countries (17% share of density level)	16 countries (33% share of density level)	24 countries (50% share of density level)

Source: 118 countries in Table 1 (WHO, 2014: 20), 48 countries in Group 6 from Figure 4 (*Ibid.*: 19)

High income countries' greater health workforce densities include sizeable shares of health workers from the Global South. The Organisation for Economic Co-Operation and Development (OECD) has collected data on the percentage of foreign-trained doctors in its member countries. Figure 1 (see next page) presents the share of foreign doctors in higher income countries in 2013, and shows that physicians trained outside of nations such as Australia, United Kingdom and the United States comprise 25 percent or more of these countries' total stock of doctors. These workforce density statistics indicate that external brain drain processes could exist between core countries in the Global North, and periphery nations in the Global South.

Figure 1. Share of Foreign-Trained Doctors of Physicians in OECD Countries – 2013



Source: Gaetan Lafortune (2016: 11), OECD Health Division

According to Fitzhugh Mullan, over 60 percent of the United States’ international physician graduates emigrated from low and / or lower-middle income countries, as determined by WB national income classifications (2005: 1811). Foreign-trained doctors comprised between 23 to 28 percent of total physicians in Australia, Canada and the United Kingdom in 2005, while the share of foreign doctors from low to lower-middle income countries ranged from 40 percent in Australia, to over 75 percent in the United Kingdom (*Ibid.*).

Another study by Barbara Torrey and Edwin Torrey shows that of 265,851 international medical graduates actively practicing medicine in the United States, 128,729 physicians (48 percent) were from low to lower-middle income countries under WB classifications (2012: 1-2). Torrey and Torrey identify 53 sending-countries that international medical graduates practicing in the United States emigrated from, all of which were low to lower-middle income nations.

Additionally, Torrey and Torrey also find that the countries experiencing the highest losses of doctors per 100,000 people (due to physicians emigrating to the United States), were the Philippines, Syria, Jordan and Haiti (*Ibid.*: 1). Using a survey of 62 sub-Saharan medical schools in 2009, Mullan *et al.* estimate that 22 percent of physicians migrated to practice outside of Africa five years after graduating from medical school (2011: 1115 & 1117).

There is a wide gap between rich and poor countries in the number of health workers serving national populations. Wealthier countries tend to have more health workers for every 1,000 residents than lower income nations. These richer countries also maintain relatively denser health workforces, in part through a reliance on foreign-trained doctors and health care professionals. Edward Mills *et al.* sum it up best, concluding that rich countries “have sustained their relatively high physician-to-population ratio by recruiting medical graduates from developing regions,” at the same time that “over half of the countries in sub-Saharan Africa do not meet the acceptable physician-to-population ratio of one per 5,000” (Mills *et al.*, 2008: 685). Studies that

measure the size of South-to-North / periphery-to-core migrations of skilled health workers are summarized in Part 2's literature review.

The above introduction to external brain drain phenomena highlights disparities between core countries in the Global North, and periphery nations in the Global South. A similar dynamic can play out for internal brain drain processes within a single, poorer country, if better-funded NGOs recruit health workers away from public sector providers. The public sector's loss of skilled workers to NGO health providers can undermine basic health coverage for a country's wider population. NGO health providers' recruitment of skilled workers can also frustrate national and international objectives to retain qualified health professionals in the public sector. Before exploring internal brain drain processes in greater depth, the next section will consider different ways of organizing national health systems.

1.5 Different Health System Models

It is important to differentiate between various national health system models before undertaking a deeper investigation of internal brain drain processes. The United States Physicians for a National Health Program finds that among hundreds of different countries, "for all the local variations, health care systems tend to follow general patterns" (2017). Summaries of the four models identified by Physicians for a National Health Program are recreated on the next page in Table 2 (*Ibid.*).

Table 2. Physicians for a National Health Program’s Health System Models

	Namesake	Coverage	Financing & Key Characteristics	Providers	Geographic Presence
System 1: “Beveridge” or “Single Payer National Health Service” Model	William Beveridge, architect of National Health Service (NHS) in England and Wales	Comprehensive care; all citizens eligible	Costs financed by government through taxes. Government as sole payer controls what health workers do and can charge	Delivery mostly through public providers, including government-owned hospitals and clinics. Private doctors, but paid by government	Cuba, New Zealand, Scandinavia, United Kingdom
System 2: “Bismarck” or “Social Insurance” Model	Otto von Bismarck, Chancellor who established social insurance in Germany	Comprehensive care; all citizens eligible	Workers and employers jointly finance insurance funds. Health insurance must cover everyone and cannot make profit. Tight regulation gives government leverage in controlling costs	Providers tend to be private	Belgium, France, Germany, Japan, parts of Latin America, Netherlands, Switzerland
System 3: “National Health Insurance” or “Single Payer” Model	No individual namesake, refers to the government managing insurance payments	Comprehensive care; all citizens eligible	All citizens must pay into government-run insurance. Government has considerable leverage to negotiate lower prices as single payer. Costs controlled by government limiting services that are paid for, and by having treatment wait-times	Private sector providers	Canada, South Korea, Taiwan
System 4: “Out-of-Pocket” or “Market Driven” Model	No individual namesake, refers to people in most countries in the world having to pay for market rates for care on their own	Tiered costs based on type of care; access dependent on ability to pay / job	Government may pay for certain health initiatives. Some workers and employers may pay for insurance coverage. Ultimately cost burden falls on individuals and families to pay for costs of care	Mix of public, NGO, religious and private providers	Majority of world (circa 160 countries)

Source: Physicians for a National Health Program (*Ibid.*)

Table 2 illustrates important complexities of health systems, which affect this project's independent and dependent variables. In evaluating which countries' public providers would be affected by activities of the NGO sector, nations that offer health care through either the Bismarck / Social Insurance or the National Health Insurance / Single Payer models would be excluded. Countries that have Social Insurance and Single Payer health systems are excluded because of the lack of public providers in these models. Put differently, public providers – this study's dependent variable – need to comprise a large enough share of a country's health providers, in order for compensation practices in the NGO sector – the independent variable – to initiate internal brain drain processes. If countries with Social Insurance or Single Payer health systems mostly rely on private sector or non-public providers to deliver health services, then it makes sense for this study to exclude countries operating under these models.

Additionally, this project can split the NGO sector into two independent variables of interest. Internal brain drains are mainly theorized as occurring due to international or domestic NGOs recruiting workers away from public sector providers. However, larger global health philanthropies, which in some cases are themselves international NGOs, could also affect the employment levels of public health providers. If resources from international NGOs are not directed towards strengthening a country's public providers (and instead provide additional resources to other international or domestic NGO health providers), then this could be another mechanism that triggers internal brain drains. How external health financing resources are directed within a country, therefore matters in evaluating the strength of public sector care providers. The next section will

hypothesize how internal brain drain processes can occur in individual countries' national health systems.

1.6 Hypothesizing Internal Brain Drains in Health Care

In an address to the 2006 American Public Health Association conference and a subsequent journal article, Paul Farmer identified a “local brain drain” effect for health workers in developing countries (2008: 10). Farmer based his observation of local (i.e. internal) brain drains on many years of professional experience working in the fields of public and global health (*Ibid.*). Specifically, Farmer saw that the activities of NGOs within a given nation could lead to the recruitment of various types of health workers away from that same country's network of public care providers (*Ibid.*).

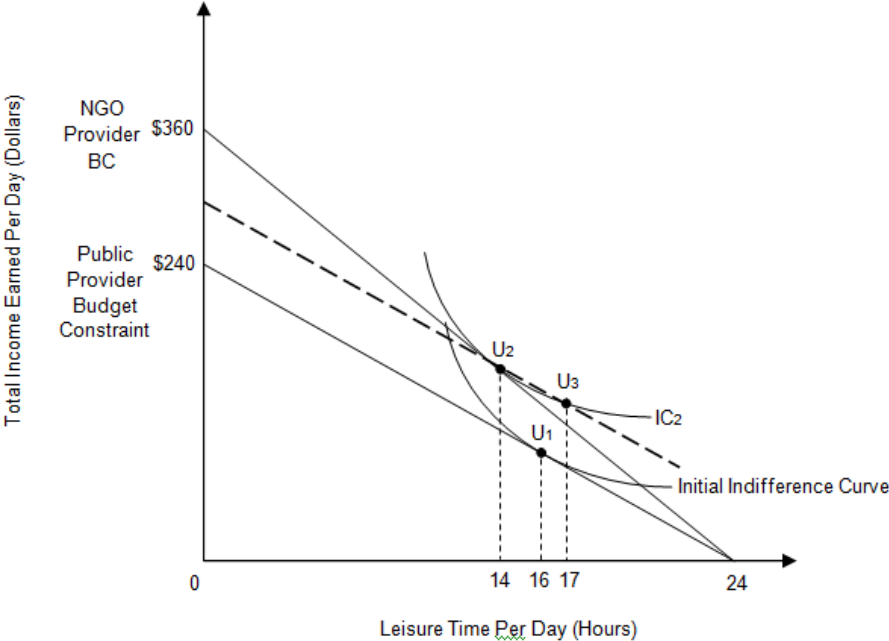
Underlying Farmer's reasoning are theories of wage gaps between public and NGO health providers. If there are substantial pay differentials between public and NGO sectors for health care professionals within a given country, then certain sectors could experience both losses of total employment, as well as attrition of higher quality staff due to asymmetries in compensation practices. Given the scale of funding for organizations that focus on global health, as well as neoliberal constraints on the budgets of more indebted countries, sizeable pay differentials could easily exist between poorer countries' public and NGO health providers. Table 3 (see next page) summarizes the above hypotheses, as well as the assumed relationships between wages paid by different providers, versus sectoral employment levels in individual countries' national health systems.

Table 3. Internal Brain Drain Hypotheses & Expected Outcomes

Employer	Trends in Funding	Compensation Capacity	Ability to Recruit and / or Retain Workers
National / public health care provider	Likely diminishing or constrained resources from national government, due to neoliberalization	Potentially decreasing relative to other sectors	Potentially decreasing relative to other sectors
Private sector	Market dependent	Potentially increasing relative to other sectors	Potentially increasing relative to other sectors
NGO sector	Likely increasing from aid by external governments or grants from philanthropic foundations	Potentially increasing relative to other sectors	Potentially increasing relative to other sectors

The presence of either pre-existing wage differentials and / or growing sectoral asymmetries due to the relatively better financing of NGOs (compared with public health providers), can be illustrated in microeconomic theory using budget constraints and indifference curves for individual workers. The effects that higher wage rates in the NGO sector could have on the sectoral employment decisions of individual hourly health workers, are modeled on the next page in Figure 2.

Figure 2. Changing Budget Constraints & Utility Maximization for Individual Workers



Looking at Figure 2, budget constraints for individual hourly health workers in the public and NGO sectors are presented as proportional downward-sloping lines. If an hourly health worker devotes the entirety of their day to work (i.e. zero leisure time per day), their public and NGO provider budget constraints are respectively \$240 and \$360 of total income per day. Dividing these income totals by 24 working hours yields hypothetical wage rates of \$10 per hour for public providers and \$15 per hour for NGOs.

If an individual health worker starts out working for a public provider, Figure 2 arbitrarily selects an indifference curve for this hypothetical employee (i.e. the initial indifference curve in Figure 2). The health worker maximizes their utility where the initial indifference curve is tangent to the budget constraint of their country’s public provider, represented by point U₁. At point U₁, the health worker employed by a public provider

will choose to devote 16 hours per day to leisure activities, which means they will work eight hours a day for \$10 per hour, earning \$80 of total daily income.

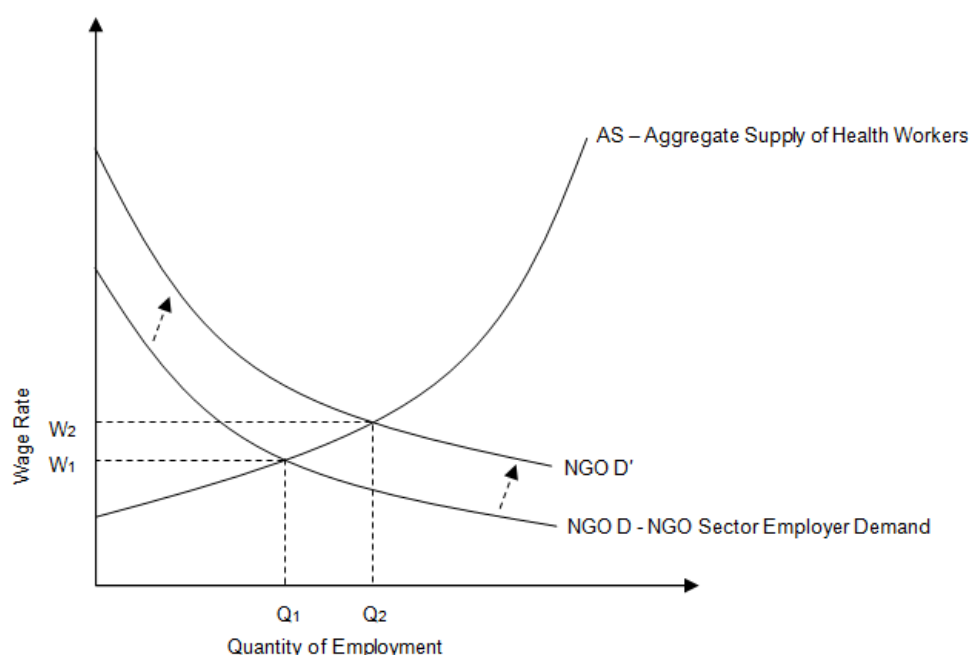
When presented with a higher paying job in the NGO sector, the same hypothetical health worker will maximize their utility at the highest possible indifference curve, given that employee's potential budget constraints. Higher wages in the NGO sector is represented in Figure 2 by a new budget constraint (NGO Provider BC), as well as a second indifference curve (IC_2). Since the hypothetical health worker will maximize their utility to the highest available indifference curve, the employee will leave their job with a public provider to work for an NGO health provider. This will result in the health worker's utility moving from U_1 to U_2 . A higher wage of \$15 per hour created by the NGO provider's larger budget constraint decreases the total hours that the health worker will devote to leisure activities, from 16 to 14 hours per day.¹ In other words, the hourly employee will work an extra 2 hours per day (i.e. a 10 hour work day), due to the higher wages offered by an NGO health provider.

Macroeconomic theory can also conceptualize internal brain drain processes. All other things being equal, health workers can be grouped together in an aggregate supply curve, with the ability to alternately work for health providers in the private, NGO, public, or other sectors. It is assumed that this aggregate supply curve does not shift, absent certain short- and long-run changes, such as natural disasters or large-scale

¹ This is the net effect of an increase in wages on an hourly worker's consumption of leisure hours (i.e. movement from U_1 to U_2 , or minus 2 leisure hours). Figure 2 also illustrates separate Income Effects ($U_1 - U_3$, +1 leisure hours) and Substitution Effects ($U_3 - U_2$, -3 leisure hours).

investments in health education. Under such conditions, two external shocks to the labor markets of NGO and public sector employers can be modeled as changes affecting each sector's aggregate demand curve for health workers. Figure 3 models the first external shock to markets of health workers: the effects of NGOs receiving more resources to hire new workers in their provision of health services.

Figure 3. Changing NGO Sector Employer Demand for Health Workers



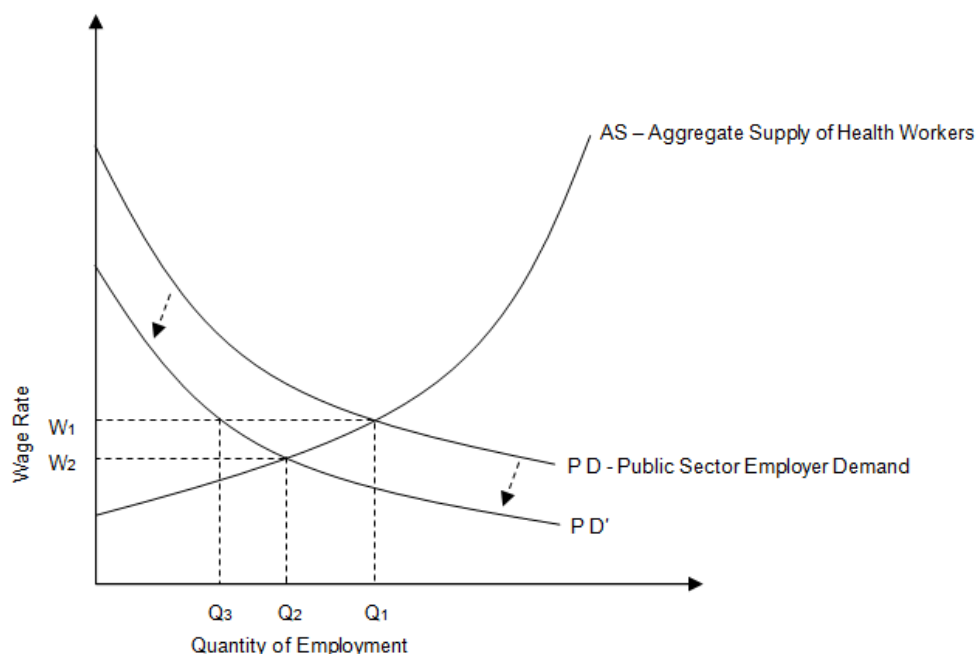
In Figure 3, increased external resources for health – such as grants from international philanthropies like the Bill and Melinda Gates Foundation or funding from initiatives like GAVI – expands the demand of NGO health providers for workers. Additional resources shift the NGO sector's demand curve to the right, which makes the curve rise from NGO D to NGO D'. An outward-shifting NGO demand curve also increases health workers' wage rates and employment levels.

As wages rise from W_1 to W_2 (due to increased demand from NGO providers), more health workers enter the labor market. This results in a number of health workers taking new jobs with NGO employers, increasing total employment from Q_1 to Q_2 . If wage rates for health workers are lower in the public sector (relative to the new NGO sector wage of W_2), then an internal brain drain can be partially represented in Figure 3 by new health workers who are employed in the NGO sector at Q_2 .

Looking at the new labor market entrants between Q_1 and Q_2 , it is assumed that at least a portion of these workers are taking up positions with NGOs after quitting jobs with other sectoral health employers, including public providers. Higher wage rates paid by NGO providers at W_2 , act to increase health workers' opportunity costs of working other jobs with relatively lower rates of pay (e.g. in the public health sector). In other words, if sectoral wage differentials exist, then higher wages in the NGO sector will increase employment among NGO providers, partially due to health workers leaving relatively lower-paying jobs, such as with public sector providers that are hypothetically underfunded.

The second external shock to markets of health workers – the effects of neoliberal budget constraints on public sector providers' demand for labor – is modeled on the next page in Figure 4.

Figure 4. Changing Public Sector Employer Demand for Health Workers



Looking at Figure 4, it is assumed that neoliberal policies decrease a government's total resources for health care. Less resources for health care leads to a lower demand for workers by public sector employers. This shifts the public sector labor demand curve to the left from P D to P D'. Shifting demand changes the number of workers employed, with one of two outcomes likely to occur vis-à-vis employment levels and wage rates.

With fewer budgetary resources, public employers could decrease health worker compensation from W_1 to W_2 . A reduction in wages would reduce the total number of employed health workers from Q_1 to Q_2 . Alternatively, public employers could maintain wages at W_1 . Maintaining compensation at W_1 aligns with theories of wage rigidity advanced by John Maynard Keynes (1936: 257), and could also reflect scenarios where

public health providers cannot easily reduce health workers' wages (e.g. due to national regulations or binding contracts negotiated by unions). If wages remained at W_1 – in spite of a decrease in the public sector demand curve, which shifts from $P D$ to $P D'$ – then the number of employed health workers would decrease from Q_1 to Q_3 .

The key question not illustrated by Figure 4, is what happens to unemployed health workers as a result of falling public sector demand? It is assumed that health workers no longer employed by the public sector have the following options: 1) seek employment in NGO, private, or other health sectors; 2) seek employment in non-health related fields; or 3) stop seeking employment altogether.

For the first case of health workers seeking employment in the NGO sector, it is critical to note that processes of neoliberalization could go hand-in-hand with NGOs increasing the extent of their operations and overall activities. For example, if certain functions of public health providers are discontinued (due to neoliberalization policies), then NGO providers could step into voids in care delivery previously filled by public providers.

