

**Incentive package for doctors in
Ghana**

**A Thesis Submitted for the
Degree of Doctor of
Philosophy**

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ABSTRACT

Background

Ghana continues to face persistent maldistribution of doctors between rural and urban areas. This thesis evaluates the Early Study Leave with Pay policy, introduced in August 2016 to incentivise rural service through earlier access to study leave with continued salary, and examines the broader drivers and barriers influencing doctors' decisions to work in rural and urban settings.

Methods

A mixed-methods design combined a systematic review, Interrupted Time Series analysis, and a three-round Delphi study. Caesarean section (CS) activity was used as a proxy for doctor presence. Analyses covered national, regional, district and hospital levels from 2011 to 2022, using segmented regression with Newey-West standard errors. The Delphi study involved doctors and regional health directors and assessed consensus on factors influencing rural and urban working.

Results

The systematic review identified limited Ghana-specific evidence on incentive schemes and persistent gaps in economic evaluation. Nationally, the intervention was associated with a 228.2% immediate increase in CS cases and a 217.9% reduction in the post-intervention growth rate ($p < 0.001$). Effects varied substantially across regions and districts. Delphi participants reached consensus on 40 descriptors, 37 of which were considered important. Four themes emerged: financial factors, professional development and career advancement, work-life balance, and community lifestyle factors. The Early Study Leave with Pay scheme itself was not perceived as a key facilitator.

Conclusion

The policy contributed to measurable but uneven redistribution of healthcare workers. Financial and educational incentives alone are insufficient to resolve rural-urban disparities; sustainable workforce policy should combine them with career progression, family support and hospital-level capacity strengthening. The findings support context-sensitive health workforce strategies in Ghana and comparable low- and middle-income countries.

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DECLARATION

I, Bernard Okoe Boye, declare that this thesis is my original work, except where otherwise acknowledged. I also declare that the materials contained in this thesis have not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

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DEDICATION

This thesis is dedicated to my wife and children.

THESIS'S OUTPUT AND OTHER RESEARCH ENGAGEMENT

1. Boye, B. O., Pokhrel, S., Cheung, K. L., & Anokye, N. (2025). Drivers and barriers to rural and urban healthcare placement in Ghana: a Delphi study. *Frontiers in Public Health*, 13, 1436098. <https://doi.org/10.3389/fpubh.2025.1436098>.
2. Boye, B. O. (2024). Delphi study on drivers and barriers of incentive adoption in Ghana. *CHMLS 9th Postgraduate Researcher Conference*. (Poster presentation)

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LIST OF ABBREVIATIONS

AHRQ	-	Agency for Healthcare Research and Quality
CASP	-	Critical Appraisal Skills Programme
CHW	-	Community Health Workers
CS	-	Caesarean sections
ERG	-	Existence Relatedness Growth
GHS	-	Ghana Health Service
HRH	-	Human Resources for Health
IQR	-	Interquartile Range
ITSA	-	Interrupted Time Series Analysis
LMICS	-	Low-and Middle-Income Countries
Mdn	-	Median
NOS	-	Newcastle-Ottawa Scale

NRI	-	Non-Randomized Intervention
P4P	-	Pay-for-Performance
PICO	-	Population, Intervention, Comparator, Outcome
PRISMA	-	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
QALY	-	Quality Adjusted Life Year
RCTs	-	Randomized Controlled Trials
SDGs	-	Sustainable Development Goals
SPSS	-	Statistical Package for Social Sciences
TB	-	Tuberculosis
UNICEF	-	United Nations International Children's Emergency Fund
WHO	-	World Health Organization

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

The purpose of this study is to evaluate an incentive package for doctors in Ghana. Incentives, in the context of workforce management, refer to various rewards or benefits offered to employees to motivate and encourage desired behaviours, such as increased productivity, commitment, or retention. These incentives can take many forms, including financial bonuses, non-monetary rewards like recognition or professional development opportunities, and improvements in working conditions or career advancement prospects. In healthcare, particularly in regions facing severe staff shortages like sub-Saharan Africa, incentives play a crucial role in attracting and retaining healthcare professionals, especially in rural and underserved areas. Health incentive schemes were first introduced in Ghana to encourage the posting of medical personnel outside the two major cities and to rural areas, where the need for healthcare services is greatest. This study seeks to assess the effectiveness of a health incentive package for doctors in Ghana. This chapter provides a brief overview of the study, including the background, rationale, research objectives and questions, and scope of the study. The chapter also provides an overview of Ghana's healthcare system as well as the incentive being evaluated in subsequent chapters.

1.2 Background to the Study

Health care workers (HCW) are the most important component of a health system. Equitable distribution of HCWs and their services across populations is paramount to meeting health needs (Joseph & Joseph, 2016). Human resources for health are essential to the operation of health systems and play a crucial role in accelerating progress toward universal health care (Bertone & Witter, 2015). However, it is impossible to meet health needs without adequate numbers of well-trained and properly distributed health workers. The World Health Organization (WHO) estimated that more than a quarter of the world's countries do not have enough health workers, with a projected shortfall of 17 million by 2030 (WHO, 2016). The shortage of health workers, especially in rural and remote areas, remains a serious challenge to the attainment of Universal Health Coverage (UHC) and the delivery of equitable health to all (Zurn et al., 2011). As Haakanestad et

al. (2022) reported, more than half of the global shortfall in each healthcare cadre is in sub-Saharan Africa and South Asia, where the demand for healthcare services far exceeds the available workforce. The projected shortage of health workers in Africa by 2030 is expected to be 6.1 million (WHO, 2016b). This gap has not only hampered the provision of essential healthcare services to meet health-related development goals but has also constrained accelerated progress towards universal healthcare coverage (Afriyie et al., 2019; Cerf, 2021).

This shortfall severely hampers efforts to achieve universal health coverage and meet the Sustainable Development Goals (SDGs) related to health. In these regions, the lack of adequate healthcare professionals exacerbates existing health disparities, leaving millions without access to essential services such as maternal and child healthcare, vaccination programs, and disease management. Furthermore, the shortage contributes to high rates of burnout among healthcare workers, further reducing the capacity of the health systems to respond to public health emergencies and ongoing health challenges. The situation underscores the urgent need for targeted strategies, including incentive packages, to attract, retain, and adequately train healthcare professionals in these critically underserved areas.

Motivation and job satisfaction have been identified as crucial factors for health worker retention and turnover in low and middle-income countries (Bonenberger, Aikins, Akweongo & Wyss, 2014). As a result, district-level health managers usually have some degree of discretionary authority to influence incentive packages of varying quality and quantity to health workers in a bid to impact their motivational levels (Bonenberger et al., 2014). Connell, Zurn, Stilwell, Awases, and Braichet (2007) highlight that incentive packages play a critical role in motivating health workers in developing countries. This importance stems from the widening gap between the supply of skilled health professionals and the growing demand for their services, a challenge that continues to confront governments and senior health managers. Ramadhan (2015) investigated the phenomenon of incentives in the health sector and concluded that, to retain and motivate health workers, the Ugandan government needed to develop an incentive package that addressed three key primary needs. These were: human resource development, financial incentives, and personal and professional support mechanisms, all of which are directly linked to motivation and productivity. Ramadhan (2015) indicated that while salary is vital to all cadres, it is notable that when a combination of other highly valued interventions is offered, such as career promotion and

study opportunities, salary becomes less of an issue to the Ugandan health workers. According to Snow et al. (2011), the upward review of doctors' salaries helped reduce their emigration to foreign lands. However, not much had happened by way of incentives to ensure equitable distribution of health personnel. Also crucial to the incentive regime is the adequacy of medical equipment for diagnostic and therapeutic purposes (Snow et al., 2011).