Alternatively, NGO providers could see their activities expand for other reasons (such as increased external financing). Increased funding for NGO providers could allow these organizations to potentially absorb more workers, or offer higher wages that would generally increase health workers' opportunity costs of leisure / alternative employment. This means that both the external shocks in Figures 3 and 4 could occur

simultaneously, resulting in health workers formerly employed in the public sector taking new jobs offered by NGO employers.

Having reviewed these theories of internal brain drains, the next section will consider various government initiatives that seek to strengthen national health systems.

1.7 Governmental Responses to Strengthening Public Systems

Although the majority of the world's national health systems operate on a market-driven or an out-of-pocket health care model (see Table 2), this does not mean that governments completely abdicate their responsibilities to deliver health services through public care providers. Public sector providers still deliver care to people in countries that primarily rely on market-driven health systems (see 1.5 & Table 2). Likewise, governments have an interest in strengthening all parts of a given country's health system, including the public sector.

A variety of initiatives highlight concerns that government representatives from nations in both the Global North and Global South, have expressed regarding public capacity building in developing countries. Representatives from over 160 nations participated in the most recent High Level Forum on Aid Effectiveness, held in 2011 in Busan, South Korea (Busan High Level Forum on Aid Effectiveness, 2011a). Busan's international aid meetings were preceded by prior gatherings held in Accra, Ghana (2008), Paris, France (2005), and Rome, Italy (2003). In a declaration from the Busan forum, participants reaffirmed commitments previously made at both Accra and Paris, to

“use country systems as the default approach for development co-operation in support of activities managed by the public sector” (Busan High Level Forum on Aid Effectiveness, 2011b: 5).

The 2011 Busan declaration further outlines the responsibilities of NGOs and other development stakeholders to explain why they cannot utilize national systems in instances where this is not possible, as well as discuss how they can move towards using national systems in the future (*Ibid.*). The Busan declaration attempts to promote developing countries’ independence, by strengthening governmental systems “within the overall context of national capacity development for sustainable outcomes” (*Ibid.*).

Member governments of the WHO have similarly committed to not maintain the health care networks of more developed, core countries, at the expense of public health systems in periphery and semi-periphery nations. In 2010, the WHO’s World Health Assembly adopted a Global Code of Practice on the International Recruitment of Health Personnel. The WHO code of practice was partly created in response to problematic dynamics of external brain drains of health workers from poorer sending-countries, to wealthier receiving-nations. As one of eight guiding points in this code, WHO member states aimed to create voluntary international principles, one of which is to help “mitigate the negative effects of health personnel migration on the health systems of developing countries” (WHO, 2010: 2).

The WHO code of practice is closely related to the organization's Kampala Declaration and Agenda for Global Action (where the code was first conceived), as well as the latest WHO Global Strategy on Human Resources for Health: Workforce 2030. In 2008, government representatives of WHO member states convened for the first Global Forum on Human Resources for Health in Kampala, Uganda. The result of this forum was the Kampala Declaration, which made broad commitments to massively increase the size of national health workforces, train and recruit health workers from within richer countries' own borders, create better systems to track health workers, and put mechanisms in place to retain individual nations' domestic health workers (WHO, 2008: 10-11).

The WHO's Workforce 2030 strategy is a work plan linked to the development goals of the United Nations (UN). In 2015, member states of the UN set 17 so-called Sustainable Development Goals (SDG), which last 15 years until 2030. The UN's SDG initiative builds on the work of a prior 15-year campaign known as the Millennium Development Goals (the latter of which were set in 2000 and expired in 2015). The new SDG initiative includes a variety of objectives, such as achieving universal health care coverage by 2030, as well as increasing the "financing and the recruitment, development, training and retention of the health workforce in developing countries" (UN, 2017b).

The WHO views human resources for health and health systems strengthening as key components to achieving universal health coverage. The WHO outlines specific

targets and policy options related to health workers in its Workforce 2030 strategy. The Workforce 2030 strategy aims to implement the WHO's Code of Practice on the International Recruitment of Health Personnel, by expecting countries to "make progress towards" reducing their dependency on foreign-trained health professionals in half by 2030 (WHO, 2016: 9).

Two examples of individual wealthier nations' responses to brain drain problems are also worth mentioning. On one end of the spectrum, Norway's government is following up on firm commitments to the WHO's code of practice by forecasting their country's supply and demand of health care professionals every three years, over a 20 year forecast timeline (WHO *et al.*, 2013: 16). In 2013, Norway identified a sufficient supply of domestic doctors up to 2021, but noted a shortage of nurses during this same time period (*Ibid.*). By contrast, public health representatives from the United States emphasized how shifting to rely more on domestic health workers is frustrated by the decentralized nature of a federal system, where "health care governance is at the state level" (*Ibid.*: 12). Government representatives from the United States have not taken steps similar to Norway, of forecasting domestic shortages and surpluses of different types of health workers.

Prior to the UN's SDG and WHO's Workforce 2030 initiatives, a Democratic member of the United States House of Representatives from California's ninth district, Barbara Lee, sponsored H.R. 4933: the Global Health Act of 2010. Representative Lee's Global Health Act aimed to "coordinate all health-related United States foreign

assistance” and “assist developing countries in improving delivery of health services” (Global Health Act, 2010a: 1). The Global Health Act would have also provided \$400 million in funding per year over five years, to create and finance a Global Health Workforce Initiative (*Ibid.*: 64-65). This initiative would have supported “the efforts of developing countries to strengthen their indigenous health workforces, and expand the supply and equitable distribution within such countries of skilled health workers” (*Ibid.*: 3).

Ultimately, Representative Lee’s bill was only cosponsored by 21 other members of Congress (all of whom were Democrats), and the legislation was simply referred to two House committees where it died (Global Health Act, 2010b). It should be noted that the bill died in these committees without being subsequently referred to any subcommittees, reported out of any committees, or being given rules for floor consideration (*Ibid.*). The Global Health Act’s lack of further procedural consideration occurred in spite of the Democrats controlling both the executive and legislative branches of the United States’ government in 2010, and the 111th Congress being considered one of the most productive sessions in recent history (Hulse and Herszenhorn, 2010).

The United States is not alone in failing to meet its aspirational development commitments, such as the WHO’s code of practice. According to Jennifer Edge and Steven Hoffman, 86 percent of key respondents in government, civil society, and private sectors from Australia, Canada, and the United Kingdom reported that the WHO’s code

of practice had not had any meaningful impacts on their nations' recruitment of health care professionals (2013: 5). Even more concerning were Edge and Hoffman's findings that 60 percent of respondents believed that their professional colleagues were not aware of WHO's code, while 93 percent stated that no real changes in their work occurred as a result of the code's adoption (*Ibid.*: 1). There is clearly room for national representatives to make more progress in meeting the WHO's health workforce development commitments.

The next section will look at some of the initiatives of NGOs that aim to strengthen individual countries' national health systems.

1.8 NGO Initiatives to Strengthen National Health Systems

In response to concerns over NGOs potentially duplicating or supplanting the role of public health systems in the Global South, a growing number of voices within NGO communities are raising questions about the what development roles should be played by external organizations (Farmer, 2008; NGO Code of Conduct for Health Systems Strengthening Initiative, 2008).

One such group raising these concerns is the Health Workforce Alliance Initiative, which is part of a joint government-private sector initiative housed in the WHO, called the Global Health Workforce Alliance (GHWA). The goal of the Health Workforce Alliance Initiative is to "build... a broader network of civil society, health workers and others committed to global health workforce advocacy," which includes "empower[ing]

health workers themselves to become advocates” (GHWA, 2017a). The GHWA has another program, Project Brain Drain-to-Brain Gain, which seeks to improve deficiencies in measuring international, external brain drain flows (GHWA, 2017b). Project Brain Drain-to-Brain Gain supports the WHO in producing datasets and following up on countries’ reporting efforts, by focusing on collaborations with stakeholders in five pilot countries: India, Ireland, Nigeria, South Africa and Uganda (*Ibid.*).

In 2008, another group of public health practitioners started an initiative called the NGO Code of Conduct for Health Systems Strengthening (or the NGO code for short). The NGO code seeks to address problems of internal brain drains among Non-Governmental Organizations that work in the field of global health. Article 1, section 1 of the NGO code tackles the problem of internal brain drains head-on. This provision states that “in areas where trained personnel are scarce, NGOs will make every effort to refrain from hiring health or managerial professional staff away from the public sector, thus depleting ministries and their clinical operations of talent and expertise” (NGO Code of Conduct for Health Systems Strengthening Initiative, 2008: 3).

The NGO code is the first significant step taken by Non-Governmental Organizations to address processes of internal brain drains. However, gaps in information nevertheless remain in quantifying whether, where, when, how fast, and to what degree internal brain drain processes may be taking place within a given country’s national health system. And there does not seem to be a clear consensus in how to

sustain accountability within organizations that have signed onto the NGO code, which may themselves experience high staff turnover. The next section will discuss the implications of empirically measuring internal brain drain processes.

1.9 The Importance of Establishing Empirical Evidence of Internal Brain Drains

If internal brain drain dynamics are shown to exist because of NGO activities in developing countries, then there are important consequences for establishing an empirical basis for these processes. Having evidence that measures internal brain drains as a result of NGO health providers' employment practices, could be critical in persuading key stakeholders, including NGOs and foundations that fund these organizations, that more energy should be devoted to strengthening individual countries' public care providers.

A range of studies (Kaplan, 2001; Penna, 2011; Behn, 2014) have looked at how nonprofit organizations make internal decisions on the basis of what services or mission outcomes receive measurement. This is reflected in first sentence of the WHO's own National Health Accounts (NHA) website, which states "it is generally agreed that countries 'cannot manage what they cannot measure,'" and that "stakeholders are progressively more aware of the value of tracking resources for health" (WHO, 2017a). Additionally, evidence from empirical measurements can make larger impacts if they are situated within an organization's strategic logic models (Herranz Jr., 2010: 59). Therefore, in the absence of stronger empirical evidence documenting potentially negative processes like internal brain drains, it could be more difficult to change NGOs'

institutional decision-making processes. Conversely, with more robust evidence of internal brain drains, it could be possible for international NGOs and foundations that fund NGO health providers to re-evaluate their organizational impacts and future strategies.

Questioning established NGO activities and longstanding discourses is not necessarily easy, as the implementation challenges of the WHO's code of practice illustrates for stakeholders in the government sector. NGOs must be presented with robust evidence that internal brain drains actually exist in the real world, in order to more seriously consider how to respond to these processes. This makes measuring whether NGOs are in fact recruiting workers away from national health systems, the first step in addressing this problem. Additionally, while the NGO Code of Conduct for Health Systems Strengthening represents progress in terms of raising awareness among organizations about internal brain drains, meaningful accountability will be harder to work towards in the absence of metrics that measure these processes.

There are a variety of public health benefits to quantifying problems of internal brain drains. By establishing that internal brain drain processes may be occurring, public providers and national systems can use this data to improve health outcomes – for example, by moving care delivery beyond NGO providers' clinical service enclaves. As previously mentioned, there are at least two research studies that suggest public sector health providers make disproportionate impacts on health outcomes, compared to providers in other sectors.

The work of Rossana Bojalil *et al.* (1998) concludes that public sector doctors in the Mexican state of Tlaxcala, delivered better health treatment to children with diarrhea and acute respiratory infections than physicians in the private sector. Bojalil *et al.*'s study population included 40 general practitioners working in primary care units in the state of Tlaxcala, and 59 private sector physicians identified in a census conducted by public health authorities (*Ibid.*: 323-324).

The authors breakdown their findings by doctors' performance in treating diarrhea and acute respiratory infections. For diarrhea, 50 percent of doctors in the private sector provided inadequate rehydration therapy; 63 percent gave incorrect dietary advice; 66 percent made incorrect decisions in prescribing antimicrobial drugs; and 49 percent incorrectly proscribed symptomatic drugs (*Ibid.*). By contrast, only 7 percent of physicians in the public sector gave inadequate rehydration therapy; 13 percent gave poor dietary advice; 28 percent made incorrect decisions in antimicrobial prescriptions; and 3 percent made incorrect decisions in prescribing symptomatic drugs (*Ibid.*).

Bojalil *et al.* observed similar trends for acute respiratory infections. Over 57 percent of private physicians in Bojalil *et al.*'s study made wrong decisions in the proscription of antimicrobial and symptomatic drugs to treat acute respiratory infections (*Ibid.*). By contrast, only 30 percent of public sector doctors made the same types of proscription mistakes (*Ibid.*). Bojalil *et al.* conclude that their "data support[s] the

hypothesis that private care in a rural area of Mexico is inferior to that provided publicly” (*Ibid.*: 330).

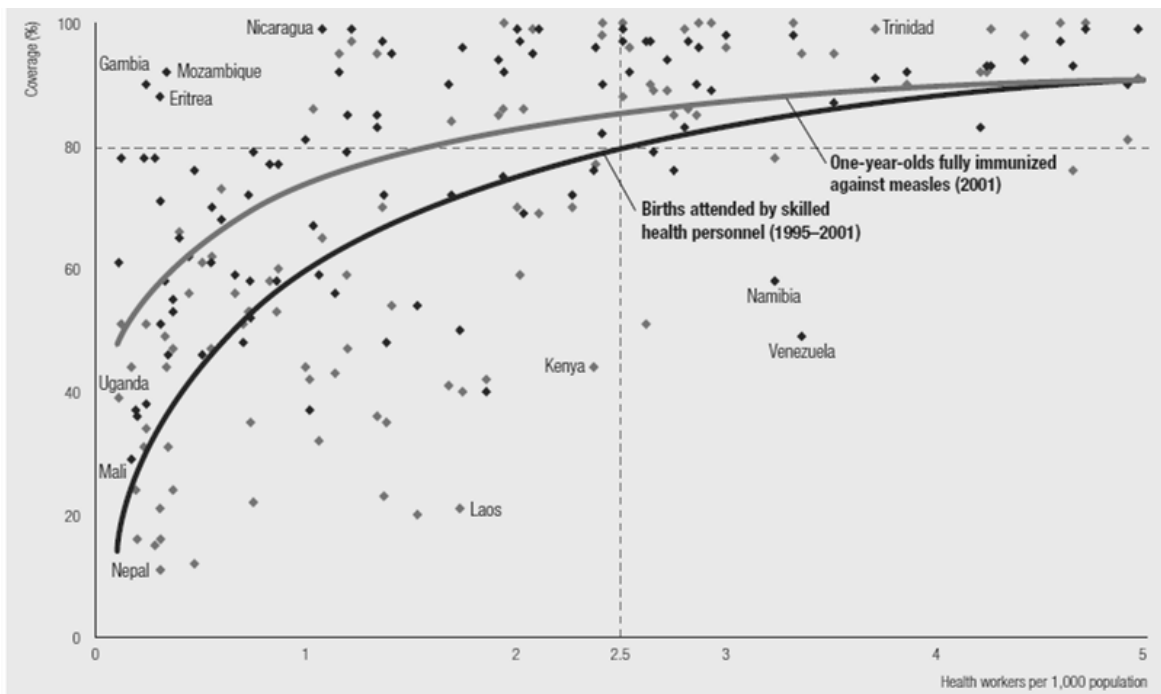
The work of Quinhas Fernandes *et al.* also highlights the importance of public sector health providers. Fernandes *et al.* show that increases in overall public sector health workforce densities in Mozambique were strongly associated with reductions in neonatal mortality, or child mortality in the first month of life, between 2000 to 2010 (2014: 473). The authors also compare their results with different cross-country research on neonatal mortality. Fernandes *et al.* conclude that their “findings add to increasing evidence from other longitudinal cross-national studies,” which “emphasizes the fundamental importance of public sector human resources underlying improvements in population health” (*Ibid.*: 475).

Considering the important role played by public sectors in national health systems, collecting data on the problems of internal brain drains would enable public health providers to calculate workforce densities on a sectoral level. But without sector-level workforce data, it will be harder for public health providers to determine the extent to which the employment practices of other providers may be negatively impacting their ability to recruit and retain skilled workers.

There are serious implications for declining health workforce densities among public sector providers. If a country’s public sector experiences losses of workers to clinical service enclaves run by NGOs, this could be correlated with decreasing overall

primary care coverage within a national health system. A report by the Joint Learning Initiative (2004) underscores the importance of maintaining adequate health workforce density levels. According to the Joint Learning Initiative, health service coverage for measles immunizations and births attended by skilled health workers exponentially increases for every additional health worker per 1,000 people, before leveling off at approximately four health workers per thousand residents (2004: 24). The Joint Learning Initiative's health coverage-to-workforce density curves are presented in Figure 5 below.

Figure 5. Health Service Coverage & Workforce Density



Source: Joint Learning Initiative (2004: 24), compiled from UN Development Programme 2003 and WHO 2004 data.

If populations are better served by national systems that provide treatment for a broader spectrum of diseases and care outcomes, then the strengthening of such

networks would presumably improve public health along the lines of Figure 5's asymptotic coverage curves. Conversely, if public health providers are unable to retain their skilled employees (due to possible internal brain drain effects from the employment practices of NGOs), then the public sector's losses of health workers could significantly decrease primary care coverage rates for a given country's population.

Workers' rights to migrate, either to other countries or within national boundaries, are enshrined in the 1948 Universal Declaration of Human Rights. Human capital migration can also occur in the same place geographically, if people transition from public to private sector employers and vice versa. There will always be some levels of external and internal human capital migration. However, measuring if, and to what extent such processes are taking place is very important for policy-makers. Better information will empower governments, NGOs, foundations, and other elements of civil society to actively manage human capital migration, as opposed to being passively impacted by these forces.

The second part of this study engages with a range of academic works in migration, public and global health, and other literatures, which are relevant to the study of internal and external brain drain processes. The end of Part 2 also formalizes this project's set of research questions.

PART TWO: LITERATURE REVIEW & RESEARCH QUESTIONS

Existing studies of brain drains (Lorenzo, 2002; Aiken *et al.*, 2004; Kingma, 2006; Yeates, 2012; England and Henry, 2013) mostly measure the bilateral movement of health workers between countries. Few studies adequately investigate the possible harmful effects of health personnel movements between public to private sectors, inside the borders of individual nations. Investigations of brain drains are one component of broader studies on migration, specifically labor migration. Like the evolution of works that focus on migration between countries, the study of internal brain drains depends on data regarding geographic and / or sectoral states of unevenness and difference, whether at local, regional, national, or international scales.

2.1 International / External Brain Drains

George Sefa Dei and Alireza Asgharzadeh argue that brain drains occur in the majority of societies, and usually happen when workers leave poorer rural areas to migrate to wealthier cities (2002: 31). This geo-historical evolution of brain drains is also supported in the broader migration literature by Wilbur Zelinsky's "mobility transition hypothesis" (1971: 221-222), which also identifies rural-to-urban internal migration as one of the earliest phases of migration. Although Sefa Dei and Asgharzadeh (2002) initially identified the existence of internal brain drains within individual countries, their ensuing analyses focus on the negative effects of external brain drains between more developed nations and poorer countries, especially nations in Africa.

The vast majority of academic investigations of brain drains concentrate almost exclusively on external brain drain processes at the international level. These studies are useful in establishing the existence of external brain drains, investigating causal mechanisms, measuring skilled workers' migration patterns, and evaluating political and even moral dimensions of these processes.

Historically, brain drains were first identified by scholars between countries that are relatively more developed. Various human capital migration effects can be seen in bilateral studies between two countries, such as skilled workers leaving the United Kingdom for the United States (Johnson, 1965); European professionals migrating between the United States and United Kingdom (Mejía, 1981); and Canadian doctors emigrating to the United States (McKendry *et al.*, 1996). While these studies uncover brain drains between countries, some of which include the international migration of health workers, they do not look at internal brain drains within individual nations.

The next section will review migration scholars' theories on the different causes of brain drain processes.

2.2 Brain Drains in Relation to Migration Literatures

Scholars discuss a range of causes for brain drains (Ravenstein, 1889; Mejía *et al.*, 1979; Todaro, 1969; Stark and Taylor, 1991), usually by looking at causation at the level of individual workers. It is also possible to situate different scholars' reasons for why skilled workers emigrate, within broader academic literature on the topic of

migration. The following sub-sections offer a survey of different works in migration literatures, which touch on the processes of brain drains and the emigration of skilled workers.