In Ghana, Okyere, Mwanri and Ward (2017) conducted a study that showed that as a result of the challenge of insufficient health workers in some regions in Ghana, the health centres in these regions have resorted to what is termed as "task-shifting" as a solution to help utilize the limited health workers available in meeting the health needs of the people in such regions. According to Okyere et al. (2017), two such regions are the Northern and Upper East regions. "Task-shifting" as used in Ghana, is defined as the rational redistribution of tasks among health workforce teams such that specific tasks are moved, where appropriate, from highly qualified health workers to health workers with shorter training and fewer qualifications (Limbani, Thorogood, Gómez-Olivé, Kabudula and Goudge, 2019). According to Okyere et al. (2017), task-shifting involves reallocating tasks typically performed by highly skilled health professionals to health workers with lower qualifications. This strategy is often employed in resource-constrained environments to maximize the use of available human resources. For instance, in Ghana, task-shifting allows medical assistants to diagnose and treat a wide range of illnesses, from terminal diseases to the common cold. The authors also note that mid-level cadres, such as non-physician clinicians and midwives, are sometimes tasked with complex responsibilities, like performing emergency obstetric caesarean operations, which would traditionally require more specialized skills. However, task-shifting is not just about moving tasks from high to low skill levels; it also frequently involves additional training to equip lower-skilled workers with the competencies needed for their new roles. For example, in some faith-based organizations, health workers have been trained to carry out diabetes screenings, a task typically handled by more specialized professionals. Despite the benefits, the findings of Okyere et al. (2017) indicate that in some rural areas, health workers are sometimes required to perform tasks that exceed their training and formal job descriptions. To achieve adequate service coverage, it is not only necessary to have a sufficient number of health workers but also to ensure their equitable distribution, accessibility, required competency, and motivation. These factors are essential for delivering quality care that meets the sociocultural expectations of the population (WHO, 2014).

Task-shifting in Ghana operates within a complex regulatory environment. The Ghana Health Service and Teaching Hospitals Act (Act 525) provides the primary legislative framework for healthcare delivery, while the National Health Policy (2020) explicitly acknowledges task-shifting as a strategy for addressing workforce shortages. The Health Professions Regulatory Bodies Act (Act 857) establishes boundaries for professional practice, though it allows for delegated responsibilities under supervision. This regulatory flexibility enables task-shifting while maintaining professional standards through oversight mechanisms.

The intersection of task-shifting with incentive schemes raises critical considerations for healthcare workforce distribution. The Early Study Leave with Pay scheme, designed as a positive incentive, may require complementary regulatory mechanisms to optimize healthcare worker distribution. Current evidence reveals significant limitations in the existing approach. The regulatory asymmetry presents a primary concern; while task-shifting policies allow for workforce flexibility, they lack corresponding disincentives for healthcare workers who concentrate in urban areas, potentially undermining redistribution efforts. Moreover, traditional task-shifting literature emphasizes complementary skill utilization between professional tiers. However, Ghana's implementation often represents necessity-driven substitution rather than optimal skill complementarity, particularly in the rural regions. The current incentive structure may inadvertently perpetuate regional disparities by not adequately addressing the underlying causes of workforce maldistribution.

In an exploratory, descriptive study conducted by Dovlo and Nyonator (1999), the authors sought to examine the causes of the migration of locally trained doctors from Ghana using graduates of the country's first medical school as a proxy. The results showed that 50% and 75% of graduates emigrate in 4.5 and 9.5 years due to the lack of incentives to retain medical doctors, respectively. Dovlo and Nyonator (1999) found that 60.9% of doctors who qualified between 1985 and 1994 had left Ghana. The need to put a lucrative incentives scheme to encourage emigrants to return, retain the current medical doctors, and motivate medical doctors to work in rural areas in Ghana emerged strongly.

Thus, it is recognized that the effective functioning of health systems is directly linked to the health workforce, improved health service coverage, and the recognition that the right to enjoy the highest attainable standard of health depends on the availability, accessibility, acceptability, and quality of

healthcare workers (WHO, 2014). The scarcity of health workers affects access to health services and poses a significant barrier to achieving universal health coverage. When such shortages are compounded by the unequal distribution of workers, the impact on healthcare provision can be particularly damaging. Countries at all levels of socioeconomic development face various challenges related to the education, placement, retention, and performance of their health workforce. Worldwide, numerous strategies have been employed to address these challenges, including policies aimed at improving remuneration and working conditions. These strategies often encompass both financial and non-financial incentives. Financial incentives may include competitive salaries, bonuses, and allowances, while non-financial incentives might involve providing opportunities for professional development, recognition programs, job security, supportive work environments, and career advancement prospects. For instance, the WHO's global strategy for human resources for health emphasizes the need for investment in decent conditions of employment to create better working environments, which in turn promotes personal development and fulfilment. However, despite these strategies, global investment in the health workforce remains lower than is often assumed, threatening the sustainability of both the workforce and health systems (Buchan et al., 2013; WHO, 2014).

The need for trained medical professionals in Africa has grown in recent years due to the high prevalence of diseases and inadequate health resources for health. Africa is home to only 3% of the world's medical professionals, with 49% of nurses and midwives and 37% of physicians working in rural regions (Appiagyei et al., 2014; WHO, 2013). Ghana is no exception. There is a significant divide between healthcare resources available in urban areas compared to rural regions. The geographical allocation of medical practitioners in Ghana exhibits a significant imbalance, since a majority of physicians are concentrated in two prominent urban centres, namely Accra and Kumasi (Snow et al., 2011). The inequitable distribution of health personnel in Ghana, with the majority in the cities, is a significant challenge. This creates poor doctor-to-patient ratios in other regions in the country, especially the regions in the Northern part of Ghana. For example, The Ministry of Health's Health Sector Annual Programme of Work: 2021 Holistic Assessment Report indicated that in 2021, Greater Accra achieved a doctor-to-patient ratio of 1:2,586, surpassing the national benchmark of 1:5,000 (Ministry of Health, 2022). Despite this progress, disparities in the distribution of doctors remained evident across the country. In the same year, the Upper East, Upper West, and Western Regions each had more than 10, 000 people per doctor with

corresponding ratios of 1:17,584, 1:10,362, and 1:12,359. The Northern region recorded 1: 9,926 doctors serving patients. Thus, the Upper East Region performed the poorest on this indicator, although the report noted steady improvements between 2017 and 2021 (Ministry of Health, 2022).. Based on the findings of Asamani et al. (2018) and Asamani et al. (2020), the health workforce stock in Ghana may therefore be suboptimal and succumb to inefficient distribution.

Despite its challenges, Ghana has had significant growth in the creation, distribution, and retention of its healthcare staff in the last two decades. This has led to substantial improvements in the number of doctors, nurses, and midwives per 1000 population, increasing from 1.07 in 2005 to 2.65 in 2017 (Ghana Health Service, 2018). This has yielded notable outcomes for Ghana, positioning it as a nation making significant progress towards achieving universal health coverage. Additionally, Ghana has emerged as a prominent contributor to the supply of healthcare professionals, including doctors, nurses, and midwives, within the sub-Saharan African region and Europe (Asamani et al., 2021).

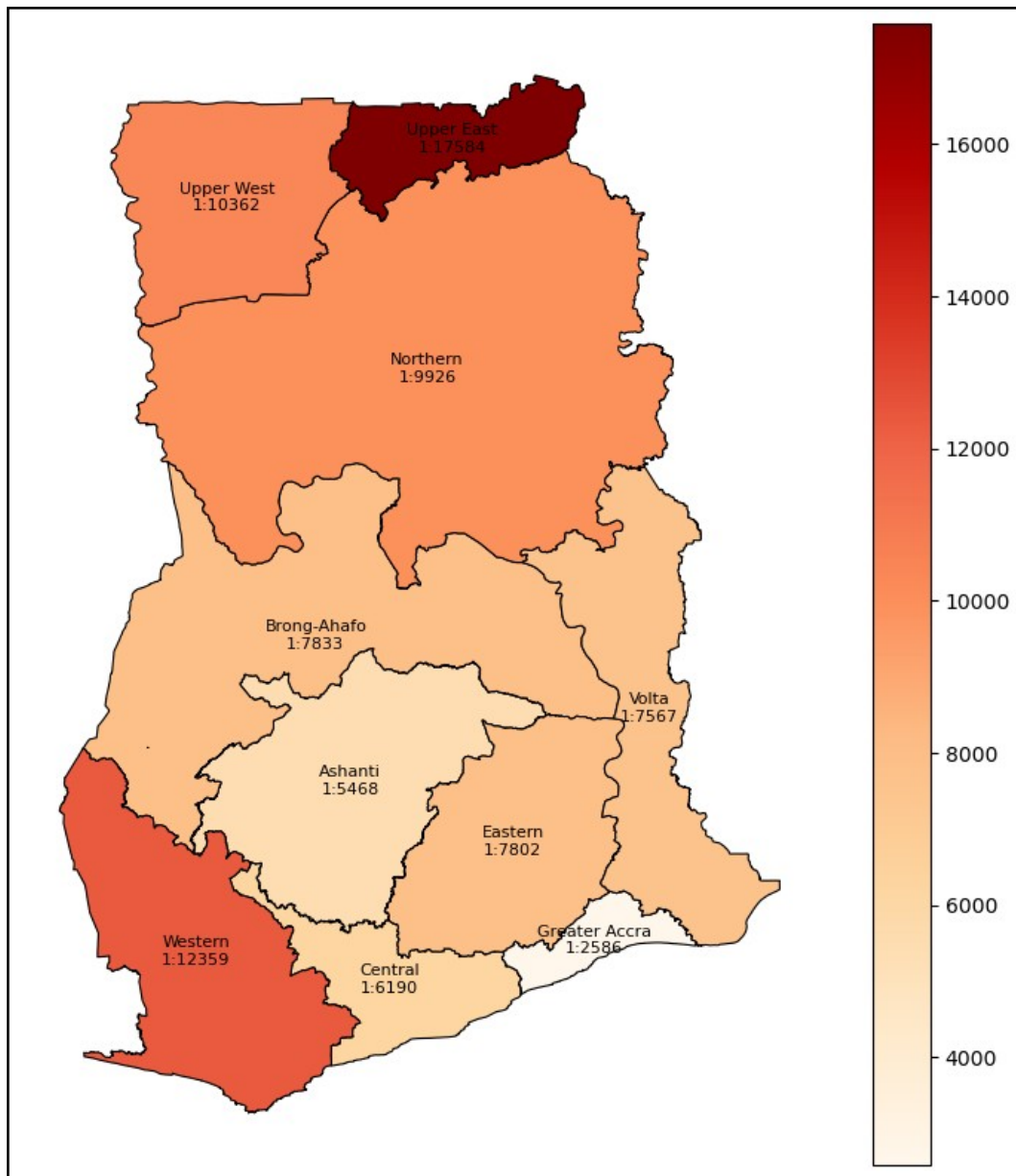


Figure 1: Doctor-to-patient ratio by region, Ghana, 2021

Source: Underlying data from Ministry of Health. (2022). Health sector annual programme of work: 2021 holistic assessment report.

1.3 Rationale of the Study

During the last decade, several new types of healthcare worker's performance incentive schemes have emerged under designations such as "Pay-for-Performance (P4P)", "Results Based Financing (RBF)", "Performance-Based Financing (PBF)" or "Performance-Based Contracting (PBC)"

(Soucat et al., 2017; WHO, 2010). These are defined as financial incentives to hospitals, physicians, and other health care providers “aimed at improving the quality, efficiency, and overall value of health care” (James, 2012). First adopted in high-income countries, these schemes have received growing attention in low- and middle-income countries where performance incentives are advocated to improve healthcare. Indeed, while it is true that there is a unifying rationale behind them, that is, the financial reward or sanction of specific behaviours and results, there are also significant variations in their logic and their implementation mechanisms. This diversity is mainly related to the fact that performance incentives solve different problems in different contexts. It could be argued that performance incentives are an integral part of a health system architecture in all contexts. For example, Chaix-Couturier et al. (2000) stressed the fact that a wide variety of different incentive methods have been used in health systems in the past. According to the authors, these incentive measures include capitation, managed care, sanctions/bonuses according to generic drug prescriptions, incentives for early retirement, and fundholding. These measures are all linked to comprehensive policy choices that modify the incentivizing elements in health systems.

From this perspective, health service providers are given incentives derived from the general health system architecture and from the various policies and strategies which are destined, directly or indirectly, to influence their behaviour. When discussing compensation changes in high-income health systems, we also speak about institutional reforms intended to change provider behaviour, improve productivity, and contain cost. These amendments are mostly linked to payment systems for providers (WHO, 2007). However, in high-income countries, the implementation of explicit provider benefits such as P4P is not explicitly related to the cost-cutting agenda found in other broader reforms (Rosenthal et al., 2007). Indeed, in high-income economies, performance incentives are either cost-neutral or potentially costly. In principle, incentive systems can be neutral if service/effort volume remains the same. Still, a transition may occur from one activity to another – from curative to preventive treatment, for example. As previously stated, the emphasis on performance benefit programs has not been on value, and as a result, very few cost-effectiveness studies have been conducted. The cost-effectiveness of a Pay-for-Performance scheme targeting heart conditions was investigated by Nahra et al. (2006). They calculated the number of quality-adjusted life-years (QALYs) gained as a result of improved care, with assumptions based on research into the efficacy of heart disease therapies and their impact on life expectancy. According to the study, the P4P scheme resulted in better care for an estimated 24,418 service users, leading to

a QALY gain ranging from 733 to 1,701. The cost per QALY achieved was quantified between US\$12,967 and US\$30,081 was quantified as the price per QALY. These findings indicate that the P4P scheme is likely to be a cost-effective strategy for enhancing the quality of care for heart conditions, offering a favourable balance between the costs incurred and the health benefits achieved.

Another research looked at how much money a P4P scheme could save compared to a previous trend in healthcare expenditure (Curtin et al., 2006). The P4P program researched in the state of New York, Rochester, rewarded primary care practitioners for complying with various care procedures. The program was value balanced in terms of reimbursement, as performance-related payment derived from a "pool" financing which included a 10% withholding for the practitioners' regular payments. Nevertheless, the scheme itself was not neutral in cost because the program costs (creating the measuring system, managing the scheme) were assessed at \$1.15 million yearly. The research, which only observed progress in diabetes care, contrasted an initial trend based on historical costs with a real trend of P4P. According to the report, the P4P scheme saved US\$1.9 million in the first year and US\$2.9 million in the second year by contrasting patterns; this resulted in positive returns on investments in the P4P program. Li et al. (2010) analysed pay output effectiveness in Taiwan regarding the rate of tuberculosis care and duration of treatment. After introducing the Tuberculosis (TB) P4P program in Taiwan, the results show that both the cure rate and average duration of care for cured cases were significantly improved. P4P hospitals had much better care results in comparison to non-P4P hospitals. The cure rate and the average length of treatment before the implementation of P4P were 46.9% and 256.24 days, respectively, compared with 63.0% and 249.74 days after implementation of P4P. The cure rate and length of treatment in P4P hospitals were 68.1% and 249.13 days, respectively, compared with 42.4% and 53.71 days in non-P4P hospitals. These results demonstrate the effectiveness of P4P TB incentives in Taiwan.

In Sub-Saharan Africa, health workers' availability, distribution, and performance are inadequate, partly tackled by providing adequate financial incentives (Bertone & Witter, 2015). Financial incentives are rewards given to health workers in the form of money, such as salaries, bonuses, or allowances, intended to motivate and retain them in their roles. Various studies have suggested that a comprehensive strategy should include not only financial incentives but also indirect benefits, such as housing or transportation allowances, and non-financial benefits, like professional

development opportunities and recognition programs, to effectively attract and retain health workers (Buchan, Thompson, & O'May, 2000). While recommendations, such as those from the World Health Organization, address the broader set of factors that influence health workers' overall income—beyond just their level of education and type of job placement—the development of financial incentives in low- and middle-income countries (LMICs) remains particularly challenging. LMICs are countries with relatively lower income levels compared to high-income countries (HICs), and they often face unique challenges in healthcare, such as limited resources and fragmented health systems. For example, health worker remuneration in LMICs often involves multiple payers such as the government, non-governmental organizations, and external donors, which can lead to issues of accountability and conflicting agendas (Ensor & Witter, 2001).

In many LMICs, health worker remuneration often involves multiple payers, meaning that the financial support for healthcare workers comes from various sources, including the government, non-governmental organizations (NGOs), international donors, and sometimes even private sector entities. This situation can lead to issues of accountability, where it becomes difficult to ensure that funds are used appropriately and that health workers are fairly compensated. The involvement of multiple payers can create confusion and inconsistencies in payment structures, making it challenging to track how funds are distributed and whether they are effectively reaching the intended beneficiaries. Moreover, these overlapping financial streams can result in conflicting agendas among the different payers, each with its own priorities and objectives, which can further complicate the management and motivation of the health workforce (Ensor & Witter, 2001).