Economic Theories of Migration & Push / Pull Factors

Some scholars believe the main reasons why individual skilled workers decide to migrate, are related to economic conditions and opportunities. Alfonso Mejía *et al.* (1979), Robert McKendry *et al.* (1996), and Asjenafi Gedamu (2002) identify dynamics in both sending- and receiving-countries' economies, which may “push” or “pull” skilled workers to emigrate. These perspectives combine various traditional theories on the causes of migration, including Ernst Ravenstein's (1889) original push and pull factors, Larry Sjaastad (1962) and Michael Todaro's (1969) neoclassical economic perspectives, and parts of J. Edward Taylor's “new economics of labor migration” approach (Taylor, 1999: 64).

Within studies of brain drains, scholars identify other reasons why skilled workers emigrate, including desires to escape political instability in sending-countries (Sefa Dei and Asgharzadeh, 2002), as well as migrants' choices to remain in receiving- countries due to quality of life preferences (Gedamu, 2002). Upon closer inspection however, these causes could easily fall under traditional push/pull analyses, since political instability could constitute a push factor in sending-countries, and quality of life characteristics could act as a pull factor in receiving-countries. George Sefa Dei and Alireza Asgharzadeh's (2002) identification of political instability as a cause of migration

can be considered a push factor, while Gedamu's (2002) focus on quality of life attractions for migrant workers in receiving-countries can be viewed as a pull factor.

Chain Migration Theory

Adding nuance to traditional push-pull theories and setting the stage for future social network theories of migration, is the work of Leatrice MacDonald and John MacDonald (1964). Analyzing international migration from Southern Italy to the United States between 1885 to 1914, MacDonald and MacDonald observe the phenomenon of emigration occurring between old and new migrants via chain relationships (*Ibid.*: 84). Chain migration includes three stages: 1) assistance from established migrants to new breadwinner migrants for the latter's initial migration; 2) recruitment of additional breadwinner migrants; and 3) delayed family migration to receiving-countries (*Ibid.*: 84-85). The concepts of chain migration can be directly applied to the emigration of skilled migrant workers, including health workers.

Neo-Marxian, Post-Modern, & Other Migration Perspectives

Studies of brain drains and parts of migration literatures are also connected to larger schools of thought in critical social theory. Neo-Marxian analyses such as Andre Gunder Frank's (1966) focus on underdevelopment and dependency, or Immanuel Wallerstein's (1974) investigation of the importance of core-to-periphery global structures, can both be applied to investigations of external brain drains.

Likewise, post-modern frameworks such as Nina Glick Schiller *et al.*'s (1995) perspectives on transmigrants and transnationalism, or Saskia Sassen's (2001) emphasis on the magnetism of global cities, can theorize why health workers may leave, go back to, or circulate between sending- and receiving-countries. The next section will review how other scholars evaluate the effects and implications of external brain drain processes.

2.3 Evaluations of External Brain Drains & More Migration Theories

While both the brain drain and broader migration literatures develop plausible theories for the causes of skilled workers' migration between countries, other scholars (Pantinkin, 1968; Albuero and Abella, 2002; Ansah, 2002; Sefa Dei and Asgharzadeh, 2002) evaluate the political and moral implications of external brain drains. Normative evaluations of external brain drain processes can be classified into five categories – nationalist, internationalist, neoclassical economic, globalization perspectives, and brain wastes – which will be considered in turn.

Nationalist Critiques

Nationalist evaluations of external brain drains blend elements of Neo-Marxian and post-colonial viewpoints, and treat migration as an inherently exploitative relationship between wealthier, core countries and poorer, periphery nations (Ansah, 2002). The departure of skilled migrants from poorer sending-countries to richer receiving-nations can create neocolonial relationships (Pantinkin, 1968), where economies of sending-countries develop a dependency on remittances that workers

send home from abroad. Additionally, the loss of highly skilled migrants – who often emigrate in pairs as couples or with multiple family members – creates a shortage of talent in sending-countries, which benefits wealthier nations and can also lead to underdevelopment in sending-countries (*Ibid.*).

George Sefa Dei and Alireza Asgharzadeh (2002) situate brain drain processes in the context of a Global North and Global South divide, and highlight core countries' legacies of imperialism and colonialism in periphery nations, especially sending-countries in Africa. Sefa Dei and Asgharzadeh emphasize that brain drains in African sending-countries first began as a result of European-imposed systems of slavery (*Ibid.*). Brain drain processes have continued to occur in Africa up to the present, in neocolonial forms such as the ways that the IMF and WB implement various financial policies to weaken African countries' domestic economies (*Ibid.*). Walter Rodney (1972) evaluates the forcible extraction of people through Western-imposed slavery and the purposive underdevelopment of African domestic economies, as massive losses of human capital that benefitted European countries and the United States.

Internationalist Evaluations

A variety of other viewpoints on brain drains contest the above 'nationalist' critiques. According to Harry Johnson, a "brain bank" exists in wealthier, receiving-countries, which creates more demand for highly skilled labor (1968: 100). It is possible that poorer, sending-countries can benefit from this brain bank as their own countries' develop, by utilizing skilled workers' knowledge when they return home, or as they send

back remittances (*Ibid.*). Internationalist theories also question the extent to which the migration of skilled workers actually does create deficits in sending-countries, due to the economic benefits of migrants' remittances. For example, Dilip Ratha (2003) suggests that any costs of brain drains are offset by skilled migrant workers' transfers of part of their relatively higher earnings, back to sending-countries in the form of remittances.

Neoclassical Economic Evaluations

While neoclassical economic viewpoints are not necessarily the same as internationalist perspectives on the benefits of labor migration, they share a focus on individuals. Internationalist perspectives consider the totality of individual worker remittances for example, while neoclassical economic theory evaluates the decision-making processes of individual migrant workers, including economic motives in workers' choices to migrate (Todaro, 1969; Mejía *et al.*, 1979; McKendry *et al.*, 1996; Gedamu, 2002). Economic theorizations of why workers migrate also implicitly endorse the unrestricted, free movement of labor (Sjaastad, 1962; Todaro, 1969; Stark, 1991; Taylor, 1999).

Globalization Perspectives

Globalization theories of brain drains do not necessarily accept the premise that migration usually leads to losses of human capital from sending-countries. Globalization theories accept conditions of international migration as an immutable assumption, and suggest that all nations, including sending-countries, could receive benefits from the global migration of skilled workers (Cao, 1996; Johnson and Regets, 1998; Saxenian,

1999; Wadhwa, 2009). In line with questioning whether it is suitable to view brain drains as negative losses, globalization perspectives re-characterize the migration of skilled labor as brain “circulations” (Cao, 1996: 269-270). Some observers (Engardio, 1994; Wadhwa, 2009) have noticed that the migration of skilled workers may not be permanent, and can lead to migrant workers returning home to work in their original sending-countries. Globalization and brain circulation perspectives also use the concept of networks to analyze why highly skilled workers migrate, which is similar to other studies that emphasize the importance of social networks between migrants in sending- and receiving-countries (Massey and Espinosa, 1997; Winters *et al.*, 2001).

Brain Wastes

In addition to evaluations of external brain drains, WB researchers have identified the phenomena of so-called “brain wastes.” Özden *et al.* document evidence of unskilled employment among more educated immigrants in the United States as a receiving-country (2008). These WB researchers find that immigrants of similar educational attainment, ages, and experience levels have very different rates of success in obtaining skilled employment in the United States’ labor market (*Ibid.*: 267).

Specifically, Özden *et al.* find that educated immigrants from Eastern Europe and Latin America generally obtain less skilled jobs, relative to migrants with similar education levels from developing countries in Asia, or more developed countries such as Australia, Canada, EU member states, and Japan (*Ibid.*). The authors also find that Middle Eastern and African college graduates did not find skilled employment to the

same degree as their counter-parts from more developed sending-countries (*Ibid.*). However, professional workers from the Middle East and countries in Africa were able to obtain relatively skilled employment in the United States (*Ibid.*).

Evaluations of brain waste are complex. Skilled migrants working in unskilled jobs may prefer underutilized employment in receiving-countries, versus more skilled employment in sending-countries (*Ibid.*: 268). Similarly, receiving-countries such as the United States do not always recognize certain countries' qualifications of skilled professionals, while other sending-countries' educational systems may have more compatible designs (*Ibid.*). This has significant implications for sending-countries that invest in creating internationally-comparable tertiary education systems, as these nations may experience human capital losses due to external brain drains. Conversely, sending-nations whose tertiary education systems are less compatible with those of destination-countries, may receive relatively lower amounts of remittances from skilled migrants whose qualifications are underutilized abroad (*Ibid.*).

What is Missing From Normative Evaluations of External Brain Drains

Analyses that look at a range of potentially negative consequences for sending-countries as a result of external brain drains, set the stage for investigating similar processes within individual sending-countries. This said, normative evaluations of external brain drains usually analyze the potential losses of human capital on multilateral levels between different countries, not within a single, individual nation. Normative evaluations of external brain drain processes do not empirically measure

internal brain drains, nor do these studies reveal whether internal brain drains are taking place between an individual country's private and public health care sectors. The next section of this project will review studies of brain drains that focus specifically on health workers.

2.4 Brain Drains & Health Workers

While the brain drain and migration literatures develop plausible theories for why highly skilled workers migrate between countries, in addition to offering important evaluations of these migration patterns, these analyses usually do not focus on the migration of health care professionals between different countries. A selection of studies that measure external brain drains of health workers will be reviewed in this section.

One of the better known examples of international brain drains of health workers is the migration of Filipino nurses. Fely Lorenzo's work (2002; Lorenzo *et al.*, 2005) notes the disproportionate representation of Filipino nurses among global care workers. Lorenzo *et al.* observe that in the early-to-mid 2000s, the Philippines was the largest source-country for migrant nurses, with 7 million Filipino registered nurses estimated to be working abroad (2005: 26).

Margarita Perrin *et al.* (2007) also examine exports of Filipino nurses in the global health labor market, but analyze the effects of international human capital migration on the Philippines' own national health system. These authors' work is an interesting hybrid study. It is notable for both uncovering the attitudes of domestic

Filipino hospital chiefs towards migrant nurses, as well as the relative strength of the Philippines' public sector in recruiting nurses (compared with the country's private sector health providers).

Perrin *et al.* surveyed hospital nursing chiefs in different facilities throughout the Philippines. The authors found that the majority of hospital chiefs who responded to their survey, expressed support for training Filipino nurses who would go on to migrate elsewhere as skilled health workers (2007: 224). These hospital chiefs supported the migration of Filipino nurses in spite of difficulties faced by both public and private hospitals in stemming the turnover of recent nursing graduates, who would gain clinical experience and then quickly migrate outside the Philippines shortly thereafter (*Ibid.*). Additionally, the nursing chiefs supported migrant nurses leaving the Philippines even though domestic hospitals also had a harder time recruiting more experienced personnel (*Ibid.*).

The most interesting part of Perrin *et al.*'s work as it relates to this study, are the authors' findings of the relative strength of public health providers in the Philippines. The results of Perrin *et al.*'s survey indicate that while two-thirds of all the surveyed hospitals reported difficulties in recruiting more experienced nurses, private hospitals had a harder time recruiting nurses with experience compared to government hospitals (*Ibid.*). Additionally, the wages of nurses in the Philippines' government hospitals were consistently higher than those of private sector nurses (*Ibid.*: 222). It is also possible that the relative strength of government hospitals is the result of past investments in

public health systems, seen for example in the Philippines' 1992 Magna Carta for Public Health Workers law (*Ibid.*: 224).

While Perrin *et al.*'s study is indicative of potential internal brain gains in the Philippines' public sector, the authors do not measure these processes. And just because government hospitals had relatively less difficulties in recruiting more experienced nurses compared to private hospitals, this does not rule out the possibility of measuring net internal brain drain flows within the Philippines' overall national health system.

Other external brain drain research tracks the so-called 'imports' of nurses from sending-countries to receiving-nations. For example, a study on the United Kingdom's reliance on migrant health workers shows that 52.6 percent of registered nurses in Britain's National Health Service came from foreign countries in 2002 (England and Henry, 2013: 8). This study also observed that the United Kingdom's import rates for foreign nurses fluctuated from levels of nearly 50 percent to 10 percent between 1999 and 2012 (*Ibid.*).

Looking at a sample of published studies that explicitly measure and evaluate external brain drains of health workers (Lorenzo, 2002; Aiken *et al.*, 2004; Kingma, 2006; Yeates, 2012; England and Henry, 2013), all of these works stop short of measuring internal brain drain processes within a single country's private and public health care sectors. This section's review of external brain drains involving health

workers focuses on international migration between multiple countries. These measurements of external brain drains are still important, because they set the stage for empirical observations of the same basic processes within the confines of a single nation's borders. Additionally, the findings of Perrin *et al.* raise a question of whether processes of internal brain gains may be occurring in individual countries, which is essentially the negative answer to this project's second research question.

Studies of external health worker migrations serve as crucial guides in examining internal brain drain processes. Having said this, a gap nevertheless exists in actually measuring these latter processes. The next section will review research on internal brain drain processes in national health systems. However, only a handful of studies exist with a narrower focus on human capital losses within individual countries. And even fewer works focus on internal brain drains within individual countries' national health systems.

2.5 Studies of Internal Brain Drains in Health Care

Studies of internal brain drains and distributions of health workers will be considered for four countries, listed in alphabetical order below.

Mozambique

As previously mentioned, the work of Sherr *et al.* (2012) measures internal brain drains of physicians employed by Mozambique's public and NGO sectors. Sherr *et al.* compile a dataset of doctors that graduated from medical schools inside and outside of

Mozambique from 1980 to 2006 (2012: 2). More than 700 doctors were identified in Sherr *et al.*'s data, of whom nearly 80 percent – 574 physicians – worked in Mozambique's public health care sector in 2008 (*Ibid.*: 3).

Sherr *et al.* found that 36 of the 574 doctors working in Mozambique's public sector left the Mozambican NHS to work for NGOs in 2008. During that same year, three physicians out of 135 total doctors working outside the public sector returned to jobs in the NHS (*Ibid.*: 3). The difference between these flows yields a net internal brain drain of 4.6 percent for doctors employed by Mozambique's public and NGO sectors in 2008 (*Ibid.*).

Sherr *et al.*'s dataset is notable in that it represents a close approximation of the entire population of Mozambican doctors trained inside and outside the country, over a 26 year time span. The authors estimate that their dataset captures 97 percent of all the physicians trained in Mozambique between 1980 and 2006 (*Ibid.*). While Sherr *et al.*'s use of descriptive statistics has already been reviewed (see 1.2), the size of this study's sample population strengthens its findings. It should be emphasized that Sherr *et al.*'s paper is very important for being one of the only studies that actually measures internal brain drain processes among health workers. No other research which measures internal brain drains of health workers between individual countries' public and NGO sectors, has been identified in relevant literatures and it is unknown whether such studies exist.

Although Sherr *et al.*'s work is the best known example that measures internal brain drains between public and NGO health providers, it nevertheless has limitations. To begin with, no controls are identified in Sherr *et al.*'s study to account for the impacts of other factors, which may have caused Mozambican doctors to leave the NHS for employment in the NGO sector. The effects of the 2008 Great Recession were felt globally, with emerging economies experiencing an average reduction in economic output of 4 percent (Llaudes *et al.*, 2010: 3). Mozambique may have been relatively less affected by the Great Recession, but the country's annual Gross Domestic Product (GDP) growth rate still declined by 3.5 percent, from 9.85 percent in 2006 to 6.35 percent in 2009 (IMF, 2017a; WB, 2017a). If the Great Recession significantly affected the wages paid by Mozambique's NHS and / or NGO providers, then this recession – and not NGO employment practices – could be more important in explaining the exodus of doctors away from public sector health providers.

There are compelling reasons to question the impact of the Great Recession on Sherr *et al.*'s findings. The Institute for Health Metrics and Evaluation (IHME) published a visualization of the WHO's NHA data (IHME, 2017a). Although IHME notes there are significant limitations with this dataset, per a WHO bulletin written by IHME staff (Bui *et al.*, 2015), Mozambique is nevertheless among the top third of countries where governments are the main financing agents for health care services. NHA figures suggest that Mozambique's general government funding accounted for an average of 74 percent of all health care expenditures from 2004 to 2006 (IHME, 2017a). If the degree of government funding for health care in Mozambique is as high as NHA data

indicates, then an economic downturn could affect NHS funding and the employment of Mozambican physicians. It is therefore possible that Sherr *et al.*'s measurements of net internal brain drains in Mozambique could be more attributed to lagged impacts of the Great Recession, as opposed to NGO employment practices.

The Great Recession could also complicate Sherr *et al.*'s findings if this economic downturn affected Mozambique's NGO sector to different degrees than the country's public health system. While it is unknown how much NGO activities may have fluctuated in Mozambique from 2008 to 2010, observations from a global scale suggest that funding for international health care increased during this time period. According to IHME data, total global health financing from selected NGO funders and core national governments continuously increased in spite of the Great Recession. Funding from NGOs and foundations increased each year from 2007 to 2010, rising from \$4.7 Billion in 2007, \$6.4 Billion in 2008, \$7.6 Billion in 2009, and up to \$9.5 Billion in 2010 (IHME, 2017b).

While it is not possible to directly link global trends in health funding to the activities of NGOs in Mozambique, in the absence of comparative data it is valid to question whether in-country NGOs were better funded than Mozambique's NHS during the Great Recession. If differential impacts of the Great Recession led to relatively more robust funding for in-country NGOs compared with Mozambique's NHS, then establishing a causal relationship between NGO recruitment and public sector job losses could be more difficult. In other words, if NGOs were possibly more insulated

from assumed effects of the Great Recession (relative to Mozambique's NHS), then a Mozambican exodus of doctors and health care professionals from the public sector to NGOs, could be explained in more basic terms of economic push and pull factors, instead of the non-governmental sector's recruitment or compensation practices.

From such a perspective, public sector Mozambican doctors may have faced layoffs or reduced employment opportunities that pushed them to other jobs. Alternately, NGOs in Mozambique may have had more funding relative to the public sector (because of the economic downturn), to pull physicians away from the NHS. In both scenarios, an internal brain drain could take place between the public and NGO sectors due to differential economic impacts of the Great Recession, as opposed to purely NGO personnel practices. It could still be argued that NGO activities play a role at a deeper level, since these organizations offer Mozambican doctors alternatives by their very existence. But this does not necessarily mean that the same physicians would have left their jobs in Mozambique's public sector under better economic conditions, or in the absence of the Great Recession (i.e. the unobserved counter-factual).

There are two other limitations of Sherr *et al.*'s work. In the first place, Sherr *et al.*'s findings are limited to a single country – Mozambique – as a case study. It is unknown whether measurements of a net internal brain drain of 4.6 percent of Mozambican doctors leaving the NHS for jobs in the NGO sector during 2008 to 2010, could be reproduced at similar levels for other countries over the same time period.

Sherr *et al.*'s findings have value as one specific measurement of internal brain drain processes, but they are nevertheless limited to only a single country.

Finally, related to this last point, even if Sherr *et al.*'s findings could be reproduced beyond Mozambique, their results would only apply to the employment of physicians. A more complete study of internal brain drain dynamics and the strength of national health systems would include other health workers in addition to doctors.

Saudi Arabia

Ameerah Mansour (2008) evaluates both the internal distribution of doctors in Saudi Arabia, as well as the international migration of skilled health workers in Saudi. In an analysis of internal brain drains, Mansour focuses on the possible mal-distribution of doctors between public and private health care sectors, as well as rural versus urban areas of Saudi Arabia. Using a logistic regression model to analyze survey results, Mansour discusses why doctors prefer to work in sectors outside the Ministry of Health, as well as urban areas (*Ibid.*: 98-102). Mansour's work takes the existence of an internal brain drain of Saudi doctors as a given, and focuses on what policies Saudi Arabia's government should adopt to address the mal-distribution of domestic health workers (*Ibid.*: 102).

Thailand

In a study of medical tourism in Thailand, Thinakorn Noree (2015) looks at the impact of medical tourists in the expansion of the Thai private health care system.

Noree notes that an internal brain drain of Thai doctors occurred between public and private hospitals in Thailand over 20 years. According to Noree, the percentage of Thai doctors working in private hospitals increased from 11.4 percent in 1987, to nearly 21 percent in 2007 (*Ibid.*: 34).