In HICs, financial incentives are often part of a more unified and structured system, with clear accountability and alignment of incentives. In contrast, LMICs often face fragmented systems where health workers might rely on multiple sources of income, including external payments or engagement in both medical and non-medical activities beyond regular employment (Bertone & Witter, 2015). This fragmentation can lead to issues such as inequities in pay, reduced motivation, and challenges in workforce management. Therefore, while strategies and findings from HICs can offer valuable insights, they must be carefully adapted to the specific economic, social, and healthcare contexts of LMICs to be effective.

This calls on policies at national levels to consider broader forms of financial incentives and engage in reflections to inform human resources for health developments beyond salaries and

governmental allowances. The policy-making processes should be reinforced by collecting relevant data (Bertone & Witter, 2015). A review of non-financial incentives in East and Southern Africa, specifically Kenya, Tanzania, Uganda, Zimbabwe, and Swaziland, for health worker retention revealed interesting findings (Iipinge et al., 2009). Most of these countries have developed strategies, usually a combination of non-financial incentives according to their approaches to increase morale and retain health workers in the public health sector. However, implementation was not usually uniform at all levels, nor did it reach all the intended groups of health workers. These strategies were designed after evaluating the drivers of attrition, often through surveys (Iipinge et al., 2009). Although these incentives were low, most of these countries offered hardship allowances to their health workers, often encouraging them to work in rural areas. For instance, Tanzania offers a hardship allowance for workers in remote areas and non-taxable allowances, such as car allowances and overtime pay (Iipinge et al., 2009). Likewise, in Kenya, hardship allowance was made available to staff located in the designated hardship areas; however, this did not make a significant difference if the staff member's salary was already low. Also, in Zimbabwe, smaller rural allowance was offered for remote areas, while Swaziland offers nothing (Ndeti, Khasakhala, & Omolo, 2008; Munga & Mbilinyi, 2008; Masango, Gathu, & Sibandze, 2008; Chimbari, Madhina, Nyamangara, Mtandwa, & Damba, 2008; Iipinge et al., 2009).

A significant observation from these studies was the unequal application of incentives to all health workers, which did not always reach everyone in the target category. For instance, in Kenya, the incentives primarily targeted nurses and doctors. In Tanzania, the government applied a special accelerated salary package for health workers in the public sector and seconded health workers working in district-designated hospitals and voluntary agency hospitals (Iipinge et al., 2009). The studies, therefore, raised caution about strategies that target specific groups. They pointed to health workers that appear to have been omitted from incentive packages, particularly those who work at the community level who form a bridge to other actors who play a role in primary health care, such as traditional health providers and community health workers. The unequal application of incentives is not only a matter of policy but often a product of the reality of the situation on the ground in terms of management's authority and decisions and the resources available (Iipinge et al., 2009). In addition, the mode of implementation, how they are introduced, the reasons for and measures to address gaps in implementation, how they are managed, monitored and evaluated, and the systems and information needed to support implementation. This category requires more

attention, from safeguarding the adequate performance of institutions and categories to manage human resources for health to designing the processes and information required to introduce them, assess their impact, and establish trust and credibility around their implementation (Iipinge et al., 2009).

The unequal application of incentive packages is an issue of policy and relates to the situation of management authorities and decisions and the resources available. For instance, In Tanzania, all districts were found to receive money from the central government, and they also mobilize their local resources through taxes and obtain donor support from a combined pool of funds known as a basket fund. In all these funding pools, there is no specific budget vote for improving non-financial incentives. Additionally, it is probable that if incentives are funded through locally pooled funds rather than central allocations, it may result in districts with higher levels of poverty (and health need) having lower levels of funds to finance incentives, aggravating inequities (Iipinge et al., 2009). Though the government, through its district councils, provided guidelines for improving some of the non-financial incentives, such as housing for senior officers, there is inadequate evidence of the extent to which resources are found to implement these in practice, and limited monitoring of whether spending these resources on the incentive packages provides an effective response to outmigration (Munga & Mbilinyi, 2008).

The most evident expression of the influence of resource gaps in implementing incentives was revealed in the Kenya and Zimbabwe studies concerning the different applications of non-financial incentives between different public, private not for profit and private for-profit health institutions (Iipinge et al., 2009). In Zimbabwe, municipal and private sector health institutions were realized to have better retention packages than central government health institutions, with evidence of some association with improved retention indicated by longer terms of employment in those with better packages. They were, however, not routinely monitored or evaluated (Chimbari et al., 2008). In Kenya, private sector health institutions were realized to provide more comprehensive, transferable incentives than public institutions and the improved conditions often found in these services. In private-for-profit hospitals, mission hospitals and semi-autonomous government institutions, all hospital machines or equipment were found to be serviced and in working condition, with medical supplies available (Iipinge et al., 2009). Transport was also made available to the staff coming early on duty, working late or odd hours. However, equipment was not always

fully functional in public institutions, with limited medical supplies and significantly limited support to health workers (Ndetei et al., 2008). These findings, therefore, indicate the need to intensify focus on the issues of operationalizing and implementing non-financial incentives. Thus, moving from inserting incentives in policies and strategies to ensuring their application across all providers, moving from focused application for specific categories of health workers to the sector-wide application of incentives for all health workers, and moving from experiments within the health sector to more sustained multi-sectoral policies that involve other sectors, including public service, public works, finance, housing, and education (Iipinge et al., 2009).

Many works of literature have established that the success of health care system is greatly dependent on health workers' motivation. Also, many health organizations in Ghana have mainly depended on financial incentives in motivating health workers. These, however, have no significant effect on the morale of health workers in Ghana as it continues to decline. Therefore, studies have established the need for organizations to go beyond the typical traditional human resource management approaches that only apply financial incentives to motivate and retain health workers to employ non-financial incentives to motivate and retain health workers (Ankomah & Karikari, 2016). A study conducted by Ankomah et al. to examine the role of non-financial incentives on health worker motivation in Ghana further confirmed other studies on health staff motivation in Ghana (Kruk et al., 2010; Kwansah et al., 2012). The study revealed that insufficient tools, equipment, and space; emotional and physical stress; lack of learning and development opportunities and limited promotions were the main factors affecting the morale of health workers in Ghana. Additionally, the working environment of health workers was indicated as the highest and most crucial non-financial motivator for health workers in Ghana, followed by training and career development, job security, accommodation, promotion, growth and development, recognition, praise, and acknowledgement. Also, younger health professionals were greatly motivated by training and career development and staff accommodation. Among female health workers and older health care professionals, highly valued recognition, praise, and acknowledgement were identified as an essential non-financial motivator (Ankomah & Karikari, 2016).

A study conducted in Ghana by Kruk et al. (2010) to determine how certain job attributes influenced the fourth-year medical students' preference for job postings in rural areas in Ghana

found they valued rural job attributes that enabled them to perform well clinically (improved infrastructure and equipment) and to grow professionally (supportive management) as well as a doubling of their starting salary (Kruk et al., 2010). Issues raised concerning management not remembering rural workers regarding promotions and career development opportunities, such as fellowships or speciality training opportunities (Kruk et al., 2010). Students' interest in free rural housing options was low, which may be due to the poor quality of housing in rural towns of Ghana. Additionally, the students did not regard attributes such as allowances for children's education as an influential factor for selecting rural postings. Furthermore, this may be because most of the students involved in the study were young and had not started a family (Kruk et al., 2010). The study also indicated that three non-financial incentives (better housing, improved infrastructure, and shorter contract duration before study leave could be desirable to graduating students if offered mutually. Improving medical equipment and supplies is also likely to contribute to the quality of care and health outcomes in rural areas. Another study conducted by Kwansah et al. for human resources for health in Ghana also revealed similar challenges affecting the retention of health workers in rural areas that have also been outlined in some studies (Iipinge et al., 2009; Wurie et al., 2016). Notably, the inadequacy of training and career opportunities in remote areas compared to urban areas and the perception of being forgotten in rural areas by management. Also, the absence of clear terms of contract concerning posting, together with uncertainties regarding promotions and transfers, were indicated as factors affecting rural recruitment and retention in Ghana (Kwansah et al., 2012). Financial incentives, though important, were not indicated as the most critical incentives or motivational factors for rural service among Ghanaian nurses. Therefore, the study recommended a more precise term of the contract specifying the length of stay at a post, transparent procedures for transfer and promotion, career opportunities for all categories of nurses, and benefits such as better on-the-job housing and better mentoring and more recognition from leaders. Thus, a combined set of recruitment and retention policies focusing on career development are more likely to improve job satisfaction and retention of nurses in rural Ghana (Kwansah et al., 2012).

The distribution of doctors in Ghana is highly skewed, with a majority serving in two major metropolitan areas (Accra and Kumasi) (Snow et al., 2011). The inequitable distribution of health personnel in Ghana, with the majority remaining in the cities, is a significant challenge. Therefore, there is a critical need to find appropriate and effective incentive schemes to attract health

personnel to other areas apart from the big cities. Ministry of Health, Ghana, for instance, had been engaged in developing more Human Resources for Health (HR) Strategy, one that tries to draw on some of the evidence on the dynamics of the health market, but this did not attract health personnel to the rural areas (Lievens et al., 2011). Consequently, there is an urgent need to develop appropriate and successful incentive programs to attract health personnel to places other than major cities. Therefore, the absence of a policy that comprehensively addresses the distribution of health personnel is a significant challenge. Policy instruments that empower district health managers to motivate personnel via best HR management effectively are essential.

The aim of this thesis is to explore the phenomenon of incentive schemes within the Ghana Health Service and to investigate how such schemes can be designed to be comprehensive, responsive to staff concerns. The focus is particularly on understanding how to attract and retain health workers, especially doctors, in rural areas of Ghana. To achieve this, the research will examine various aspects of incentive schemes, including their impact on human resource development, financial incentives, and personal and professional support mechanisms. By analysing these factors, the study aims to provide a detailed understanding of the current challenges and opportunities in implementing effective incentive schemes in attracting and retaining healthcare workforce in rural areas. Based on the findings, the thesis will offer informed recommendations on how to enhance these schemes to better meet the needs of health workers and improve their service in rural areas.

The research conducted by Ramadhan (2015) highlights that while salary is a crucial factor for all workers, other interventions such as career promotion and study opportunities can significantly impact motivation and make salary less of a primary concern. In the context of the Ghana Health Service, there is a need to explore what combination of incentives or disincentives can effectively motivate doctors to remain in Ghana and serve in rural areas.

1.4 Research Questions

1. How effective is the Early Study Leave with Pay in attracting and retaining doctors in rural areas?
2. What are the key facilitators and barriers to the adoption of incentive schemes in the health sector?
- 3.

4. How can incentive schemes be used to facilitate the deployment and retention of doctors workers who accept posting to rural areas?

1.5 Research Objectives

This research aims to evaluate the effectiveness of an incentive scheme for Ghanaian health doctors and identify the drivers and barriers of incentive schemes in rural placement and retention. Specifically, the study seeks to achieve the following objectives.

1. To assess the effectiveness of the Early Study Leave with Pay incentive scheme in attracting and retaining doctors in rural areas.
2. To identify the barriers and drivers to the adoption of incentive schemes.
3. To use research findings to facilitate human resource policy development that provides specific incentives for personnel that accept postings to places outside the major cities.

1.6 Overview of the Ghanaian Healthcare System

Ghana's healthcare system is structured within a highly decentralised framework, an arrangement that reflects the country's broader decentralisation policy which came into effect in 1988 (Amoah et al., 2021). At the apex of the system, the Ministry of Health (MoH) provides overall leadership in the development of health policy, regulation, and sector planning. The responsibility for service delivery lies largely with the Ghana Health Service, which oversees care at the community, district, and regional levels. Financing is strongly influenced by the National Health Insurance Authority (NHIA), which manages the National Health Insurance Scheme (NHIS), a social protection mechanism intended to expand access to health services, alongside other private insurance arrangements (Amoah et al., 2021; Owusu-Addo et al., 2017; Gros, 2016; Saleh, 2012).

Service delivery in Ghana operates through a three-tiered structure of primary, secondary, and tertiary care levels (Daniels & Abuosi, 2020). The primary care level is the broadest and includes Community-based Health Planning and Services (CHPS) compounds, health centres, polyclinics, and district hospitals. These facilities provide a mix of preventive and curative services, and district hospitals function as the first referral points for lower-level facilities within this tier (Korah et al., 2023). Secondary care is delivered exclusively at regional hospitals, which cater to referrals from district hospitals and provide more advanced diagnostic, medical, and surgical services, staffed by both generalist doctors and selected specialists. At the top of the system are the tertiary facilities, consisting solely of teaching hospitals, which provide highly specialised care, advanced training, and research, while serving as referral centres for the entire system (Korah et al., 2023). In principle, patients are expected to move progressively from primary to tertiary care depending on the complexity of their health needs. In practice, however, referral compliance is inconsistent, with patients often bypassing lower levels to seek care directly at higher-level facilities, contributing to inefficiencies in service delivery (Daniels & Abuosi, 2020).

The Ghanaian health system is also pluralistic, as it accommodates both orthodox and traditional medical practices. While orthodox care is delivered through the formal three-tier structure, traditional services, comprising herbal and spiritual healing, remain a significant part of healthcare provision (Agyei-Baffour et al., 2017). These practices were formally recognised under regulation in 2012, but integration with the formal system has been weak, and many households continue to rely on informal providers, particularly in rural communities where access to biomedical services is limited (Agyei-Baffour et al., 2017; Saleh, 2012).

In terms of human resources, Ghana is comparatively better resourced than some countries of similar economic status, yet it remains below international standards. The country records an average of 1.24 essential healthcare workers per 1,000 population, which falls short of the global benchmark of 2.02 to 2.54 (World Bank, 2016). Furthermore, a considerable proportion of these workers, around 40 percent are non-clinical staff, further reducing the availability of qualified personnel for direct patient care (World Bank, 2016; Saleh, 2012).

A critical challenge lies in the inequitable distribution of resources and personnel. Healthcare services and medical staff are disproportionately concentrated in urban areas, with Greater Accra, Ashanti, and Eastern regions benefiting from better infrastructure and higher densities of doctors.

The remaining regions, which are largely rural, continue to face severe shortages of personnel, under-resourced facilities, and weak service delivery capacity. This uneven distribution has resulted in pronounced disparities in access to healthcare, reinforcing existing rural–urban inequities. These systemic challenges underscore the need for targeted interventions such as the Early Study Leave with Pay policy, which was introduced to encourage more equitable distribution of doctors across the country.

A critical feature of the Ghanaian health sector is the system of training health professionals. For doctors, training is provided largely through public medical schools, although in recent years private medical schools have also emerged to complement public institutions. Allied health professionals and nurses, on the other hand, are trained through a wider variety of channels, including public, private, and faith-based training institutions. After training, newly qualified doctors are employed by government through the GHS. As part of professional requirements, they undergo a mandatory two-year housemanship, during which they are posted to accredited health facilities. At this stage, doctors have limited choice in terms of location, as the postings are centrally determined to ensure exposure to diverse clinical environments.

The real challenge emerges when doctors complete their mandatory housemanship and are then required to take up permanent postings. While government through the MoH and GHS has the authority to post doctors and nurses to areas of greatest need, including rural and underserved districts, many professionals are reluctant to accept such postings. In practice, some find ways to influence posting decisions, allowing them to remain in larger urban centres such as Accra, Kumasi, or regional capitals. This phenomenon undermines equitable distribution of health professionals and exacerbates the rural-urban divide in healthcare provision.

Secondary and tertiary hospitals are typically located in major urban areas and regional capitals. These facilities tend to have more specialists and receive the bulk of house officers, thereby experiencing fewer staffing shortages. In contrast, district-level facilities which include district hospitals, polyclinics, health centres, and clinics are disproportionately affected by shortages of doctors and allied health workers. These facilities, particularly those in rural and remote areas, are not training centres and therefore do not benefit directly from the presence of house officers or specialist rotations. Their relative unsuitability for clinical training, combined with the widespread

reluctance of newly posted medical officers to accept rural assignments, has created a persistent shortfall of skilled health professionals at the district level.

The situation is further compounded by infrastructural limitations. In Ghana, there are currently 261 districts, each of which is supposed to have a functional district hospital as the first point of referral. However, only about 234 districts have district hospitals that are reasonably fit for purpose. The remaining districts either lack such facilities or rely on health centres that serve as district hospitals in name but lack the staffing, infrastructure, and capacity required to provide comprehensive district-level care. This uneven distribution of functional health facilities intensifies the human resource challenge, as even where staff are available, they may be posted to facilities that lack the basic capacity to support effective healthcare delivery.