Noree's investigation of internal brain drains of Thai health workers concentrates on patient services, and specifically how medical tourism may affect these migration processes. Noree observes that an internal brain drain of health workers from public to private hospitals does exist in Thailand, but that the growth of medical tourists is not responsible for this sectoral migration. Noree concludes that medical tourism is not responsible for Thailand's internal brain drain among health workers, because of the fact that Thai citizens still comprise a supermajority of all providers' patients (*Ibid.*: 211).

Noree and Mansour's studies shed more light on internal brain drains, but their analyses look only at Thailand and Saudi Arabia. Additionally, in the case of Noree, the sectoral migration of health workers away from public hospitals to the private sector is observed in passing, within a wider study of medical tourism. For Mansour, the existence of asymmetries in the rural-to-urban and sectoral distributions of doctors in Saudi Arabia is taken as a fact, and serves as an unquestioned backdrop for making policy recommendations to the Saudi government. Neither of these works conduct a thorough, empirical investigation that measures internal brain drain processes for health workers on a sectoral basis, within a single country's national health system.

United States

In the United States, there is a long history of rural-to-urban mal-distributions of health workers, especially doctors (United States Congress, 1990). For example, the so-called “doctor distribution problem” referred to the United States’ shortage of doctors in richer and poorer rural communities, as well as poorer urban areas in the 1960s (Redman, 1973: 31-32). These “doctor deficient” areas led the United States Congress to create the National Health Service Corps (NHSC) in 1971 (*Ibid.*). The original purpose of the NHSC was to allow doctors to fulfill military draft obligations domestically, in rural and poorer urban areas of the United States (*Ibid.*). The NHSC still exists today, but now functions to reimburse doctors for their medical school loans (NHSC, 2017). The NHSC also awards scholarships and stipends to physicians who spend two-to-four years practicing in geographic locations of need (*Ibid.*).

Internal brain drains are not reviewed in greater depth for the United States, primarily because this country is the largest donor of total foreign aid to other nations in absolute terms. In 2016, the United States donated \$33.16 Billion in net Official Development Assistance to other countries (OECD, 2017a). The United States’ total foreign aid in 2016 was nearly \$9 Billion more than Germany’s level of aid in the same year, which accounted for the second largest amount of international aid in absolute terms (*Ibid.*). The status of the United States as a major donor of foreign aid, along with its ability to recruit health workers from other nations, does not make this country a prime candidate for investigating whether NGOs are eroding public sector health providers.

The United States' domestic health systems are also complex, and this country has a weak network of public providers relative to total economic output and national wealth. According to international health system profiles compiled by the Commonwealth Fund, public providers run only 15 percent of all hospitals in the United States (Mossialos *et al.*, 2015: 9). There are no government-run primary care providers in the United States noted by the Commonwealth Fund's profile, outside of these public hospitals or veterans' health care facilities (*Ibid.*). Additionally, many of the United States' public hospitals are no longer funded by municipalities or states, and are instead connected to medical schools (America's Essential Hospitals, 2017).

In the United States, federal financing policies for un- and underinsured patients, such as Medicaid's Disproportionate Share Hospital payments (*Ibid.*) or the Affordable Care Act's expansion of Medicaid, are more important to public sector employment than sectoral compensation asymmetries. Having said this, it should be noted that neoliberalization policies or the employment practices of other sectoral health providers could still undermine the ability of public care providers to recruit and retain health workers in the United States. But the conditions of national health systems in wealthier countries like the United States is not the focus of this thesis.

The next section will summarize the current gaps in migration and public / global health studies identified by this literature review.

2.6 Summary of Literature Gaps

Although the NGO Code of Conduct for Health Systems Strengthening's website (2017) has links to a range of references, there is limited research that quantifies an empirical presence of internal brain drain effects in developing nations, beyond single country case studies like the work of Sherr *et al.* Therefore, while evidence of internal brain drains among health workers can be found based on the professional experiences of practitioners, such as Paul Farmer, or organizational signatories to the NGO code (e.g. ActionAid International USA, the Global AIDS Alliance, and Partners for Health), there is a lack of cross-country, quantitative studies that validate these qualitative observations. Additionally, no studies that quantify differences in sectoral wages between public versus NGO health care professionals, have been identified in relevant academic literatures.

This literature review has shown the need to test the hypothesis that NGO activities lead to internal brain drains within individual countries' public health systems, for a range of developing nations, and over a long enough timeframe. Academic studies focused on brain drains tend to investigate the effects of these processes in the context of multilateral, international migration. For investigations of internal brain drains within individual countries that do exist, such studies alternately do not focus enough on health workers, do not thoroughly measure the movements of health workers between public and NGO sectors, or are too limited as case studies of single nations over relatively brief periods of time.

In short, theories that the activities of NGOs can create internal brain drains within certain countries' public and NGO health sectors, would benefit from more empirical testing. Such a cross-country project – which would investigate whether multiple countries' public and NGO health providers experienced sectoral human capital migrations – would therefore add value to a range of literatures. The next section will formalize this study's set of research questions.

2.7 Research Questions

The purpose of this project is to fill identified gaps in relevant literatures. Few studies measure whether internal brain drains may exist between different health workers in individual nations, on a cross-country basis. This project will attempt to test the hypothesis that NGOs recruit health workers away from public sector care providers within national health systems. The main research questions of this thesis are:

- 1) How can internal brain drain processes between public and NGO health providers be measured over time for different countries?

- 2) Does the employment of health workers by NGO care providers affect the employment levels of public health providers in poorer, periphery or semi-periphery countries?

Part 3 of this study will consider which quantitative methods and statistical models to use in answering the above research questions.

PART THREE: QUANTITATIVE METHODS & STATISTICAL MODELS

Measuring cross-country sectoral human capital migrations between public and NGO health providers requires a fuller understanding of this project's assumed causal relationships. Additionally, it is important to define how dependent and independent variables of interest will be measured and operationalized by this study. Once this project's assumed causal relationships and variables are defined, different quantitative methods will be reviewed before introducing a preferred statistical model.

3.1 Assumed Causal Relationships

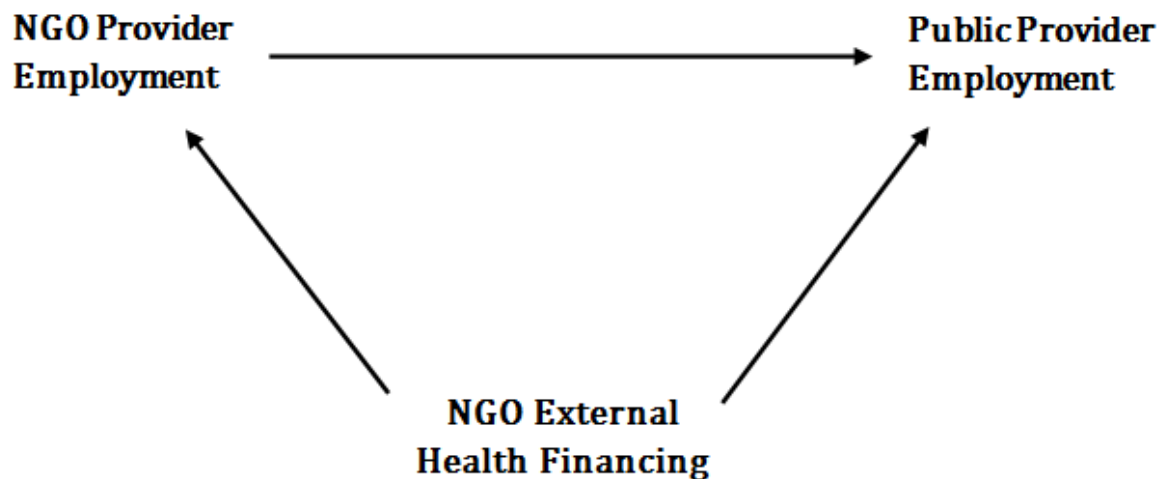
Building off the hypotheses of wage differentials and NGO sectoral expansion discussed previously (see 1.6), the following two sets of causal relationships are assumed to exist between public and NGO health providers in periphery or semi-periphery countries:

- 1) If international NGOs' external health funding increases the resources of domestic or other international NGOs to a greater extent than public providers, then NGO providers may have a higher ability to pay competitive wages or hire health workers, relative to public providers. Over time, higher wages or greater employment capacity in the NGO sector could entice health workers to leave jobs with public providers.
- 2) If neoliberalization policies reduce government resources while giving NGOs new opportunities to deliver health services previously offered by the public

sector, then public providers may have a lower ability to pay competitive wages or hire health workers relative to NGO providers. Over time, higher wages or greater employment capacity in the NGO sector could entice health workers to leave jobs with public providers.

The above two assumed causal relationships can be conceptualized in diagrams. Figure 6 presents a diagram of causal relationships between public sector providers, domestic or international NGO health providers, and NGOs that generally fund these health providers with external financing.

Figure 6. Diagram of NGO Providers and External Financing Effects on Employment

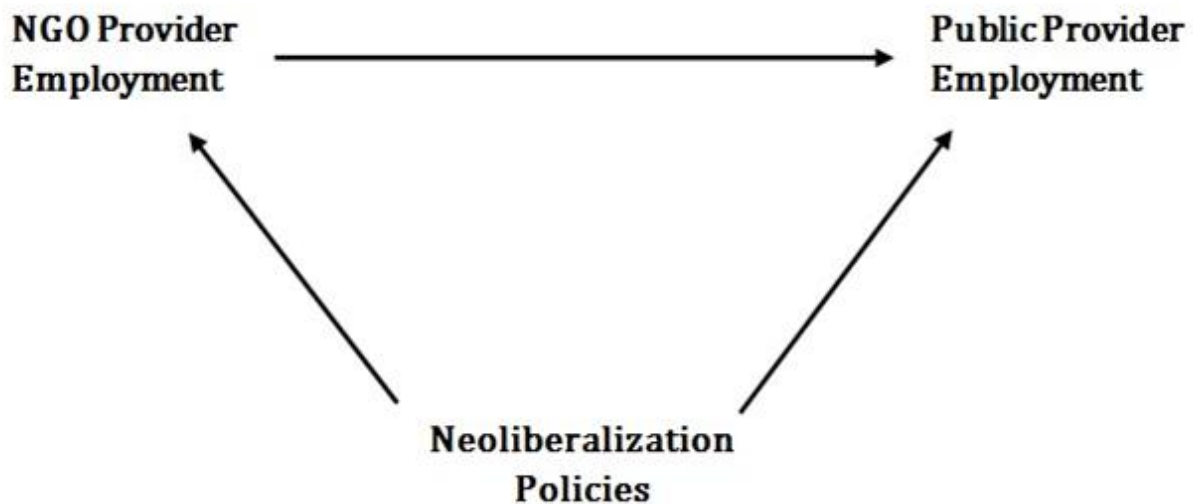


Looking at Figure 6, external financing resources from NGOs could increase funding for both public and NGO health providers in a given country. If NGO providers were to hypothetically receive relatively more resources than public providers, and if the same NGO providers are assumed to reduce public sector employment on their own,

then the total effect could be an overall reduction in employment by public health providers.

The next figure presents a diagram of this project's second set of assumed causal relationships. Figure 7 shows the relationships between public sector providers, domestic or international NGO health providers, and neoliberalization policies.

Figure 7. Diagram of NGO Providers and Neoliberalization Effects on Employment



Looking at Figure 7, neoliberalization policies imposed on a country by international lenders could decrease resources for public health providers. If public health providers received less resources from a country's general government funds (due to imposed neoliberalization policies), this could give more opportunities to the NGO sector to provide new health care services (assuming NGO providers enter voids previously filled by the public sector). If public health providers hypothetically receive fewer resources at the same time that NGOs take advantage of opportunities to deliver

new health services, then the total effect could be an overall reduction in employment by public providers.

It should be emphasized that the extent of exogeneity inherent in this project's assumed causal relationships is unknown. Endogenous relationships between the above parameters could easily exist, where this study's dependent variable – public sector employment – could have effects on the employment capacities of NGO health providers, as well as the health financing decisions of external actors (e.g. international NGOs, foundations, lenders, or governments). However, the purpose of this project is to test hypotheses, based on theory (see 1.6), which indicate that the above assumed causal relationships could exist.

The next section will discuss how the ecological fallacy relates to the main variables of interest to this thesis.

3.2 The Ecological Fallacy

Depending on data and research design, many projects that attempt to measure change over time encounter problems related to the ecological fallacy. Earl Babbie describes the ecological fallacy as “[e]rroneously basing conclusions about individuals solely on the observations of groups” (2014: 506). It is important to discuss the ecological fallacy before offering definitions for this project's key variables.

If only aggregate data measuring health providers' total annual employment levels is available for a given country, then it will be harder to determine whether transfers of human capital may be taking place among public versus NGO health providers. If data analyses indicate that annual changes in the employment of health workers by public providers are decreasing, while employment levels for NGO providers are increasing over the same period, then these changes could be unrelated.

For example, health workers previously employed by public providers may leave their jobs to work in other, non-NGO health sectors; they might work in completely different industries; they may accept new jobs located outside a country of interest; or they might no longer be working at all. Similar arguments can be made for hypothetical employment growth among a country's NGO health providers. NGO providers that experience year-to-year increases in employment might recruit health workers away from non-public providers; they may hire workers from different industries; they might hire newly migrated health workers; or they may hire previously unemployed persons.

These concerns can be mitigated to a certain extent by the inclusion of additional explanatory variables (see 3.3-3.4), such as employment totals of all other health care providers, as well as proxies for countries' economic growth and unemployment rates. Different research designs could also mitigate problems associated with the ecological fallacy. Sherr *et al.*'s descriptive statistics, which track net changes in the employment of physicians registered in Mozambique's Ministry of Health files, is an example of an alternative approach.

However, if a hypothetical study that uses data on employment totals found that a certain country's public provider workforce declined, while NGO provider employment grew (all other things being equal), then such results could represent strong evidence that internal brain drain processes may be occurring within an individual nation. Likewise, if internal brain drains were actually taking place between a country's public and NGO health providers, then presumably changing employment levels between these providers would be a necessary precondition for these processes to exist.

The next section will conceptualize and operationalize this study's main variables of interest.

3.3 Dependent, Independent, & Other Variables of Interest

The following list conceptualizes this study's key dependent and independent variables, in addition to considering how to operationalize their measurements:

- 1) *Dependent Variable: Employment of health workers by public health providers in individual countries.* This is estimated at the country level through annual measurements of public providers' headcounts of health workers, as well as Full Time Equivalent (FTE) employee ratios. This can also be estimated through samples of annual health worker headcounts and FTE ratios.

2) *Independent Variable: Employment of health workers by domestic or international NGO health providers in individual countries.* This is estimated at the country level through annual measurements of NGO providers' headcounts of health workers, as well as FTE employee ratios. If employment data for the entire population of NGO providers in a given country is not available, then estimates of annual health worker headcounts and FTE ratios can be obtained through appropriate samples of NGO workforces. It should be noted that the slope for this independent variable, which is represented by β_1 in Equation 1 (see 3.9), is the main coefficient of interest to this thesis.²

There are other variables of interest to this project. The following list describes these variables, along with ways to operationalize their measurements:

- *External health financing by international NGOs in individual countries.* This is estimated at the country level by measuring the total annual financing by international NGOs provided to public, private, domestic, religious, and other NGO health providers. External health financing by international NGOs should exclude capital funds, in order to isolate funding designated for health providers' operating budgets.
- *Neoliberalization policies affecting individual countries.* This variable should measure whether a given country has enacted neoliberal policies, which may

² The coefficient of β_1 for the main independent variable measures how the dependent variable of public provider employment will be affected by a one unit increase in NGO provider employment.

result in less funding for public services, including government-financed health providers. This is estimated at the country level by measuring the annual levels of government funding for public health providers, a government's total operating budget, and / or indicator variables noting if a country has been subject to neoliberal lending conditions (e.g. a SAP).

- *Employment of health workers by private sector health providers in individual countries.* This is estimated at the country level in the same manner that this project's dependent and independent variables are operationalized.
- *Employment of health workers by health providers affiliated with religious / faith / mission institutions in individual countries.* This is estimated at the country level in the same manner that this project's dependent and independent variables are operationalized.
- *Median wages – selected public provider health workers in individual countries.* This can be estimated at the country level by calculating the median wages of selected employees, broken out by job categorizations of different types of health workers employed by public health providers. The WHO's health workforce indicators (2017b) can be used to select the appropriate types of health workers to include in calculating median wages. Workers could be classified as doctors, nurse and midwifery personnel,

medical assistants, pharmaceutical personnel, community and traditional health workers, and dentistry personnel, among other options (*Ibid.*).

- *Median wages – selected NGO provider health workers in individual countries.* This can be estimated at the country level in the same manner that this project's variable of median wages for selected public provider health workers is operationalized.
- *Median wages – selected private provider health workers in individual countries.* This can be estimated at the country level in the same manner that this project's variable of median wages for selected public provider health workers is operationalized.
- *Median wages – selected religious provider health workers in individual countries.* This can be estimated at the country level in the same manner that this project's variable of median wages for selected public provider health workers is operationalized.

The above variables are of interest to this project, but do not necessarily have to be included in every statistical regression. There are benefits to not losing degrees of freedom by adding too many controls into a regression equation. As more controls are added into a regression equation, there is an increased possibility that one of these variables may be statistically significant due to random chance. Separate sets of

regressions can be run for different groups of independent variables, and with or without controls.

Including neoliberalization policies and international NGO external financing in this project's analysis is important, as omitting these variables may bias our coefficients. Measuring the effect of external NGO financing on public providers' employment could help determine how external financing resources are distributed within a country's health system. Estimating employment levels from other health providers, including private sector and religious entities, along with these employers' median wage levels for selected health workers, could similarly yield important market information.

Predictions of coefficient signs for this study's main variables of interest are presented on the next page in Table 4.

Table 4. Predicting Signs of Coefficients

Variable	Expected Sign Relative to Dependent Variable	Description
<i>Public Provider Employment</i>	N/A	Dependent variable, employment of health workers by public sector providers.
<i>NGO Provider Employment</i>	- (negative)	Main independent variable, number of workers employed in each country's NGO health sector. For every one unit increase in NGO provider employment, public provider employment is expected to decrease.
<i>International NGO External Financing</i>	- / + (negative or positive)	Independent variable, total annual external health financing from international NGOs. For every one unit increase in international NGO external financing, public provider employment could increase or decrease, depending on the distribution of external funds.
<i>Neoliberalization Policies</i>	- (negative)	Independent variable, indicator of past neoliberalization policies enshrined in terms of IMF/WB loans. If neoliberalization policies are indicated, public provider employment is expected to decrease.
<i>Private Provider Employment</i>	- (negative)	Independent variable, number of workers employed in each country's private health sector. For every one unit increase in private provider employment, public provider employment is expected to decrease.
<i>Religious Provider Employment</i>	- (negative)	Independent variable, number of workers employed in each country's religious health sector. For every one unit increase in religious provider employment, public provider employment is expected to decrease.
<i>Median Wages – Public Health Workers</i>	+ (positive)	Independent variable, median wages of selected health workers employed by public providers. For every one unit increase in median wages, public provider employment is expected to increase.
<i>Median Wages – NGO Health Workers</i>	- (negative)	Independent variable, median wages of selected health workers employed by NGO providers. For every one unit increase in median wages, public provider employment is expected to decrease.
<i>Median Wages – Private Health Workers</i>	- (negative)	Independent variable, median wages of selected health workers employed by private providers. For every one unit increase in median wages, public provider employment is expected to decrease.
<i>Median Wages – Religious Health Workers</i>	- (negative)	Independent variable, median wages of selected health workers employed by religious providers. For every one unit increase in median wages, public provider employment is expected to decrease.

The next section will look at additional control variables, which could be appropriate to include in a regression equation.

3.4 Other Control Variables

Although control variables should be added judiciously, it does make sense to include controls that may affect this project's main dependent and independent variables. The following controls (and their operationalizations) are considered appropriate for inclusion in this project's regression model:

- *Population*. This can be measured by the estimated annual number of persons living in a given country, according to WB data.
- *Gross Domestic Product*. This can be measured by calculating the annual monetary value of all final goods and services produced in a given country's economy, according to WB data in current International Dollars and using Purchasing Power Parity rates.
- *Total annual workforce participation*. This can be measured by calculating a country's total annual proportion of working-age people who are actively engaged in the labor market, according to International Labour Organization (ILO) data and definitions.
- *Infectious diseases associated with poverty*. This can be measured by the estimated number of annual cases of selected infectious diseases, which are associated with poverty. According to a WHO report, AIDS, HIV, malaria, and

tuberculosis are infectious diseases associated with poverty that are high on global agendas for health (2012: 13).

It makes sense to control for a country's population, since the size of national health systems could vary depending on population levels. For example, a relatively large country might have a bigger tax base to fund public providers. Alternately, a country with a larger population could attract relatively more NGO health providers (e.g. if there are higher absolute numbers of certain infectious disease cases).

GDP can help control for annual economic changes in a given country. This is critical to any study of sectoral employment, as the number of health workers employed by public providers could change for a variety of broader economic reasons, besides losses of human capital due to NGO employment practices. A country's annual workforce participation rate can also help control for changes in unemployment.

For example, a recession could lead to general workforce attrition throughout a country's economy. Additionally, cross-country workforce participation rates and GDP measurements could be correlated with changing levels of external health financing offered by international NGOs. Higher workforce and GDP growth in individual countries could easily be related to large increases in international NGOs' funding of external health resources, and vice versa for declining labor force or economic output rates. Including workforce participation rates, workforce participation rates per capita, GDP, and / or GDP per capita, could all help control for these types of economic fluctuations.

It is also important to include certain diseases as controls in this project's regression equation, especially infectious diseases that are associated with poorer countries. Infectious diseases associated with poverty could affect the flows of external health resources to poorer countries, as well as the number of health workers employed by NGO providers. Focusing on infectious diseases versus chronic conditions is more appropriate to control for short-term variations in health outcomes (e.g. outbreaks such as Ebola, which may have lagged effects on public and NGO providers, as well as external health financing). Fluctuations in the cases of infectious diseases could also affect public health providers. Governments could decide to increase or decrease funding for public health providers in response to certain events, such as epidemics or instances where cases of an infectious disease might significantly fall.

An obvious, but general note should also be made on the need for controls in cross-country datasets. Changes in control variables in one country could be much different from those of another nation. Because this project attempts to use cross-country datasets, including the above variables in a regression model would help control for changes across both time and geography.

Different units of analysis could also vary depending on data, which means it could be appropriate to include additional controls. If the unit of analysis is at the level of individuals, then controls such as age/birth year, sex, gender, race, ethnicity, or other

indicators could be considered for inclusion in this project's statistical model. The next section will discuss this study's unit of analysis, population, and mode of observation.

3.5 Unit of Analysis, Population, & Mode of Observation

The unit of analysis of this study is individual countries. Following David Dranove (2012: 2), this project's unit of observation is a country/year. The entire population for this thesis is all countries that include data on health providers' employment levels over time. However, greater specificity of which countries should be included in this project's population for data collection and hypothesis testing will be considered in the next section (see 3.6).

This project's mode of observation will be secondary analysis of data. Attempts to observe processes of internal brain drains among individual countries' public and NGO providers will occur through analyses of statistical data. Various statistical datasets will be reviewed (see 4.2) to try to find measurements of this project's variables of interest. The limitations of existing datasets will be evaluated in greater detail in the next part of this thesis, along with options for finding alternative ways to measure the health workforces of different countries (see 4.2 & 4.4).

The next section will narrow down this project's population to a specific set of periphery and semi-periphery countries.

3.6 Selected Geographies & Time Spans

Existing works on internal brain drains of health workers are limited by case studies that are too narrow, may only focus on one country, or might not cover long enough time periods. It is necessary to narrow down which countries should be selected for investigations of internal brain drain processes, and over what time spans. This project has made repeated references to core, semi-periphery, and periphery designations of individual nations. Paul Knox *et al.* (2014)'s classification of different countries as core, semi-periphery, or periphery nations will be followed, which itself is based on the work of Immanuel Wallerstein (1974).

Reviewing this project's different health system models (see 1.5), theories of wage rates and sectoral transfers of employment (see 1.6), and assumed causal relationships (see 3.1), it makes sense to prioritize poorer, semi-periphery or periphery nations with histories of neoliberal lending conditions, as countries for hypothesis testing. Such countries should also not rely on either Social Insurance or Single Payer models, due to the lack of public providers operating within these types of health systems (see 1.5).

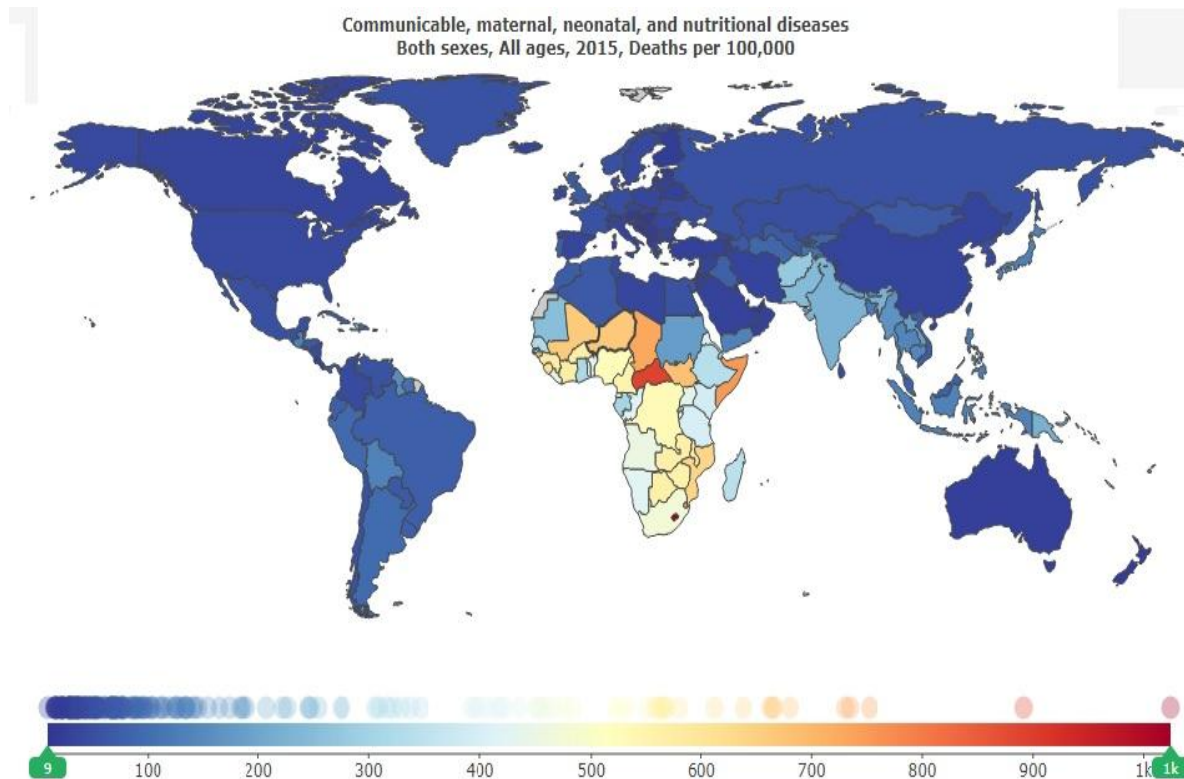
In 1996, the IMF and WB created the so-called Heavily Indebted Poor Countries (HIPC) initiative, which originally offered some debt relief for poorer nations, while making participating countries agree to structural adjustment policies (Naiman and Watkins, 1999). The IMF now claims that their updated HIPC initiative allows countries to use funds from debt reduction "on programs that benefit the poor" (IMF, 2017b).

However, it should be noted that no formal contractual agreements or detailed documents about the HIPC initiative are available on the IMF's website (*Ibid.*). Instead, vaguer policy statements outline criteria for participation in the HIPC initiative, which includes countries having "a track record of reform and sound policies through IMF- and World Bank-supported programs" (*Ibid.*).

What is clear about HIPCs is that these nations were originally subject to SAP-like terms, and already had large amounts of debt before participating in the IMF and WB's initiative (Naiman and Watkins, 1999). Therefore, the IMF and WB's list of 39 HIPCs (IMF, 2017b) can serve as a guide in choosing which nations to prioritize for investigating internal brain drain processes among countries that have been subject to neoliberal lending conditions.

Public health outcomes can help further narrow the focus of which semi-periphery and periphery countries to prioritize for research. An IHME visualization based on the Institute's Global Health Data Exchange (2017c) shows deaths due to communicable, maternal, neonatal, and nutritional diseases per 100,000 people in 2015. IHME's map highlights geographic inequalities in the treatment of infectious diseases between core nations in the Global North, versus periphery countries in the Global South, and is presented on the next page in Figure 8.

Figure 8. IHME Map of Deaths Per 100,000 People Due to Communicable, Maternal, Neonatal, & Nutritional Diseases – By Country in 2015



Source: <https://vizhub.healthdata.org/gbd-compare/>

Looking at Figure 8, there is a concentration of deaths exceeding approximately 300 per 100,000 people in sub-Saharan African nations, based on 2015 data. Death rates per 100,000 people in 2015 in sub-Saharan African countries, range from a low of 183 deaths for Sudan to a high of 1,025 deaths for Lesotho (IHME, 2017a). For the purpose of comparing these figures with IHME data from other nations, the following are deaths per 100,000 people due to infections and other diseases in 2015 from selected core countries: Canada – 33.95 deaths, China – 30.93 deaths, Germany – 47.19 deaths, Russia – 54.55 deaths, United Kingdom – 70.05 deaths, and the United States – 40.41 deaths.

Figure 2's global mortality data can be combined with the IMF-WB's list of 39 HIPCs. Additionally, the WHO's country profiles (2017c; 2017d) can indicate whether public health providers are present in individual countries national health systems. Table 5 (see next three pages) combines all of this information to select which nations to include in this study's list of population countries.

A note should be made about the last column in Table 5, which indicates whether public health providers are present in individual countries. After searching the main WHO website, regional WHO pages, and academic search engines, information on health care providers broken down by country and sector, could not be located or obtained. While it is assumed that public health providers do have some presence in every HIPC-eligible country, it is nevertheless surprising that national lists of providers are not readily accessible from the WHO or other sources.

Table 5. HIPC's By Health Indicators & Presence of Public Health Providers (1 of 3)

Country	WHO Region	Classification in Knox et al. (2014: 22)	IMF-WB HIPC Initiative – Eligible to Participate?	IHME Deaths Per 100,000 in 2015 – All Communicable, Maternal, Neonatal, & Nutritional Diseases	WHO Country Profile – Presence of Public Health Providers?
1) Afghanistan	Eastern Mediterranean	Periphery	Yes	275.72	Most likely, but could not be definitively determined
2) Benin	African	Periphery	Yes	415.09	Most likely, but could not be definitively determined
3) Bolivia	Americas	Periphery	Yes	135.17	Yes
4) Burkina Faso	African	Periphery	Yes	564.59	Yes
5) Burundi	African	Periphery	Yes	482.82	Most likely, but could not be definitively determined
6) Cameroon	African	Periphery	Yes	552.28	Most likely, but could not be definitively determined
7) Central African Republic	African	Periphery	Yes	891.69	Most likely, but could not be definitively determined
8) Chad	African	Periphery	Yes	729.83	Yes
9) Comoros	African	Periphery	Yes	246.90	Yes
10) Republic of Congo	African	Periphery	Yes	418.20	Yes
11) Democratic Republic of Congo	African	Periphery	Yes	531.83	Unknown, could not be determined
12) Côte d'Ivoire	African	Periphery	Yes	568.45	Unknown, could not be determined
13) Ethiopia	African	Periphery	Yes	336.93	Yes
14) Eritrea	African	Periphery	Yes	406.09	Yes
15) The Gambia	African	Periphery	Yes	273.94	Yes

Table 5. HIPCs By Health Indicators & Presence of Public Health Providers (2 of 3)

Country	WHO Region	Classification in Knox et al.	IMF-WB HIPC Initiative – Eligible to Participate?	IHME Deaths Per 100,000 in 2015 – All Communicable, Maternal, Neonatal, & Nutritional Diseases	WHO Country Profile – Presence of Public Health Providers?
16) Ghana	African	Periphery	Yes	316.33	Yes
17) Guinea	African	Semi-Periphery	Yes	579.58	Yes
18) Guinea-Bissau	African	Periphery	Yes	664.17	Yes
19) Guyana	Americas	Periphery	Yes	153.64	Most likely, but could not be definitively determined
20) Haiti	Americas	Periphery	Yes	244.88	Unknown, could not be determined
21) Honduras	Americas	Periphery	Yes	70.16	Yes
22) Liberia	African	Periphery	Yes	452.33	Yes
23) Madagascar	African	Periphery	Yes	346.13	Yes
24) Malawi	African	Periphery	Yes	566.54	Yes
25) Mali	African	Periphery	Yes	662.32	Yes
26) Mauritania	African	Periphery	Yes	253.27	Yes
27) Mozambique	African	Periphery	Yes	638.11	Yes
28) Nicaragua	Americas	Periphery	Yes	45.38	Yes
29) Niger	African	Periphery	Yes	665.79	Yes
30) Rwanda	African	Periphery	Yes	309.25	Yes

Table 5. HIPCs By Health Indicators & Presence of Public Health Providers (3 of 3)

Country	WHO Region	Classification in Knox et al.	IMF-WB HIPC Initiative – Eligible to Participate?	IHME Deaths Per 100,000 in 2015 – All Communicable, Maternal, Neonatal, & Nutritional Diseases	WHO Country Profile – Presence of Public Health Providers?
31) São Tomé & Príncipe	African	Periphery	Yes	185.13	Most likely, but could not be definitively determined
32) Senegal	African	Periphery	Yes	321.32	Yes
33) Sierra Leone	African	Periphery	Yes	612.02	Yes
34) Somalia	African	Periphery	Yes	751.96	Yes
35) Sudan	African	Periphery	Yes	183.07	Yes
36) Tanzania	African	Periphery	Yes	397.84	Yes
37) Togo	African	Periphery	Yes	457.80	Yes
38) Uganda	African	Periphery	Yes	436.22	Yes
39) Zambia	African	Periphery	Yes	564.92	Yes

Sources: WHO Regions Map (2017); Knox et al. (2014); IMF-WB HIPC initiative (2017); IHME Global Health Data Exchange (2017); WHO Country Profiles (2017)

Table 5's indication of whether public health providers were present in a given country was obtained from either the regional WHO African Health Observatory's country profiles, or WHO Country Cooperation Strategy documents (2017c; 2017d). In reviewing both of these sources, information on sectoral health providers usually had to be derived from context, although the African Health Observatory's profiles are structured to provide details of a country's health workforce and service delivery systems (which are incomplete in many cases). This raises a considerable issue that will be analyzed in more detail by the final part of this project – namely the lack of basic information about a country's different health providers, broken down by sector, tier of care, facilities delivering care, geography, and financing of care services (see 4.1 & Table 6).

Based on Figure 5, this project could limit its population countries to nations in sub-Saharan Africa, as well as countries with a clear presence of public health providers in this region. Limiting this study's population countries to sub-Saharan Africa seems appropriate because nations from other regions all have relatively lower ranges of deaths per 100,000 people, due to infectious and other diseases. Additionally, it makes sense to exclude countries where it was harder to determine if public providers are active, as there is a large enough number of countries – 26 nations – where it was easier to identify the presence of public providers. These 26 countries, which comprise this project's population are: Burkina Faso, Chad, Comoros, Republic of Congo, Eritrea, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Malawi,

Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, and Zambia.

Finally, the time span of this project will undoubtedly be limited by the availability of data. It would be beneficial to have multiple years of data measuring this study's variables of interest, since fewer years of data will make it harder to detect clear patterns of internal brain drain processes. The next section will discuss this project's sampling methods.

3.7 Sampling

All available data will be sampled from the 26 countries that make up this project's population. Possible data constraints, such as the absence of variable measurements in multiple countries over a number of years, could expose this study to statistical power problems. With less statistical power, there is a greater possibility of falling into Type II error (Sprinthall, 2000; Smith, 2017). This could result in erroneously accepting a null hypothesis that NGO health providers' employment may have no effects on the employment of public providers, when this null hypothesis may be false, and effects could actually be present (*Ibid.*).

However, thinking about national sectoral employment data, the number of health professionals working for NGO and public health providers are presumably calculated after counting hundreds, thousands, or even more health workers – who together deliver health services to countries' entire populations (which could be quite sizable). In

other words, having fewer data points on the total annual employment of health providers masks the fact that available information could measure a large number of health workers. This means that it may be appropriate to add frequency weighting to statistical regressions of cross-country data. Such frequency weights could be based on different countries' populations. Adding frequency weighting based on country populations would presumably result in a much larger number of observations, which would increase this study's statistical power.

Regardless of whether or not frequency weighting is added, having enough years of data for this project's 26 population countries is critical to addressing potential problems related to statistical power. Since this study's unit of analysis is a country/year, having five or more years of data per country for this project's population of 26 developing nations, could result in having over 130 units of observation / data points. The more years of data that are available for this study's 26 population countries, would increase both the total number of data points and overall statistical power of this thesis (Sprinthall, 2000: 243). Therefore, this project will seek out data points (i.e. information on variables of interest by country/year) for as many of the 26 selected population countries as possible.

The next section of this project will discuss different quantitative methods and statistical models that can be used to measure internal brain drain processes.

3.8 Discussion of Quantitative Methods & Statistical Models

Causal relationships are best investigated using random control trials, or true experiments, where random assignment to a control group allows for the artificial creation of counterfactual conditions. In social science research, there are many ethical problems and cost barriers to conducting random control trials. Relying on experimental methods such as random control trials can also raise ethical difficulties when investigating certain questions in the social sciences. In the case of this thesis, using a random control trial would be nearly impossible due to the extremely low likelihood of NGOs or governments taking actions that would limit their activities, or people's employment options – such as health workers – on a purely randomized basis. Additionally, even if these ethical constraints did not exist, the costs of conducting true experiments are economically prohibitive.

This leaves the option of analyses that rely on quasi-experimental methods. It is not clear that quasi-experimental approaches, such as natural experiments, uses of instrumental variables, regression discontinuities, difference-in-difference methods, or propensity score matching, can be deployed effectively for this project's variables of interest. Examples of exogenous changes in broad, sectoral NGO activities cannot be identified for any of the countries identified in Table 5. This does not suggest that either natural experiments or difference-in-difference methods would be appropriate. No valid instrumental variable can be conceived of, which would have exogenous effects on NGO health providers, while also not affecting the employment levels of public health providers.

Similarly, it does not make sense to use either regression discontinuities or propensity score matching methods. Using a regression discontinuity to estimate causal impacts requires a threshold to exist, in order for population members to receive treatment effects. There are no imposed thresholds on NGO health providers that can be conceived of, or identified by this study. Likewise, propensity score matching cannot be used because there is no random assignment to control and treatment groups for the main dependent and independent variables.

If experimental or rigorous quasi-experimental methods cannot be used, then this project is left with the possibility of making non-causal measurements. Non-causal measurements could isolate changes on the cross-country, sectoral employment of health workers over time, and estimate effects that the employment levels of NGOs may have on those of public health providers. It is possible to statistically measure the fluctuation of public and NGO providers' employment levels using panel data, which can be analyzed with a fixed effects model.

Using a fixed effects model could also help control for unobserved heterogeneity between multiple countries, and in the different characteristics of variables over time. A fixed effects approach removes time invariant components from the estimated regression model. This would limit controls to time variant variables. All of the proposed controls identified in this project (see 3.4) are time variant, with the possible exception of some indicator variables based on individual health workers' identities (which will not be

included). Per Ethan Lewis (2017), year effects should also be controlled for in this project's fixed effects model. Because time series regressions including fixed effects models, can "pick up the influence of aggregate trends which have nothing to do with causal relationships," it is appropriate to control for year-to-year effects (*Ibid.*: 1).

Strictly speaking, panel data and a fixed effects regression model will not measure counter-factual conditions in different countries over time. For example, hypothetical results from a fixed effects regression of cross-country panel data could clearly indicate declining employment levels for public health providers, while those of NGO providers might be rising at the same time. If such results were observed, this project's statistical model would not be able to measure what would have happened to the cross-country employment of health workers by public providers, in the absence of NGO providers' changing employment levels. Approximating counter-factual conditions is technically required in attempting to answer causal questions. The lack of counter-factual conditions means that any conclusions of this study will be suggestive.