Together, these challenges make the shortage of doctors and other health professionals in rural Ghana a national issue of urgent concern. While secondary and tertiary hospitals in cities may appear adequately staffed, many district hospitals and peripheral facilities continue to operate with significant shortages. This inequity in health workforce distribution undermines access to essential healthcare services for rural populations, contributing to poor maternal, neonatal, and general health outcomes in these areas

In recognition of this persistent challenge, the Government of Ghana has, over the years, experimented with various incentive schemes to attract and retain healthcare professionals in underserved areas. The Early Study Leave with Pay incentive package, introduced in 2016, was one such strategic policy. Its objective was not only to retain health workers but also to correct inequities in the distribution of skilled professionals by encouraging them to serve in rural areas. In this way, incentive schemes go beyond individual benefits for healthcare professionals; they function as systemic interventions to address the structural problem of rural-urban inequities in healthcare provision.

1.7 Overview of The Early Study Leave with Pay Policy: Rationale, Content, Delivery and Measurement

The Early Study Leave with Pay policy was introduced in August 2016 as a consolidated education-linked incentive to address health doctor shortages and persistent maldistribution in Ghana. Before its introduction, the government relied on measures such as rural allowances and

prompt promotions to encourage doctors to accept rural postings. These measures had limited long-term impact, as doctors continued to migrate to urban centres or exit the public health system altogether. The policy was therefore designed to link doctors' career development opportunities to service in underserved areas. By allowing earlier access to postgraduate training and continued salary support, the policy aimed to create stronger incentives for doctors to accept and remain in rural or peri-urban postings.

The content of the policy is straightforward but strategic. Doctors serving in designated rural and peri-urban areas can qualify for state-sponsored study leave with pay after only three years of general practice. This sponsorship covers tuition fees as well as continued salary during training. In contrast, doctors serving in urban facilities are only eligible for the same benefits after four or more years of service. Those in urban posts who seek to enter specialist training earlier must forfeit their salaries while in training. By creating this distinction, the incentive policy makes rural service more attractive by offering faster access to professional advancement while reducing the financial risks associated with further training.

The policy applies solely to doctors in public service who work in government or state-sponsored facilities across the then ten administrative regions of Ghana. Implementation is overseen by the Ministry of Health through the Ghana Health Service, with regional health directors responsible for administering, supervising, and monitoring the policy at the regional level. Facility medical superintendents and district health management teams maintain duty rosters and service records that document eligibility. Regional health directors then certify that doctors meet the service criteria before recommending them for study leave. Final approvals are processed at the national level by the human resources divisions of the Ghana Health Service and the Ministry of Health. Priority is often given to healthcare workers who are already serving in rural or underserved regions, as the scheme is explicitly designed to address the disparities in healthcare worker distribution across the country (MOH, 2017). Upon completing their studies, participants are required to return to their rural posts or other underserved areas for a defined period, which typically ranges from two to four years. This return-to-service requirement is a critical element of the scheme, ensuring that rural healthcare systems benefit from the enhanced expertise of these professionals. However, the actual enforcement of these agreements has been a source of concern, as some healthcare workers seek to bypass their rural service obligations, as observed by Ankomah

et al. (2016). This has led to calls for stricter enforcement mechanisms, including financial penalties or other forms of accountability for those who fail to return to rural areas as agreed.

The incentive policy was introduced with clear goals. The first goal was to improve the distribution of doctors across the country by encouraging more to accept rural postings. The second was to retain these doctors in underserved areas for a minimum period by tying eligibility for postgraduate training to the completion of rural service. The third was to strengthen healthcare delivery in rural communities by ensuring that doctors were available to provide essential services, including Caesarean Sections and other life-saving interventions. The broader intention of the policy was to reduce the persistent disparities in healthcare access between rural and urban populations, thereby promoting equity in the health system.

Verification of eligibility under the policy relies on several layers of administrative records. These include posting and transfer letters, service records within the Human Resource Information System, duty rosters, and regional certification of rural or peri-urban service. All approved applicants are required to sign a bond to return and serve the public health system after their training. For wider system monitoring, the Ghana Health Service also uses data from the District Health Information Management System, supplemented by claims data from the National Health Insurance Authority where applicable. These data sources allow verification of both the service histories of doctors and the outputs of facilities where they work.

This research focused on the policy as a whole rather than its individual components. The intervention was evaluated using an interrupted time-series design that leveraged the national introduction of the policy in August 2016. Because Caesarean Section procedures can only be performed in facilities from the polyclinic level upwards and require the presence of a qualified doctor, they were used as a proxy indicator of doctor availability and service capacity. A detailed justification of this approach is provided in chapter three.

1.8 Use of Caesarean Sections as the Primary Outcome

This section explains why Caesarean section procedure was selected as the primary outcome for evaluating the Early Study Leave with Pay intervention, and sets out the assumptions, scope and limitations of using CS as a proxy for physician availability and facility capability.

1.8.1 Policy Alignment and Conceptual Fit

The intervention explicitly sought to increase the presence of doctors in facilities capable of providing emergency obstetric care. CS is a core signal function of comprehensive emergency obstetric and newborn care, and its provision requires the presence of a practising doctor. In Ghana, CS can be performed only from the polyclinic, district, secondary and tertiary facility types.

In Ghana, the minimum clinical requirement for doing a caesarean section is the presence of a qualified medical doctor, be they a general practitioner or specialist doctors. In the absence of reliable, credible data on the numbers and movement of doctors between the districts and the big cities, the next available indicator of a doctor's presence is the performance of the CS since their presence is required before a CS is performed. Using CS therefore aligns closely with the stated policy intent: if the incentive succeeds in attracting and retaining doctors in targeted facilities, CS provision should become more available and more reliably delivered in those facilities.

CS is not substitutable by non-physician cadres in the Ghanaian public system. Unlike many outpatient or primary care indicators that can be delivered by nurses, midwives or physician assistants, CS requires a doctor, an operating theatre, anaesthetic support and perioperative care. As such, observed changes in CS volumes are more tightly coupled to physician presence and the functional readiness of hospitals and polyclinics than broader service utilisation measures. This clinical specificity reduces ambiguity when attributing changes in the outcome to changes in medical staffing and operative capacity.

1.8.2 Measurement Properties and Data Quality

CS procedures are routinely recorded in hospital theatres and maternity registers and are aggregated within district, regional and national health information systems. Compared with many service indicators, CS counts are less prone to double counting and miscoding, are available at monthly intervals, and are consistently defined across facilities. These properties support robust interrupted time series analysis that relies on stable definitions and uniform reporting over long periods.

CS volumes respond to both the availability of doctors and the broader readiness of facilities to deliver emergency surgical care. Increases in CS activity can indicate that more doctors are present and that teams, theatres and supply chains are functioning. In the context of a policy designed to

shift doctors towards underserved settings, CS acts as a tracer of whether that shift translates into tangible improvements in access to life-saving care.

1.8.3 Alternatives Considered

Other potential outcomes were considered. General outpatient visits and inpatient admissions are influenced by many cadres and are weakly specific to doctors. All-surgery counts aggregate heterogeneous procedures with varying coding practices across facilities. Staffing rosters or payroll records would more directly measure doctor numbers but were not consistently available across time and sites, and they do not capture whether doctors are delivering key services. Birth-denominated indicators, such as CS per 1,000 live births, would strengthen comparability across places and time, but reliable monthly denominators were not consistently available for the whole study period and all facilities. On balance, CS counts offered the best combination of policy relevance, physician specificity, data availability and definitional stability.

1.8.4 Assumptions Underpinning the Proxy

The approach rests on several explicit assumptions. First, CS provision requires the physical presence of a doctor in the facility. Second, the intervention targeted facilities where CS is possible, so changes in CS reflect, at least in part, changes in the distribution of doctors induced by the policy. Third, background determinants of obstetric demand, such as fertility and case-mix, evolve smoothly and are captured by pre-intervention trends, allowing the interrupted time series design to isolate changes at the time of the intervention. Fourth, reporting practices for CS did not change systematically at the intervention point.

1.8.5 Limitations and how they were Addressed

Using CS as the primary outcome has limitations. CS reflects maternity surgical care, so it does not capture physician activity in paediatrics, internal medicine or primary care. It is sensitive to obstetric demand and referral patterns; increases or decreases can arise from changes in fertility, clinical thresholds for CS, or referral behaviours, not solely from staffing changes. It is also dependent on theatre capacity, anaesthetic services, and blood availability; constraints in any of these can mute the effect of more doctors on CS volumes.