One of the biggest problems with this project's proposed hypothesis test, is that it might not be possible to characterize cross-country changes in employment levels between public and NGO health providers, as purely exogenous relationships. In other words, the activities and employment practices of NGO health providers may not have one-way impacts on the ability of public providers to recruit and retain health workers. Instead, the exact opposite relationship could exist between these variables, as there are other forms of sectoral employment transfers that might be occurring in national

health systems. For example, it is possible that the employment levels and decision-making practices of public health providers could negatively affect the ability of NGO providers to recruit and retain health workers. It could be very difficult to resolve cases of endogeneity, or to measure exactly how, and to what degrees two variables may be simultaneously exerting varying levels of influence on each other, in different countries over time.

These and other limitations reduce the ability of a fixed effects regression model to definitively answer this study's second research question. What a fixed effects regression model can do however, is either offer evidence that the employment levels of NGO health providers may be affecting those of public providers (controlling for other variables), or suggest the absence of a statistically significant relationship. Having said this, obtaining statistically significant results and / or not being able to reject a null hypothesis, could still offer empirical indications of whether or not internal brain drains may be occurring in different countries' health systems. The following section formalizes this project's fixed effects regression model.

3.9 Preferred Statistical Model

Cross-country panel data will be organized by stacking the annual employment figures of public and NGO health providers for each country, over the number of years for which information is available. A fixed effects estimator will attempt to isolate a relationship between the employment levels among different countries' NGO health providers, and those of health workers hired by public sector providers. This study will

use the below fixed effects estimated regression equation, which includes an effect for individual countries and a year effect, for country i at time t .

Equation 1. Cross-Country Fixed Effects Regression Model

$$Y \text{ Public Provider Employment } i_t = \beta_0 i + \text{Year } t + (\beta_1 * \text{NGO Provider Employment } i_t) + (\beta_{\#s} * X_{\#s} i_t) + \varepsilon i_t$$

In Equation 1, *Y Public Provider Employment* is the estimated outcome for the dependent variable, measuring employment by public health providers for i countries at year t . $\beta_0 i$ is the estimated y-axis intercept or constant for i countries. *Year* is the fixed year effect for year t . β_1 is the estimated slope of the first and main independent variable, and is this project's primary coefficient of interest. The coefficient of β_1 will measure how *Y Public Provider Employment* will be affected by a one unit increase of the independent variable *NGO Provider Employment*, which measures employment by NGO health providers for i countries at year t . $\beta_{\#s}$ are the estimated slopes or coefficients for additional independent variables. $X_{\#s}$ are estimates of a range of time variant independent variables (see 3.3-3.4), for i countries at year t . The model's estimate of residual error is represented by ε , for i countries at year t . This regression equation may transform the dependent and independent variables into per capita values, in order to balance out any large variations between the population levels of different countries within the panel data.

There are three important things to note in using the above fixed effects model to answer this study's second research question. In the first place, no treatment group is constructed to estimate counter-factual conditions. Therefore, the coefficient values

produced by this model will not technically be able to isolate causal effects of the independent variables on the dependent variable. Secondly, what the model will do, is provide a measurement of how changes in employment levels among NGO health providers may be related to changes in the number of health workers employed by countries' public providers. Finally, both of these points speak to potential problems of endogeneity, where a fixed effects model will be unable to determine if: 1) changing employment by NGO health providers causes changes in employment among public providers; 2) the opposite may be true; or 3) both variables may be simultaneously exerting effects on each other.

The next section will discuss the ethical dimensions involved in conducting this project's research.

3.10 Ethical Considerations

No meaningful negative ethical implications are anticipated in conducting this research. This project's statistical analysis of secondary data means that no human subjects are directly involved in the research process. To the extent that the names of individual workers may be provided by countries' health ministries, steps can be taken to anonymize this information by deleting names, and replacing them with identifier numbers. A similar process can be followed for data that may identify the names of different countries' NGO health providers. Similarly, no issues of unintended damages or consent problems can be identified. This study's findings are unlikely to affect the economic livelihoods / well-being of individual health workers or NGO providers.

This leaves potential ethical impacts on national governments. The governments of nation states represented in secondary datasets may not have provided their specific consent to sharing national information for this project's research questions. However, the act of publicly sharing data would involve decision-making on the part of government representatives, who would presumably consider the fact that releasing such information could result in public scrutiny. Finally, critical evaluations of national health systems fall within the realms of public policy analysis, academic investigations, and freedom of expression. For these reasons, presenting findings that could affect the reputations of countries' health systems, are not likely to create major ethical problems.

The main ethical problem for this study is the importance of stating expected relationships before the outcomes of statistical analyses are known. Predicting the exact values of this project's statistical results is not necessary, but it is important to state the expected signs of this study's coefficients. Table 4 (see 3.3) lists this project's variables and expected coefficient signs.

The final part of this study will discuss deficiencies in currently available secondary datasets, which ultimately make it impossible to test this project's hypotheses. This thesis will conclude by considering directions for future research and the implications of internal brain drain processes for key stakeholders.

PART FOUR: DATA DEFICIENCIES, DIRECTIONS FOR FURTHER RESEARCH, & CONCLUSIONS

Unfortunately, existing secondary datasets do not contain any cross-country indicators that measure this project's dependent and independent variables. These deficiencies in current secondary datasets make it impossible to answer this project's second research question. To quantify the possible effects of NGOs' employment practices on the ability of public care providers to recruit and retain health workers, it is necessary to obtain alternative data measuring these variables of interest.

Existing secondary data will be evaluated in alphabetical order, according to the name of the institution that compiles and maintains each dataset. Explanations will be offered for why selected indicators in every available dataset fail to measure this project's dependent and independent variables. Each institution's dataset will also be reviewed as potential sources of control variables and / or other independent variables of interest. Before moving to an evaluation of different institutions' secondary datasets, it is relevant to consider all the dimensions of data that would ideally be available for individual countries' national health systems.

4.1 Ideal Organization of National Health Workforce Data

This thesis focuses on health workers who are employed by health providers that actually deliver care services to citizens. Under ideal conditions, a cross-country database would exist with information on individual countries' health care systems organized by: 1) sector, or type of employers who hire health workers to deliver care services; 2) tier, or type of care services performed; 3) facilities where care services are

delivered; 4) geography or location of care delivery; and 5) financing of care services.

These different dimensions of care delivery in national health systems are presented in Table 6 below.

Table 6. Dimensions of Care Delivery in National Health Systems

Sector Delivering Care Services	Tier of Care Services Provided	Type of Facilities Delivering Care	Geography of Delivery	Financing of Care Services
Public Providers: <ul style="list-style-type: none"> • National / central government • Regional government • Local government • Military / police / prisons • Stand-alone government organization (e.g. NHS – United Kingdom) 	Primary: <ul style="list-style-type: none"> • First point of contact • Triage care & provides referrals Secondary: <ul style="list-style-type: none"> • Short-term treatment • Injuries, births, acute care Tertiary: <ul style="list-style-type: none"> • Long-term / specialty care • Inpatient treatment 	Facility Example: <ul style="list-style-type: none"> • Hospital • Health center • Clinic • Small practice • Pharmacy • Small health unit • Mobile or traveling care services 	Scales: <ul style="list-style-type: none"> • National • Regional • Local • Urban • Suburban • Rural • Parish 	Examples: <ul style="list-style-type: none"> • Domestic government • Private insurance • Household out-of-pocket • International NGOs • Foreign Government Aid
NGO Providers: <ul style="list-style-type: none"> • Domestic organization • International organization 	Primary: <ul style="list-style-type: none"> • First point of contact • Triage care & provides referrals Secondary: <ul style="list-style-type: none"> • Short-term treatment • Injuries, births, acute care Tertiary: <ul style="list-style-type: none"> • Long-term / specialty care • Inpatient treatment 	Facility Example: <ul style="list-style-type: none"> • Hospital • Health center • Clinic • Small practice • Pharmacy • Small health unit • Mobile or traveling care services 	Scales: <ul style="list-style-type: none"> • National • Regional • Local • Urban • Suburban • Rural • Parish 	Examples: <ul style="list-style-type: none"> • Domestic government • Private insurance • Household out-of-pocket • International NGOs • Foreign Government Aid
Private Providers: <ul style="list-style-type: none"> • Individuals • Small businesses / practices • Large companies / corporations 	Primary: <ul style="list-style-type: none"> • First point of contact • Triage care & provides referrals Secondary: <ul style="list-style-type: none"> • Short-term treatment • Injuries, births, acute care Tertiary: <ul style="list-style-type: none"> • Long-term / specialty care • Inpatient treatment 	Facility Example: <ul style="list-style-type: none"> • Hospital • Health center • Clinic • Small practice • Pharmacy • Small health unit • Mobile or traveling care services 	Scales: <ul style="list-style-type: none"> • National • Regional • Local • Urban • Suburban • Rural • Parish 	Examples: <ul style="list-style-type: none"> • Domestic government • Private insurance • Household out-of-pocket • International NGOs • Foreign Government Aid
Religious / Mission / Faith Providers: <ul style="list-style-type: none"> • Churches • Other faith organizations 	Primary: <ul style="list-style-type: none"> • First point of contact • Triage care & provides referrals Secondary: <ul style="list-style-type: none"> • Short-term treatment • Injuries, births, acute care Tertiary: <ul style="list-style-type: none"> • Long-term / specialty care • Inpatient treatment 	Facility Example: <ul style="list-style-type: none"> • Hospital • Health center • Clinic • Small practice • Pharmacy • Small health unit • Mobile or traveling care services 	Scales: <ul style="list-style-type: none"> • National • Regional • Local • Urban • Suburban • Rural • Parish 	Examples: <ul style="list-style-type: none"> • Domestic government • Private insurance • Household out-of-pocket • International NGOs • Foreign Government Aid

Table 6 illustrates the complex web of health service delivery, which is further muddied by the fact that health providers are not limited to single, discrete categories. For example, doctors in a developing country's public sector may work at a clinic or hospital run by the government, while also running their own private practice to supplement their income.³ Similarly, some religious or faith institutions may receive public sector funding, such as mission clinics and hospitals in Zimbabwe.³

Despite these complexities and the potential for blurry categorical boundaries in Table 6, it is nevertheless possible to measure different characteristics of national health systems. Datasets that contain information on the number of health workers who are employed by public sector providers, or who are remunerated through government funds, could be used as proxies to measure this project's dependent variable. Assuming such hypothetical data exists, even if information was complicated by instances of public health workers moonlighting in another sector, imperfect measurements could still be made of how many total health workers were employed by public providers.

Another basic aspect of Table 6 should be emphasized. Beyond considering sectoral breakdowns of health workers, Table 6 conceptualizes many different ways in which skilled health care professionals can be distributed within a country's national health system. With better data collection, more information could be compiled for health workers by sector, tier of care, facilities delivering care, geography, and financing

³ Personal correspondence with Scott Barnhart (MD & MPH), University of Washington School of Medicine and Department of Global Health, 2017.

sources. These gradations of information about countries' health workforces would be very valuable to governments in tracking how human resources for health are distributed within national health systems.

With this review of important dimensions of national health systems in mind, the next section will evaluate the existing cross-country, secondary datasets of eight institutions.

4.2 Deficiencies in Cross-Country Secondary Datasets

Indicators were searched for that measure this project's key variables in the databases of the following eight institutions: the Center for Civil Society Studies (CCSS), Institute for Health Metrics and Evaluation (IHME), International Labour Organization (ILO), International Monetary Fund (IMF), Organisation for Economic Co-Operation and Development (OECD), United Nations (UN), World Bank (WB), and World Health Organization (WHO). These institutions' secondary databases will be evaluated in turn.

Center for Civil Society Studies

The Center for Civil Society Studies (CCSS) is a joint initiative of the United Nations Statistical Division and Johns Hopkins University, and is headed by Lester Salamon. The CCSS was founded due to a lack of comparative statistics on nonprofit institutions at an international level. The CCSS's Comparative Nonprofit Sector Project seeks to improve measurements of the size and activity of different countries' nonprofit

sectors (CCSS, 2017). Salamon *et al.* note that the international System of National Accounts governing data collection on a global level, does not fully capture the size of different countries' nonprofit sectors (2007: 1). Salamon *et al.* also observe that problems in the System of National Accounts reporting structure results in few governments even bothering to measure the size of their nonprofit sectors (*Ibid.*).

Although CCSS definitions of nonprofit institutions could replicate how this project conceives of NGOs (Salamon and Anheier, 1996: 2), there are two larger problems with the Center's datasets. CCSS information on nonprofit institutions is not broken down for individual countries' health care industries, and the Center's comparative data is very limited, both by time and geography. The CCSS does not usually break down data on countries' nonprofit sectors into sub-groups, such as health care providers. For example, in a comparative report on 16 countries' nonprofit sectors published in 2013, the number of workers employed by nonprofit institutions is calculated as a sector-wide total of each country's entire labor force (Salamon *et al.*, 2013: 2). There is no information in comparative CCSS reports that detail the number of workers employed by nonprofit institutions, which focus specifically on providing health care services.

The CCSS's datasets also have serious limitations in terms of time and geography. The Center's databases collect data points intermittently over approximately 20 years. CCSS comparative data relies on surveys that measure individual countries' nonprofit sectors at different points in time (Salamon *et al.*, 1999; 2004; 2013). There

are only three years – 1999, 2004 and 2013 – of comparative data, where the size of different countries' nonprofit sectors are measured. Additionally, CCSS comparative reports only survey 16 countries, which are mostly wealthier nations and are under-representative of periphery and semi-periphery countries.

This leaves CCSS reports on individual countries. The Center has published reports on the nonprofit sectors of 47 nations, including the following semi-periphery and periphery countries: Argentina, Brazil, Cameroon, Chile, Colombia, Egypt, Ghana, India, Kenya, Morocco, Mozambique, Pakistan, Peru, Philippines, South Africa, Tanzania, Turkey, and Uganda. Some of these in-depth, country-specific publications do break down the work of nonprofit institutions into different sub-groups, such as health care providers. Unfortunately, CCSS publications on individual countries' nonprofit sectors do not report health care data in a uniform manner. The lack of uniformity in CCSS data means that any information the Center does provide on nonprofit institutions working in individual countries' national health systems is not comparable. There is no CCSS data that measures this project's main variables of interest or any control variables.

Institute for Health Metrics and Evaluation

The Institute for Health Metrics and Evaluation (IHME) is an independent population health research center affiliated with the University of Washington (IHME, 2017d). One of IHME's priorities is researching how to allocate global and national resources to improve health outcomes (*ibid.*), including the health workforces of

individual countries. The Institute collects and reports information related to health workers, but primarily uses WHO data on individual countries' NHAs.

In 2015, IHME produced a visualization of different countries' NHA data (2017a). IHME's visualization of NHA data includes indicators that measure four key components of different countries' health systems. These include:

- *Financing Agents*. This measures which entities manage health spending in a given country. Financing agents include: general governments, households' out-of-pocket spending, the private sector, providers from the rest of the world, and agents that are not specified (*Ibid.*).
- *Financing Source*. This measures where resources for health care originate from in a given country. Financing sources include: external funds, private funds, public funds, and funds that are not specified (*Ibid.*).
- *Health Function*. This measures what health care services are provided in a given country. Included in health functions are: ancillary services (supporting primary care), curative / rehabilitative / nursing care, health administration and insurance, public health and prevention services, and retail pharmaceutical services (*Ibid.*).

- *Health Provider.* This measures which entities receive money in anticipation of providing health services in a given country. Health providers include: ambulatory care / nursing / residential care facilities, hospitals, health administration and insurance entities, pharmacies, public health providers, and the rest of a country's economy or world providers (*Ibid.*).

At first glance, it might seem like IHME's visualization of NHA data could measure certain characteristics of public health providers, external financing by NGOs, and even NGO providers. For example, the NHA Health Provider indicator covers public health providers and the rest of a country's economy or world providers, which include domestic and international NGOs. Similarly, the Financing Source indicator includes measurements of external health resources that enter a given country.

However, both of these indicators fail to measure this project's variables of interest. The Health Provider indicator does not adequately differentiate between sectors and facilities, and mixes public providers with hospitals or ambulatory facilities that could be run by public, NGO, or other sectors. Likewise, the Financing Source indicator does not isolate external financing from only NGOs. Rather, it measures the total amount of all external health financing resources, which mixes contributions from NGOs with aid from foreign governments, as well as funding from international agencies.

Additionally, IHME itself notes serious problems with the WHO's NHA data. In a bulletin produced for the WHO, IHME staff raise significant questions about the reliability of NHA data (Bui *et al.*, 2015). Bui *et al.* conclude that NHA data "are not sufficiently reliable for evaluating differences in health expenditures between countries or changes over time" (*Ibid.*). Some of the reasons why NHA data cannot be used to reliably make cross-country comparisons include: incomplete information provided by different countries' governments, categories that were unique to an individual nation's health expenditures, uncategorized expenditures, and implausible changes in annual figures that likely resulted from random data generation decisions (*Ibid.*). IHME data cannot provide cross-country measurements on the employment levels of NGO and public health providers.

IHME does have other data related to this project's variables of interest. IHME has data on Development Assistance for Health (DAH),⁴ which includes resources from international NGOs and foreign government aid given to recipient countries. IHME's DAH data includes external health financing provided by international NGOs, but mixes these resources with government aid. However, DAH data can be split into different categorizations based on which entities this aid gets distributed to within recipient countries. For example, IHME's DAH data can be broken down into funds that are distributed to recipient countries' governments, non-government entities, and funds that are not allocable.

⁴ This was obtained courtesy of Joseph Dieleman and Bianca Zlavog on July 13, 2017.

Although this information does not capture external health resources that come from only the NGO sector, IHME's DAH data nevertheless could be used to answer a different research question. If indicators could be identified that measure employment levels of a country's public and NGO health providers, this information could be compared against the levels of external funds distributed to that same country's government, non-government, or not allocable DAH categories. IHME's DAH data covers 15 years from 2000 to 2014, and includes a breakdown of funds for all 26 countries in this project's population (see 3.6).

IHME also has data on cases, death rates, and prevalence rates of AIDS/HIV, malaria, and tuberculosis, for different countries in its Millennium Development Goals Visualization (2017e). National data exists for AIDS/HIV, malaria, and tuberculosis cases covering all 26 countries in this study's population from 1990 to 2013. IHME's Millennium Development Goals Visualization data can therefore be used as a source for measuring one of this project's control variables: cases of infectious diseases associated with poverty. The Institute does not have any other data that measures this project's control variables.

International Labour Organization

Attempts were made to find data measuring employment levels in individual countries' health sectors by searching the International Labour Organization (ILO)'s databases. The ILO collects a variety of employment and labor statistics, including cross-country data on total public employment per year (2017a). The ILO uses an

annual survey to member states to collect data on countries' total public sector employment (Hammouya, 1999: 40-50). Although the ILO's survey solicits information on public employment at central, federal, state, regional and local levels, as well as general government versus public corporation sectors, ILO data is not broken down for individual countries' health systems (*Ibid.*: 4). There are also no ILO cross-country indicators that measure NGO or other sectoral employment in national health systems. The ILO does not collect statistics on the wages of health providers.

However, it is possible to measure one of this project's control variables using ILO statistics. The ILO does have an indicator that measures different countries' labor force participation rates. Cross-country data on total labor force participation rates for all 26 countries in this project's population can be obtained from the ILO from 1990 to 2017. Similar data is also available from the ILO on these countries' annual unemployment rates. No other ILO indicators measure this project's remaining control variables of interest.

International Monetary Fund

The International Monetary Fund (IMF)'s databases do not contain indicators that measure this project's main dependent and independent variables. The IMF's Government Finance Statistics database does include details on different countries' expenses, including compensation of public employees (2017c). But like ILO data, the Fund's indicators on public employee compensation are not broken down for health workers employed by public providers in countries' national health systems.

The IMF's Government Finance Statistics database also measures cross-country expenditures on health (2017d). However, this is a very broad indicator. According to the IMF's manual on Government Finance Statistics, health expenditures include: costs to provide services at a range of facilities (e.g. clinics, pharmacies, and hospitals), costs to buy medical equipment, costs to engage in research and development, and costs to pay for administrative or other services not otherwise classified (2014: 161-164). The IMF's total measurements of health expenditures are too coarse to quantify public health providers' employment levels.

The IMF's International Financial Statistics database contains the only other indicators that measure variables of interest to this project. The IMF has indicators that measure different countries' percentage changes in real GDP, the number of persons participating in countries' labor forces, total employment, and unemployment rates (2017e). The IMF's International Financial Statistics database only has incomplete information for 11 out of 26 countries⁵ in this project's population, over four years from 2013 to 2016 (*Ibid.*). There are no indicators in other IMF databases measuring variables that are relevant to this study.

Organisation for Economic Co-Operation and Development

The Organisation for Economic Co-Operation and Development (OECD) was established in 1948, to manage Marshall Plan funds provided by the United States for

⁵ These 11 countries are: Burkina Faso, Guinea-Bissau, Madagascar, Mali, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Togo, and Uganda.

European reconstruction after World War II (OECD, 2017b). The OECD has 35 member countries, all of which are core nations with the exceptions of Chile, Mexico, and Turkey (OECD, 2017c). Because the OECD's membership does not include a majority of the world's countries, especially semi-periphery and periphery nations, the Organisation's datasets are limited.

Having said this, the OECD does measure a variety of health indicators for its member states and other countries. OECD data on health resources provide cross-country measurements of doctors, nurses, medical graduates, and nursing graduates per 100,000 people (OECD, 2017d). The OECD also has indicators of different countries' health spending levels, which include government spending on health care, as well as health expenditures financed through the private sector (OECD, 2017e). None of these OECD indicators measure outcomes for this project's 26 population countries.

Even if OECD data did include measurements for countries in this study's population, the Organisation's indicators do not capture any variables of interest. For example, OECD data on health workers such as doctors and nurses, are presented as totals and are not broken down by sector. Similarly, OECD indicators on health spending focus on how health services are paid for (i.e. through government or private funds), and do not measure the size or funding levels of specific health providers.

The OECD has additional indicators that are related to other variables of interest. For example, there is an OECD indicator measuring grants by private agencies and NGOs, but no measurements are available for countries in this project's population (OECD, 2017f). Additionally, the OECD's indicator on private and NGO grants does not break down which types of health providers receive these funds within individual countries (*Ibid.*). The OECD also has indicators that measure countries' populations and different ways to calculate GDP, but this data excludes nations in this project's population. None of the OECD's other indicators measure variables that are relevant to this study.

World Bank

The World Bank (WB) maintains an extensive database containing a variety of indicators on health and economic development. The WB's databases also report information collected by other entities, such as the ILO, WHO, and UN. Among the WB's health indicators, there are many measurements from the WHO's system of NHA data that has been critiqued by IHME staff (Bui *et al.*, 2015). None of the WB indicators measure this project's main variables of interest.

A number of WB indicators can be used to measure this study's control variables. The WB maintains cross-country data on population levels, GDP, labor force participation, HIV prevalence, incidences of malaria, and incidences of tuberculosis. The WB's indicators on population (2017b) are obtained by the UN Population Division, and cover every country in this study's population with partial data from 1960 to 2016. The

WB's GDP indicator (2017c) is calculated in terms of current International Dollars, using Purchasing Power Parity rates. There is WB data on GDP for all the countries in this project's population from 1990 to 2016. The WB calculates labor force participation (2017d) using ILO data, with measurements for all 26 population countries from 1990 to 2016.

The WB's indicators on infectious diseases are based on WHO data. WB indicators that measure incidences of malaria (2017e) and tuberculosis (2017f) cover all of this project's population countries, and contain data ranging from 2000 to 2015. The WB indicator measuring HIV prevalence (2017g) excludes four countries in this project's population,⁶ but does provide data for 22 other countries of interest from 1990 to 2015. There are no other WB indicators that measure variables of interest to this project (2017h).

World Health Organization

Limitations in the World Health Organization (WHO)'s system of NHA data have already been discussed. WHO data on countries' NHAs are part of the Organization's Global Health Expenditure Database (GHED). In part due to the limitations of NHA data, the WHO created a new System of Health Accounts (SHA) in 2011 (WHO, 2011). SHA data contains the WHO indicators which provide the closest approximations of this project's dependent and independent variables. However, the WHO's SHA data is ultimately unable to measure this study's key variables.

⁶ These four countries are: Comoros, the Republic of Congo, Ethiopia and Guinea-Bissau.

Looking at the WHO's manual on its SHA 2011 system of health accounts (*Ibid.*), more details are provided on the former NHA categories for health providers. The WHO's SHA data differentiates information on health providers into detailed categories, such as types of hospitals (e.g. general versus mental health hospitals), providers of ambulatory care (e.g. general practices, dental practices, family planning centers, etc.), and other variations (*Ibid.*: 130). However, the main problem with NHA data is also present in the WHO's newer SHA system, namely that health providers are not broken down by sector.

The WHO's SHA data does have a new component that comes closer to analyzing health providers on a sectoral basis. The SHA system includes information on so-called "factors of provision," which measure the value of inputs used in the process of providing health care services (*Ibid.*: 212). Examples of factors of provision in the WHO's SHA data include categories such as compensation for employees, self-employed professionals' remuneration costs, materials and services used, and fixed capital costs, among other expenses (*Ibid.*: 214).

The SHA factors of provision do not measure the labor costs of health providers on a sectoral basis. But the SHA factors of provision can be "cross-classified" with other indicators, to reveal more information on how health resources are spent in national health systems (*Ibid.*: 213). In other words, tables can be created using SHA data that measure spending on factors of provision, like employee compensation, which can be

combined with data from other SHA indicators, such as health providers, financing agents, or financing sources.

From a practical perspective however, cross-classified tables that measure compensation for employees, compared with other SHA indicators, are not always easy to understand in existing WHO data. For example, a cross-classified table of factors of provision against health providers, does not seemingly break down compensation costs for health providers on a sectoral basis. Likewise, cross-classified tables measuring government expenditures on wages, does not guarantee that this spending is correlated with compensation paid specifically to public sector health workers. The apparent lack of sectoral breakdowns in SHA data means that this new WHO dataset cannot directly measure the size or compensation costs of different countries' public and NGO health providers.

Having said this, the WHO's available SHA data (2017e) appears to be reported from dashboards.⁷ The ability to create data using a dashboard suggests that it might be possible to cross-classify multiple indicators against each other, such as health providers (who is providing services / how care is delivered), by financing source (where health resources come from), financing agent (who manages spending), and factors of provision (costs of providing care). This kind of hypothetical table, which attempts to cross-classify multiple SHA indicators and factors of provision, could potentially measure total compensation costs of different health providers by sector.

⁷ For example, see the SHA country reports for Benin in 2012, Botswana in 2014, or Tanzania in 2012.

Similarly, a cross-classified SHA table might be able to show the extent to which external health financing resources are allocated to compensation costs in the public, versus NGO sectors. It is important to note that the above hypothetical cross-classified SHA tables would not measure how many health workers are employed by different providers. Rather, fully cross-classified SHA tables might be able to measure different health providers' annual compensation costs broken down by sector, along with a sectoral breakdown of external health financing expenditures.

Even though SHA data does not measure changes in the number of health workers employed by public and NGO providers, different WHO indicators can quantify other control variables of interest to this project. The WHO Global Health Observatory (GHO) database contains multiple indicators that measure health outcomes related to AIDS, HIV, malaria, and tuberculosis.

The WHO's GHO database has two indicators that measure cross-country cases of malaria. One indicator measures malaria incidence per 1,000 people who are at risk in a country's population (WHO, 2017f), and contains complete data for all 26 countries in this project's population over the following five years: 2000, 2005, 2010, and 2015. Another GHO indicator measures the estimated cases of malaria per year (WHO, 2017g) in different countries, including this study's population of 26 developing nations. Estimated malaria case data is available for the following five years: 2000, 2005, 2010, and 2013.

The GHO also has data that measures combined AIDS and HIV health outcomes. One of these GHO indicators is deaths due to AIDS/HIV (2017h). This indicator has five data points (2000, 2005, 2010, and 2015) for every country in this project's population except Comoros, the Republic of Congo, Ethiopia, and Guinea-Bissau (*Ibid.*). Another AIDS and HIV indicator in the GHO measures the prevalence of HIV (expressed as a percentage), in individual countries for adults aged 15-49 (WHO, 2017i). The WHO's data on HIV prevalence is available for every country of interest to this project, except Comoros, the Republic of Congo, Ethiopia, and Guinea-Bissau (*Ibid.*). Cross-country data on HIV prevalence is available for the following five years: 2000, 2005, 2010, and 2015 (*Ibid.*).

Finally, the WHO also has a variety of indicators that measure health outcomes related to tuberculosis. Indicators in the GHO database measure both incidences of tuberculosis, as well as deaths due to this disease. The GHO indicator on tuberculosis deaths measures mortality rates among people who are HIV-negative (WHO, 2017j), and is complete for all 26 of this project's population countries from 2000 to 2015. The GHO indicators also split up incidences of tuberculosis by total cases, versus those for people who are HIV positive. The GHO's indicator for total incidences of tuberculosis per 100,000 people (WHO, 2017k) is complete for this project's population of countries from 2000 to 2015. Likewise, incidences of tuberculosis for people who are HIV positive per 100,000 people (WHO, 2017l), is also complete for this project's 26 population countries from 2000 to 2015. No other WHO indicators measure any remaining variables of interest to this study.

United Nations

The United Nations (UN) maintains 35 different databases with over 60 million records (UN, 2017c). Much of the UN's data is compiled from other sources, including institutions previously reviewed in this section. There are no unique UN indicators that measure this project's key dependent and independent variables, which have not already been captured by other datasets.

For example, the UN reproduces the following indicators from other institutional databases: GDP and population measurements based on WB data; labor force participation rates using IMF data; unemployment rates from the ILO; and various AIDS, HIV, malaria, and tuberculosis indicators from the WHO (*Ibid.*). There are no other UN indicators that measure this project's variables of interest to more precise degrees (compared with indicators from other institutions, which have already been reviewed).

Table 7 (see next three pages) summarizes the institutional databases reviewed above – excluding the UN's datasets – and also provides assessments on the ability of available indicators to measure this project's key variables.

Table 7. Summary of Institutions' Secondary Datasets (1 of 3)

Institution	Dataset	Name of Indicator	Variable That Indicator Attempts to Measure	Assessment of Indicator's Measurement of Variable	Number of Population Countries Included in Data	Years of Available Data
CCSS	Comparative Nonprofit Sector Project statistics and country reports	No common indicator, different measurements of Nonprofit Institutions' workforces	NGO Provider Employment	Poor proxy, does not measure	4 in individual reports (Ghana, Mozambique, Tanzania, Uganda)	3 years (1999, 2004, 2013)
IHME	NHA (from WHO)	Health Provider	Public Provider Employment	Poor proxy, does not measure	17	11 years (1995-2010)
		Financing Source	External Health Resources from International NGOs	Poor proxy, does not measure	17	11 years (1995-2010)
	DAH	Development Assistance for Health – Non-Government	External Health Resources from International NGOs	Poor proxy, but partially measures variable mixed with foreign government aid	26	15 years (2000-2014)
ILO	Employment	Total Annual Public Sector Employment	Public Provider Employment	Poor proxy, does not measure	26	12 years (2004-2015)
	Key Indicators of the Labour Market	Labour Force Participation Rate	Labor Force Participation Rate	Good proxy, does measure	26	28 years (1990-2017)
IMF	Government Finance Statistics	Total Annual Government Compensation of Employees	Public Provider Employment	Poor proxy, does not measure	4 (Republic of Congo, Rwanda, Tanzania, Uganda)	12 years but incomplete (2003-2015)
		Total Annual Government Expenditures on Health	Public Provider Employment	Poor proxy, does not measure	1 (Uganda)	1 year (2015)
	International Financial Statistics	GDP	GDP	Good proxy, does measure	11	4 years (2013-2016)

Table 7. Summary of Institutions' Secondary Datasets (2 of 3)

Institution	Dataset	Name of Indicator(s)	Variable That Indicator Attempts to Measure	Assessment of Indicator's Measurement of Variable	Number of Population Countries Included in Data	Years of Available Data
OECD	OECD Data	Number of doctors; nurses; medical graduates; nursing graduates	Public / NGO Provider Employment	Poor proxies. do not measure	0	0 years
		Grants by private agencies and NGOs	External Health Resources from International NGOs	Poor proxy, does not measure	0	0 years
WB	World Bank Open Data	Population (from the UN)	Population	Good proxy, does measure	26	57 years but incomplete (1960-2016)
		GDP	GDP	Good proxy, does measure	26	27 years (1990-2016)
		Labor Force Participation Rate (from ILO)	Labor Force Participation Rate	Good proxy, does measure	26	27 years (1990-2016)
		HIV prevalence (from WHO)	AIDS/HIV	Partial proxy, does measure HIV	22	26 years (1990-2016)
		Incidences of malaria (from WHO)	Malaria cases	Good proxy, does measure	26	16 years (2000-2015)
		Incidences of tuberculosis (from WHO)	Tuberculosis cases	Good proxy, does measure	26	16 years (2000-2015)

Table 7. Summary of Institutions' Secondary Datasets (3 of 3)

Institution	Dataset	Name of Indicator(s)	Variable That Indicator Attempts to Measure	Assessment of Indicator's Measurement of Variable	Number of Population Countries Included in Data	Years of Available Data
WHO	GHED	NHA – Health Provider	Public Provider Employment	Poor proxy, does not measure	17	11 years (1995-2010)
		NHA – Financing Source	External Health Resources from International NGOs	Poor proxy, does not measure	17	11 years (1995-2010)
		SHA – Fully Cross-Classified Tables (i.e. FoP / FA / FS / HF / HP)	Public / NGO Provider Employment	Poor proxies, do not measure. Unclear if could measure total wages paid by sectoral providers	Varies / unclear (WHO, 2017m)	Varies / unclear (WHO, 2017m)
	GHO	HIV prevalence	AIDS/HIV	Partial proxy, does measure HIV	22	5 years (2000, 2005, 2010, 2015)
		Deaths due to HIV/AIDS	AIDS/HIV	Good proxy, does measure	22	5 years (2000, 2005, 2010, 2015)
		Incidences of malaria	Malaria cases	Good proxy, does measure	26	5 years (2000, 2005, 2010, 2015)
		Estimated malaria cases	Malaria cases	Good proxy, does measure	26	5 years (2000, 2005, 2010, 2015)
		Deaths due to tuberculosis (HIV negative)	Tuberculosis cases	Good proxy, does measure	26	16 years (2000-2015)
		Incidences of tuberculosis	Tuberculosis cases	Good proxy, does measure	26	16 years (2000-2015)
		Incidences of tuberculosis (HIV positive)	Tuberculosis cases	Good proxy, does measure	26	16 years (2000-2015)

Table 7 highlights the inability of multilateral institutions' secondary databases to measure the main variables of interest to this project. While all of this study's control variables can be measured by different indicators in Table 7, there are no indicators that measure this project's main dependent or independent variables (public and NGO provider employment), or other relevant variables (external financing resources provided by international NGOs, private and religious provider employment, neoliberalization policies, and sectoral median wages).

Except for neoliberalization policies, which are accounted for by limiting this study's population to HIPC nations, or could also be measured via indicator variables that note whether individual countries were subject to SAPs (see Table 4), new sources of data must be found to measure this project's key variables. While limitations in the secondary datasets of multilateral institutions prevent this study from performing actual data analysis, the next section will look at the likelihood of whether internal brain drains are occurring in individual countries, alongside a discussion of this project's assumed causal theories.

4.3 Internal Brain Drains & Causal Conclusions

This thesis uses relatively high evidentiary standards in attempting both to measure internal brain drains, as well as establish causal relationships between different sectoral health providers. Although this project cannot measure internal brain drains on a cross-country basis using existing secondary datasets, this does not mean that these processes are not occurring in individual countries. The measurements of

Sherr *et al.* succeed in establishing net internal brain drains between public and NGO health providers in Mozambique, even if the authors cannot definitively attribute these flows to the employment practices of Mozambican NGOs.

It is prudent to be concerned about problems of internal brain drains based on global health financing trends and the dominance of neoliberalism in mainstream approaches to economic development. In 1990, the total estimate of all global health financing was \$7.1 Billion, of which only \$540 million or 7.6 percent was spent by international NGOs and foundations (IHME, 2017b). Health initiatives like GAVI and the Global Fund to Fight AIDS, Tuberculosis, and Malaria (or the Global Fund for short), did not even exist in 1990, nor did the Bill and Melinda Gates Foundation.

By 2016 however, total global health financing rose to \$37.6 Billion, of which \$11.3 Billion or more than 30 percent was spent by NGOs and foundations – excluding the Bill and Melinda Gates Foundation, GAVI, and the Global Fund (*Ibid.*). Factoring in the expenditures of these three other entities, increases total NGO and foundation spending to \$18.7 Billion in 2016, which comprised 49.7 percent of worldwide global health spending (*Ibid.*).

Looking at where these funds were spent, Sub-Saharan African countries received \$14 Billion or 38.8 percent of total global health spending in 2014, which is the most recent year of available geographic data (*Ibid.*). Health spending by NGOs and foundations in Sub-Saharan Africa totaled \$3.4 Billion in 2014, which equaled 24.3

percent of total global health spending in Sub-Saharan Africa (*Ibid.*). Adding the spending of the Bill and Melinda Gates Foundation, GAVI, and the Global Fund to the expenditures of other NGOs and foundations in Sub-Saharan Africa totaled \$6.6 Billion in 2014, which equaled 47.1 percent of all health spending in Sub-Saharan Africa, and 18.3 percent of total worldwide health spending (*Ibid.*).

Given the dramatic rise of international NGOs in the arena of global health financing, as well as the dominance of neoliberal development models over the last 25 years, it is simply not reasonable to think that massive increases in external health resources have not impacted public health providers in the Global South – at least to certain degrees. Rather, it is far more likely that public health providers in cash-strapped, poorer, periphery countries have had a harder time recruiting and retaining health workers, compared with better-financed international and domestic NGOs.

Even though this thesis is not able to prove that internal brain drains are occurring in this project's 26 population countries, or that NGOs are responsible for recruiting health workers away from public sector care providers, it is the belief of this author that both of these phenomena are real. The next section of this project will consider different ways of researching internal brain drain processes in the future.

4.4 Directions for Further Research

The following sub-sections outline various directions that future research could take in investigating internal brain drain processes.

Compiling a New Cross-Country Database of Skilled Health Workers

Sherr *et al.*'s study of internal brain drains among physicians in Mozambique relies on a national dataset containing information about individual doctors. Health ministries in sub-Saharan countries like Mozambique, maintain national files of physicians that are similar to the United States American Medical Association's Physician Masterfile (American Medical Association, 2017). These records strive to compile information on nearly the entire population of doctors who are currently practicing medicine in a given country.

In Sherr *et al.*'s dataset of over 700 Mozambican doctors, different sectoral employers were identified for every individual physician registered in the Mozambique Ministry of Health's files. If access to equivalent datasets could be obtained from other countries' ministries of health, it could be possible to construct a cross-country dataset of individual countries' doctors. A multi-country dataset measuring the number of physicians working for different health providers by sector, could produce indicators to serve as this project's dependent and independent variables.

For example, Uganda's Ministry of Health maintains a national file of physicians.⁸ Uganda's records could be classified to determine what types of sectoral health providers employ individual doctors, which could be repeated and compared for other records at different points in time. Depending on the state of available data, it could require a significant amount of effort to: 1) obtain national doctor files from ministries of health; 2) clean data and classify which sectors individual doctors are working in; 3) repeat this over multiple years of physician files, and 4) repeat this process for several different countries of interest. If health ministries also maintain national files of individual registered nurses, the same processes could be used to obtain annual data on the sectoral employment of nursing staff.

The level of resources and time required to create a cross-country database of specific types of health workers, such as doctors or nurses, could easily be cost prohibitive. An alternative to creating a new multi-country database, is to produce more case studies of brain drain processes in individual countries.