Few doctors, because of their work rate or practice style, may perform disproportionately high numbers of CS, inflating procedure counts without reflecting broader physician presence. In some areas, obstetric complications may be unusually high, leading to elevated CS numbers unrelated to

staffing. Special medical teams that periodically visit facilities to perform surgeries, including CS, can temporarily boost procedure counts, masking underlying shortages.

Urban private sector activity may divert cases away from public facilities and confound trends in some regions. The COVID-19 pandemic and other system shocks during the study period may also have influenced access to facility-based delivery and elective surgery, independent of physician numbers.

These limitations should be borne in mind when interpreting the findings, but the chosen approach remains a valid and pragmatic measure of doctor presence in the Ghanaian context. Several steps were taken to mitigate these issues. The analysis focuses on changes in level and trend at the intervention point rather than raw counts, which helps account for pre-existing upward trajectories in CS use. Newey–West robust errors were applied to address autocorrelation and heteroscedasticity, and fixed effects at subnational levels were used in extended models to absorb time-invariant differences in infrastructure and baseline service capacity. Results are reported at national, regional, district and facility levels to reveal heterogeneity that might arise from referral networks or supply constraints.

1.8.6 Implications for Interpretation

Given these considerations, CS should be read as a conservative, policy-aligned tracer of doctor availability and operative readiness in maternity care rather than as a comprehensive measure of all physician-led services. Positive impacts on CS at the time of the intervention are consistent with improved distribution or retention of doctors in facilities that matter for emergency obstetric care. Where impacts are muted or negative, the explanation may lie in supply-side constraints, referral dynamics, or broader shocks, not solely in the success or failure of the incentive. Subsequent chapters therefore complement this analysis with subnational disaggregation and expert elicitation to place the CS-based findings within a wider understanding of workforce motivation and system capacity.

1.9 Scope of the Study

This study is situated within the wider discourse on health worker attraction and retention in Ghana, with a specific focus on the effectiveness of incentive packages to attract and retain doctors in rural areas. While the Early Study Leave with Pay scheme constitutes the central intervention

examined at the national level to the hospital level (chapters four to six), the study also integrates broader empirical evidence drawn from a Delphi study with medical doctors and regional directors. It is important to clarify that the Delphi study was not restricted solely to doctors who had participated in the Early Study Leave with Pay scheme. Instead, it captured perspectives from a wider pool of doctors working across both urban and rural health facilities, including some who might have previously moved between rural and urban postings. As such, the findings provide a general picture of the types of incentives and enabling conditions that doctors consider critical in shaping their career choices and willingness to accept or remain in rural postings.

This broader scope serves two purposes. First, it allows the study to contextualise the policy under investigation within the wider system of health worker incentives in Ghana, rather than treating it in isolation. Second, it provides insights into what it would take to incentivise doctors more generally to relocate to or remain in rural areas, thereby generating policy-relevant evidence that extends beyond the specific design and implementation of the Early Study Leave with Pay scheme. By combining an assessment of the specific policy intervention (chapters four to six) with an exploration of wider incentive dynamics (chapter seven), the study offers a holistic understanding of both the effectiveness of the scheme and the broader structural factors that influence rural attraction and retention of doctors.

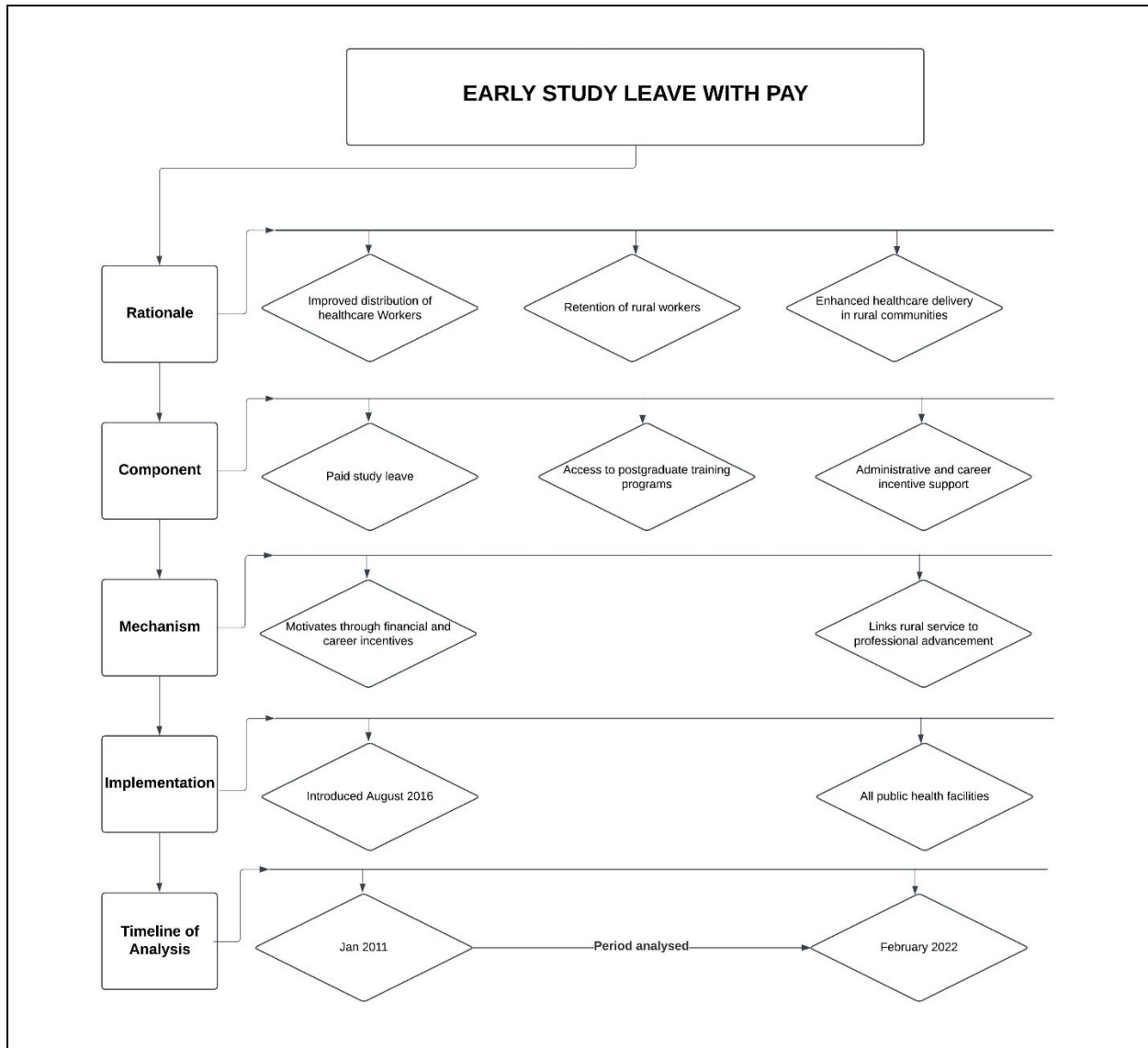


Figure 2: Overview of the Early Study Leave with Pay policy framework

1.10 Organization of the Study

This thesis is organized into 8 chapters. The first chapter introduced the research rationale and outlined the objectives of the study, an overview of Ghana’s healthcare system, the Early Study Leave with Pay, use of CS as the primary outcome as well as the scope of the study. Chapter 2, through a systematic review, identified gaps that this thesis sought to address. The chapter highlighted the dearth of knowledge in the examined literature: (a) paucity of studies evaluating health worker incentives; (b) inadequate studies exploring the facilitators and barriers of incentive

adoption; (c) inadequate economic evaluation studies on incentive schemes and (d) insufficient use of theoretical models in incentive schemes.

Chapter 3 provides the framework of empirical analysis. It identified the use of the Existence Relatedness Growth model in conceptualizing the research model. It also identified the data used in addressing the gaps discovered in chapter 2. The chapter also discussed the reflexivity and positionality of the researcher. Chapter 4 is the first empirical chapter of the study. It evaluated the effectiveness of the incentive scheme at the national level. Chapter 5 is the second empirical chapter of the study. It examined the effectiveness of the incentive scheme at the district and regional levels. Chapter 6 is the third empirical chapter. It examined the effectiveness of the incentive scheme at the hospital level. Chapters 4 to 6 addressed the first research gap highlighted in chapter 3.