Producing New Case Studies for Individual Countries

If collecting national doctor or nursing files is too ambitious, data from individual nations such as Uganda could be analyzed in single country case studies of internal brain drain processes. This is the same approach Sherr *et al.* used in these authors' investigation of internal brain drains in Mozambique. Analyzing national doctor records such as Uganda's physician files, could be valuable as a point of comparison to Sherr *et*

⁸ Uganda's 2013 register of physicians was obtained courtesy of Amy Hagopian on July 22, 2017.

al.'s findings in Mozambique. If similar results to Sherr *et al.*'s findings could be obtained in Uganda for a different point in time or perhaps across a longer range of years, then this would add more weight to claims that internal brain drains could be occurring between different sectoral health providers in other periphery countries.

Measuring internal brain drain processes via single country case studies would depend on the availability of health worker data. For Uganda, only one year of data from 2013 is available in the Ministry of Health's physician records. Additional years of doctor files would need to be obtained from Uganda's Ministry of Health, in order to create a more robust case study. Assuming such data is available, and that these records represent a large percentage of the entire population of doctors practicing medicine in Uganda, a similar method to Sherr *et al.* can be used to calculate net flows of physicians between sectoral health providers.

A major advantage in creating a single country case study of internal brain drains is that this approach would be relatively easier than creating a multi-country database of health workers. If similar results to Sherr *et al.*'s case of Mozambique could be observed for a county like Uganda, these findings would lend credence to both studies and could also add more impetus to create a larger, multi-country health worker database.

Simultaneously Building Theory & Collecting Data for a Larger Study

The two research strategies reviewed above (i.e. developing more single country case studies and creating a larger cross-country dataset) have the potential to be

mutually-reinforcing, and could also be pursued at the same time. Sherr *et al.*'s work is valuable because the authors' findings actually measure internal brain drains, and this study also helps observers develop theories about why these processes may be occurring.

The creation of more case studies on internal brain drains in other countries, present opportunities of further exploring the causal mechanisms underlying these processes. And new case studies from other individual countries need not be limited to only quantitative methods. A wide variety of qualitative methods could be deployed to develop causal theories of internal brain drains, in addition to searching for more evidence of these processes. Unfortunately a deeper, or even cursory review of different qualitative methods that could measure internal brain drains is outside the scope of this thesis. However, adopting qualitative approaches to measure internal brain drains could easily be the most realistic, cost effective, and accurate means of conducting future research on this topic.

Likewise, collecting cross-country data in a larger study could also allow researchers to gather case-by-case information on the sectoral employment of health workers in individual countries on an interim basis. It could take a long time to collaborate with different health ministries and other stakeholders to create a larger, cross-country dataset. In the course of compiling employment data on health workers, it would presumably be possible to measure internal brain drain processes for a selection of nations, before cross-country data is collected for all population countries. Interim

measurements of internal brain drains could be published for countries either as stand-alone case studies, or in a more pared-down, cross-country comparison of a handful of nations.

Because it would be necessary to reach out to different health ministries in order to collect new cross-country data, it could also be possible to interview government officials about their experiences and knowledge of internal brain drains. Interviewing health officials could provide rich qualitative data on internal brain drain processes. Representatives from individual countries' health ministries might also be able to connect researchers with other interview subjects, such as frontline health workers employed by public and NGO providers.

If the above parallel strategies can generate measurements of this study's dependent and independent variables, either for single country case studies or cross-country comparisons of multiple nations, then there is another avenue of research on health worker brain drains that could also be pursued. NGO and foreign government aid for health systems both provide significant streams of funding for global health. Given the availability of IHME's Development Aid for Health (DAH) data, it makes sense to include this information in future analyses. The next sub-section will consider how IHME's external financing data can be analyzed alongside variables that measure sectoral employment levels in national health systems.

Measuring How External Health Resources from International NGOs and Foreign Government Aid Affect Employment Levels of Health Providers By Sector

IHME's DAH data mixes external health financing resources of both NGOs and foreign governments. This data cannot measure financing resources provided solely by international NGOs to different sectoral health providers. Nevertheless, the question of how much external NGO and government aid gets distributed to different care providers within a country's national health system is very important. Knowing more about where DAH funding is distributed and who receives these funds, could be very useful information for health policy-makers.

A study that looks at the distribution of DAH funds would be relatively straightforward to conduct, assuming data on sectoral health providers is available. If a cross-country database of health workers or an individual health ministry's file of skilled professionals exists, then changing sectoral employment measurements could be compared against varying levels of DAH funds. In this way, IHME's DAH indicator can stand in the place of this study's variable that seeks to measure external health funding from international NGOs. A fixed effects regression model could measure how DAH funding may affect individual countries' public sector employment levels (or the sectoral employment of other health providers).

Learning how DAH funding for non-government entities may be affecting the public sector, would help government representatives to determine future distributions of resources within their health systems. Such information could also empower the

negotiating positions of receiving-countries in discussions of how to allocate resources from external aid donors, such as international NGOs or foreign governments.

Additional Considerations

The controls of health workers' median wages, broken down by sectoral health providers (see 3.3), have not been discussed in terms finding indicators that measure these variables. This is because it is difficult to conceive of ways to measure these control variables, which are not cost prohibitive. A survey of different health workers could be conducted to approximate wage information, but this could easily become very expensive. Without an affordable means of measuring these variables, researchers could consider abandoning these median wage controls in future studies.

Last but not least, a key aspect of internal brain drain problems is the degree to which public sector providers may deliver superior health care services compared to NGO and private sectors, or otherwise make disproportionate impacts within national health systems. Less time was available to find resources on the possible differences between the care services of public, private, and NGO health providers. Having said this, it was surprising to not identify more research on this topic. Notwithstanding the possibility that a larger body of such research already exists, investigating care differentials between public and NGO providers could bolster future arguments on the importance of measuring internal brain drains. The next section will discuss the implications of measuring internal brain drains, as well as the risks associated with these processes for a range of stakeholders.

4.5 Implications of Internal Brain Drains

This study provides a thorough consideration of how internal brain drain processes can be measured from quantitative perspectives. Data cannot be easily obtained in order to deploy this project's proposed statistical model, but alternative methods of investigating internal brain drains have been outlined for future researchers.

The deficiencies in the various secondary databases analyzed by this study provide important feedback for stakeholders. This thesis has shown that cross-country data on the distribution of health providers largely does not exist for individual countries in the Global South. How to respond to a lack of distributional knowledge on national health workforces, as well as the real risks of internal brain drain processes both have important consequences and tradeoffs. The implications of measuring internal brain drains will be considered in turn for NGOs, foundations and international agencies, and national governments.

Non-Governmental Organizations

In the non-governmental sector of individual countries, domestic and international NGO health providers presumably establish operations in order to fill gaps in health care coverage. Domestic and international NGO health providers have an interest in advancing various health outcomes for their patients.

If strengthening a country's national health system – including public sector care providers – is a shared goal for some NGOs, then measuring internal brain drain processes is critical to evaluating how NGO personnel policies may be affecting

employment levels in the public sector. Unless NGOs invest in measuring internal brain drain processes, it will be harder to determine whether their personnel policies (or other factors) might be affecting public sector employment.

If NGOs that are committed to strengthening public sector employment wanted to take preventative actions to prevent internal brain drains, such as by changing their personnel policies, it is possible that certain moral dilemmas could arise. For example, if such NGOs believed that health workers should be paid more than the wages currently offered in a hypothetical country's public sector, these organizations might have to compromise their values by paying workers less money if they do not want to recruit skilled health workers away from public providers.

Similarly, if lowering wages in the NGO sector is the most realistic way of stopping internal brain drain processes in a certain country, the payment of what some workers would surely consider a less-than-fair wage, might come at too great of an economic or moral cost. Alternately, if NGOs tried to prevent brain drains while also avoiding wage cuts (such as by employing workers at providers' less-than-full hiring capacities), this could lead to artificially lower workforce densities, as well as reduced overall care coverage within a national health system.

For NGO providers that focus on delivering specialty care, such as treating specific diseases like AIDS/HIV or malaria, internal brain drain processes could lead to tradeoffs for different health outcomes. Specialty NGO providers could make progress

in treating specific diseases by expanding their operations and hiring more health workers. However, assuming that the expansion of NGO service enclaves came at the expense of public providers losing employees, then growth in the NGO sector could affect a country's total level of primary care coverage.

For example, if public sector health workers provide the majority of primary care within a national health system, then the loss of these employees to specialty NGOs could weaken a country's overall delivery of primary care services. This scenario could be reflected in changing national health outcomes, where specialty NGOs might make gains in treating certain diseases, at the same time that more basic health indicators could decline. The converse could also occur, where NGOs that take action to prevent internal brain drains, could make less progress in treating specific diseases, while public providers might improve or maintain outcomes for more basic health indicators.

Finally, NGOs that desire to prevent internal brain drains might choose to close or shift their operations outside of a given country. By closing or shifting operations to another country, NGO providers could reduce their impacts in recruiting health workers away from public sector providers. If specialty NGO providers left a certain country, this could create more urgency for national governments and public sector providers to devote new resources to treating specific health outcomes, or investing in secondary and tertiary care services. However, a diminished NGO sectoral footprint could also reduce overall care coverage within a national health system, as well as lead to negative short- and long-term health outcomes.

Foundations & International Agencies

In the context of this project, foundations are entities that primarily finance health services in different countries around the world, such as the Bill and Melinda Gates Foundation. International agencies are quasi-governmental entities like the ILO, IMF, WB, and WHO. Foundations and international agencies have similar although not entirely identical interests. It is assumed that foundations and international agencies both seek to improve global health outcomes, as well as strengthen national health systems. Foundations and international agencies try to accomplish their goals of improving health outcomes and strengthening health systems, in part by providing external financing resources for health and managing the collection of health statistics.

Measuring internal brain drains is important for foundations and international agencies because these processes have the potential to affect people's health outcomes, as well as weaken individual countries' national health systems. Without better information on how health care services are distributed within individual countries, foundations and international agencies cannot optimize their allocations of external health resources, nor fully evaluate the overall conditions of different national health systems. The absence of data on health providers in individual countries means that foundations and international agencies are both flying blind in analyzing, evaluating, and otherwise assisting different sectors of national health systems.

If international agencies like the WHO had a clearer picture of sectoral employment dynamics among health workers in developing countries, these organizations could use this information themselves, as well as share such data with the public, in order to inform a variety of health intervention strategies. Foundations rely on information collected by international agencies and could incorporate sectoral workforce data into their processes for awarding health funding.

More data on health providers could empower foundations and international agencies to address or even reverse internal brain drain processes. If a domestic or international NGO hypothetically recruits workers away from a given country's public sector, but also relies on external financing from a foundation or international agency that seeks to strengthen health systems, then these latter entities could place restrictions on the resources that they grant to NGOs.

Foundations and international agencies could attach various different restrictions on their funding of NGOs, including policies such as not duplicating or supplanting services offered by public health providers, or placing moratoriums on the hiring of health workers. Better yet, foundations and international agencies could respond to documented instances of internal brain drains by redirecting resources away from NGOs, and towards individual countries' public health providers.

But if foundations or international agencies do not have critical information on internal brain drains within individual countries, these entities could unwittingly fund

NGOs that recruit health workers away from public sector providers. This converse example would make the health investments of foundations and international agencies counter-productive, even if these entities specifically do not want to contribute to internal brain drain processes.

The main tradeoff for foundations and international agencies in responding to internal brain drain processes, is that devoting resources to measuring the sectoral employment of health providers could come at the expense of other priorities.

As previously mentioned (see 4.4), there could be substantial costs in collecting new data on the sectoral employment of health workers. Collecting this data could also require large front-end investments of time and resources. Even the best-financed foundations and international agencies do not have endless resources. If foundations and international agencies decide to gather more data on individual countries' health providers, such decisions could come at the expense of not funding other worthwhile initiatives. This could have tangible effects on health outcomes, such as by redirecting funding for a vaccine program to collecting new data on the sectoral employment of health providers. In such a hypothetical example, it is possible that less people around the world could be vaccinated against certain diseases, which could increase global disease incidence rates and / or mortality figures.

Having said this, foundations and international agencies arguably should take the initiative in improving existing statistical data collection systems. This is because

foundations and international agencies have relatively more resources than either public sector health providers, or NGOs operating in developing countries.

For example, the ILO is a well-funded organization with an annual operating budget of nearly \$800 million (ILO, 2017b). The ILO could dedicate some of its resources towards developing finer breakdowns of public sector employment, by measuring the number of government workers employed in different industries, such as health care. Additionally, organizations like the WHO could consider ways that existing systems like the SHA dashboards, could be used or repurposed to measure distributional attributes of national health systems. Finally, foundations could also help fund the creation of new statistical databases, by financing joint projects with partners such as international agencies, research universities, or organizations like IHME.

Given the increased roles of foundations and international agencies in financing global health, both of these entities have a responsibility to ensure that their external funding decisions do not create unintended consequences of undermining national health systems.

National Governments

The national governments of semi-periphery and periphery countries where internal brain drains are theorized to take place, have a variety of interests. National governments are supposed to ensure that health outcomes for their country's population are promoted at all levels. Likewise, national governments must respond to

emergencies, such as outbreaks of specific infectious diseases. Government decision-makers also have an interest in maintaining standards of health care within a national health system, as well as regulating the workplaces of care providers. Finally, governments want robust national health systems that are able to deliver universal coverage to citizens, which provides a foundation for economic growth and the promotion of other social welfare goals.

In countries where governments fund public sector health providers, measurements of internal brain drains are very important. Like NGOs that seek to strengthen health systems, governments could have a harder time in stopping the attrition of health workers if they cannot measure internal brain drain processes. Measuring internal brain drains or the sectoral employment levels of health workers, could also provide national governments with valuable, on-going information on the status of public health providers in individual countries.

The above perspective assumes that national governments and public sector care providers do not already know distributional challenges associated with their own health systems; public health leaders are undoubtedly aware of these problems. By the same token, the implementation of new measurement systems to quantify internal brain drains may not be anywhere near the top priority of health ministries in poorer developing countries. Despite these considerations, collecting distributional information on health workers would arm governments with data to stimulate legislative action, spur

the enforcement of existing regulations, or strengthen national negotiating positions with external funders.

There are also serious implications for governments related to the effects of internal brain drains in individual countries. If a country's public health providers cannot retain their employees and NGOs recruit skilled workers away from the public sector, this could result in less health care coverage and a weaker overall national health system. Such a scenario would presumably also result in deteriorating health outcomes for a country's population.

Governments could react to these internal brain drain risks by directing public sector providers to specialize in certain health care delivery functions, such as primary care services. However, such a response could reduce the urgency of governments to strengthen existing public health systems, as well as limit the delivery of universal health services to citizens via public care providers.

There could also be downsides to governments directing public providers to broaden the scope of their coverage or care services. If public care providers duplicated the roles of specialty NGO health enclaves, this could spread public sector resources too thin and act to instigate internal brain drains. These processes could be accelerated if public providers hypothetically tried to perform too many health functions outside of their overall service capacities. This scenario could increase wage asymmetries between public providers and the NGO sector, especially if NGO enclaves had relatively

more funding for the treatment of specific diseases, or the provision of specialty care services.

A compromise might make sense for governments, where national representatives could direct public sector providers to specialize in delivering certain care services, in order to maximize health outcomes. If specialty NGOs that treat specific diseases offer to bring large amounts of external funding into a country's health system, a government could redirect scarce public sector resources to address other health priorities. In this way, it could be possible for NGOs and public providers to make greater overall progress in strengthening a country's national health system, if each sector specialized in delivering different care services. This type of joint approach would require a significant amount of coordination between key stakeholders.

The most obvious option available to governments in responding to risks of internal brain drains (and the best course of action in this author's opinion), is to increase funding for public health providers. Wage asymmetries between public and NGO providers could help pressure governments to allocate more resources to their country's national health system (especially if the public sector was already underfunded to begin with).

However, the scarcity of public resources could create a tradeoff, where increases in spending for public health providers might come at the expense of reduced government funding for other priorities. The effect of this kind of funding tradeoff could

be even more pronounced in poorer, periphery countries where national budgets are constrained.

Governments could also theoretically respond to internal brain drain problems by shutting down public health providers altogether. A country's government could decide to abandon delivering health services through the public sector, and instead redirect national resources towards insurance funding and health care financing. For example, a government could decide to adopt either a Social Insurance or Single Payer health system model (see 1.5). Although these models would delegate the delivery of health care services outside the public sector, the financial costs of these systems are not likely to be viable options for poorer countries in the Global South.

In the end, it is up to leaders of the public sector and citizens who support an expanded role of government, to coordinate and fight for public interests. This struggle is unfolding in tandem with opposing efforts to entrench policies of austerity and logics of neoliberalization, both of which seek to undermine welfare systems throughout core, semi-periphery, and periphery countries alike. In this way, brain drain problems are fueled in no small part by the global dominance of neoliberal discourses.

While not exhaustive, the above analysis offers a glimpse of the different implications faced by stakeholders in confronting the problem of internal brain drains. The next and final section will consider the contributions of this thesis, as well as offer some concluding commentary.

4.6 Contributions of Thesis & Concluding Commentary

This thesis has made three main contributions. Its' first contribution is methodological. This project has proposed a more robust statistical model for measuring internal brain drain processes. It is the hope of this author that subsequent researchers can draw upon this study's proposed fixed effects model to measure internal brain drain phenomena in the future, as better data becomes available.

Another methodological contribution of this thesis has been its' review of deficiencies in existing cross-country datasets. Specifically, this project has highlighted gaps in different institutions' collection of data on the sectoral employment of health workers. Finally, this thesis also suggests alternative quantitative methods that could be used to measure internal brain drain processes, which could help guide further research on this topic.

To take one example, further research on internal brain drains could conduct more individual country case studies. There is real value in conducting country-level case studies along the lines of Sherr *et al.*'s work on Mozambique. These individual country case studies help build theories of internal brain drains, and can actually measure raw flows of health workers between different sectoral care providers. And prospects already exist for obtaining longitudinal data from national health ministries on the employment of certain health workers, such as physicians in Uganda.

The second contribution of this thesis is its' framing and advancement of certain public health concepts. Although this author is less familiar with the disciplines and sub-fields of public and global health, it was nevertheless surprising to not find more resources on the classifications of different countries' national health systems, or the distribution of health workers within individual nations. This study adds another voice to any preexisting concerns expressed by other scholars, regarding the lack of basic health system profiles of individual countries, as well as the internal distributions of health workers within these nations.

This project has compiled basic, rudimentary information that indicates whether public sector care providers are present within the study's 26 population countries (see Table 5). Likewise, this thesis also conceptualizes a variety of ways that health workers can be distributed within national health systems beyond breakdowns by sector (see Table 6). The establishment of statistical measurement systems that track more details of how health workers are distributed within individual countries, could be very valuable to governments and other stakeholders.

The third contribution of this thesis lies in its' relevance to different public policies. This project has considered the implications of internal brain drain problems for NGOs, foundations and international agencies, and national governments. Many important policy questions are raised by this project's investigation of internal brain drain processes.

When NGO health providers look at their own operations in developing countries, this thesis can be used to evaluate whether these organizations may be recruiting health workers away from a country's public sector. This project is also valuable to foundations and international agencies, if these entities are concerned that their global health investments might have unintended effects on developing countries' national health systems. Finally, this project is relevant to governments and public health providers in the Global South, and hopefully provides useful perspectives as individual countries consider how to address problems of internal brain drains.

As someone who has observed the value of public health providers firsthand, as well as the precariousness of public sector health financing in the United States, it is very concerning to me that the employment practices of NGOs could be undermining public health systems in other countries. Beyond these personal concerns however, the question of whether NGOs may be responsible for internal brain drain processes is not just an academic puzzle. Unless the employment practices of international and domestic NGOs do not undermine the ability of public sector providers to recruit and retain skilled health workers, the presence or activities of NGOs could weaken a country's overall health system. This could also lead to a deterioration in health outcomes for a country's citizens.

Legacies of imperialism between countries in the Global South and former colonizing nations in the Global North should make it incumbent on international NGOs to not foster dependencies in their day-to-day activities or organizational operations.

Addressing problems of internal brain drains must include the dismantling of neocolonial relationships, as well as respecting the self-determination of developing countries to build robust public health systems. Non-Governmental Organizations, foundations, and international agencies in the Global North, all bear the burden of proof to show that health services delivered by providers outside of public sectors in developing countries, do no harm to national health systems.

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