Chapter 7 is the fourth empirical chapter of the study. It identified the key drivers and barriers to working in rural / urban settings in Ghana. It seeks to address the second research gap highlighted in chapter 3. Chapter 8 concludes the study. It situated the research findings within the context of the literature and the Ghanaian ecosystem. It also identified some implications of the study as well as future research avenues.

CHAPTER TWO

A SYSTEMATIC LITERATURE REVIEW OF INCENTIVE PACKAGES FOR HEALTHCARE WORKFORCE

2.1 Introduction

The preceding chapter outlined the context and background of this thesis, with a focus on the persistent challenges surrounding the recruitment and retention of healthcare workers in Ghana. It highlighted how workforce shortages, uneven distribution of staff, and the migration of

professionals undermine health service delivery, particularly in rural and underserved areas. Building on that foundation, this chapter presents a systematic review of the wider literature on health workforce incentives, with particular attention to evidence from low- and middle-income countries and its relevance to Ghana.

A systematic review was undertaken because of the need to synthesise existing evidence in a transparent and rigorous way, rather than relying on narrative summaries of prior studies. This approach makes it possible to critically assess what is already known, to identify areas of consensus, and to highlight gaps that remain underexplored. For this thesis, the review serves a dual purpose. First, it provides an evidence base against which the Early Study Leave with Pay scheme in Ghana can be evaluated. Second, it ensures that the empirical analyses in later chapters are informed by insights into the types of incentives that have been most effective in other contexts and the methodological approaches previously employed.

The review sought to address three central questions that emerge directly from the overall research aims. The first concerns the types of incentive packages that have been used to attract and retain healthcare workers in rural and hard-to-reach settings, paying attention to both financial and non-financial interventions. The second focuses on the effectiveness of these incentives in improving retention, motivation, and service delivery outcomes, especially in maternal and child health. The third question relates to gaps in the literature, particularly the limited evidence from Ghana, and how these shortcomings justify the need for the empirical analysis conducted in subsequent chapters. This chapter is structured to reflect these areas of focus.

2.2 Method

The method section describes the processes followed to search, extract, appraise, and synthesize data from the identified studies. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline directed the selection of the studies (Moher et al., 2009).

2.2.1 Search Strategy

Using the search terms in Table 1 below, three electronic databases: Scopus, PsycINFO and Web of Science, were searched for relevant studies to include in this review. The databases and search

terms were informed by a pilot review (appendix 1 provides the details of the pilot review) that was conducted to inform the methods of this literature review. In each database, specific filters were used to guarantee targeted and sensitive search outcomes. Also, where possible, search alerts were activated in the databases to access current articles on the defined research topic. Thirty-two expressions were entered in the databases as shown in Table 1 below.

The search terms included broad umbrella descriptors such as “health workers,” “frontline staff,” and “health practitioners”, which were intended to capture a wide range of healthcare cadres. In addition, more specific cadres such as doctors, nurses, and physician assistants were explicitly listed. While allied health professionals such as physiotherapists, pharmacists, midwives, and laboratory staff were not individually specified in the final search string, the use of these umbrella terms was designed to increase the likelihood of retrieving relevant studies across different healthcare groups. However, as the focus of this thesis is on doctors, the screening and inclusion process ultimately prioritised studies that either directly addressed medical doctors or provided insights that could be reasonably applied to this cadre of health staff.

Table 1: Search terms

Constructs	Search Terms
Healthcare workforce	“Health workers” OR “Frontline workers” OR “Frontline staff” OR “Hospital staff” OR “Health practitioners” OR “Clinical Coordinators” OR “Nurses” OR “Doctors” OR “Physicians” OR “Physician Assistants”
Incentives	“Motivat*” OR “Mone* incentives” OR “Non Mone*Incentives” OR “Financ* incentive*” OR “Incentive* Package*” OR “Pay for performance” OR “Promotion” OR “Salary” OR “Wages” OR “Financ* intervention” OR “Pay increment*” OR “Inducement” OR “Encouragement” OR “Reward” OR “Remuneration” OR “Allowance”
Evaluation	“Monitoring” OR “effect*” OR “assess*” OR “efficien*” OR “perform*” OR “success*”

2.2.2 Eligibility Criteria

Individual and cluster randomized control trials (RCTs), quasi-experimental studies, cross sectional designs (qualitative, quantitative, and mixed studies) that reported the health outcomes of the intended incentive packages were included in the study. Studies that stated the intended outcomes of the health incentive packages were considered irrespective of the country of origin. Health incentives could be either standalone or as part of a multi-component approach to health outcomes (mixed financial and non-financial incentives). Such multi-component incentives were only included if they also reported on the intended health outcomes. Any type of health incentive package such as gifts, tokens or cash transfers was included. We excluded studies with no mentioned intended health outcome and type of incentive package. The primary concern was a measured health outcome assessed either through recognized self-report questionnaires, interviews/focused groups or more objectively (e.g., frequency of antenatal home visits, receipt of iron-folic acid, complementary feeding and family planning).

2.2.3 Data Extraction and Selection of Studies

The data of the studies that met the eligibility criteria were extracted using a developed data extraction question informed by the Joanna Briggs Institute's (JBI) data extraction guideline (Table 2). The questions included the authors' name, year of publication, research aim, methods, findings, and author's stated research limitations. The data extraction questions were piloted on three selected papers to ensure their sensitivity in extracting all relevant information from the studies before they were applied. Also, the extracted data from 50% of the studies were examined to ensure the inclusion of all relevant information appropriate for this study.

Table 2: Data extraction questions

Themes	Review questions
General Information	1. Authors
	2. Year
	3. Aim
	4. Country/Setting of study
Methodology	5. Was the study in a rural or urban area?
	6. What study design was used?

-
7. Which types of healthcare force are engaged in the study?
 8. What were the characteristics of the study population?
 9. What sampling method was used?
 10. Which type of incentive package was used in the study (financial or non-financial)?
 11. What are the outcomes used in the study?
 12. How were the outcomes of the study measured?
 13. What was the sample size?
 14. What type of analysis was conducted?
 15. How were study outcomes measured/specified?
 16. What were the findings of the study?
 17. What were the author stated limitations?
 18. What were the author stated strengths?
 19. What were the results of the study?
-

Screening of studies was carried out using Endnote. Titles and abstracts of records retrieved from searches were screened for inclusion. Data extraction for key characteristics and outcomes was carried out in Excel. Data extraction was carried out in Excel by the researcher. Verification of the extracted data was undertaken by a member of the supervisory team. Any disagreements that arose were discussed and resolved through the supervisory team to ensure consistency and rigor in the review process. This multi-level verification process helped minimise bias and ensured consistency in the extracted data.

2.2.4 Risk of Bias Assessment

RCTs were assessed using the Cochrane risk of bias tool following relevant signalling questions to assess bias in the studies. Bias due to missing outcome data was judged low if less than 20% of participants were lost to follow-up. Bias due to measurement outcome was judged low if an objective measure was used for the main results. Bias due to selective reporting of outcomes was judged low if outcomes were pre-specified. Bias due to incomplete reporting was judged low if measurement methods, methods of analysis and outcomes were specified in advance. The non-randomized intervention (NRI) study was assessed using the Newcastle-Ottawa Scale (NOS). This scale assessed the study selection, comparability, and outcome assessment. The Agency for

Healthcare Research and Quality (AHRQ) assessment tool was used to assess cross-sectional designed studies. The AHRQ contains 11 items.

2.2.5 Data Synthesis

The data from the included studies were synthesized using the JBI narrative approach for evidence synthesis in systematic reviews. Also, the studies' methods, their operationalization and their findings were compared to identify any commonalities. Finally, descriptive tables were used to summarize the type of incentives and their influence on the studies' workers' performance/output.

2.3 Results

6085 papers were identified from the database search. After de-duplication was performed in Endnote, 5755 results remained for abstract and title screening. 29 of these results were included for full-text screening based on the inclusion criteria. 5 were excluded for the following reasons: four did not focus on healthcare professionals (examining incentive schemes for other public sector workers such as teachers) and the other one was not empirical research but a commentary.. Thus, 24 studies have been included in this systematic review. Figure 3 shows the PRISMA flowchart process.

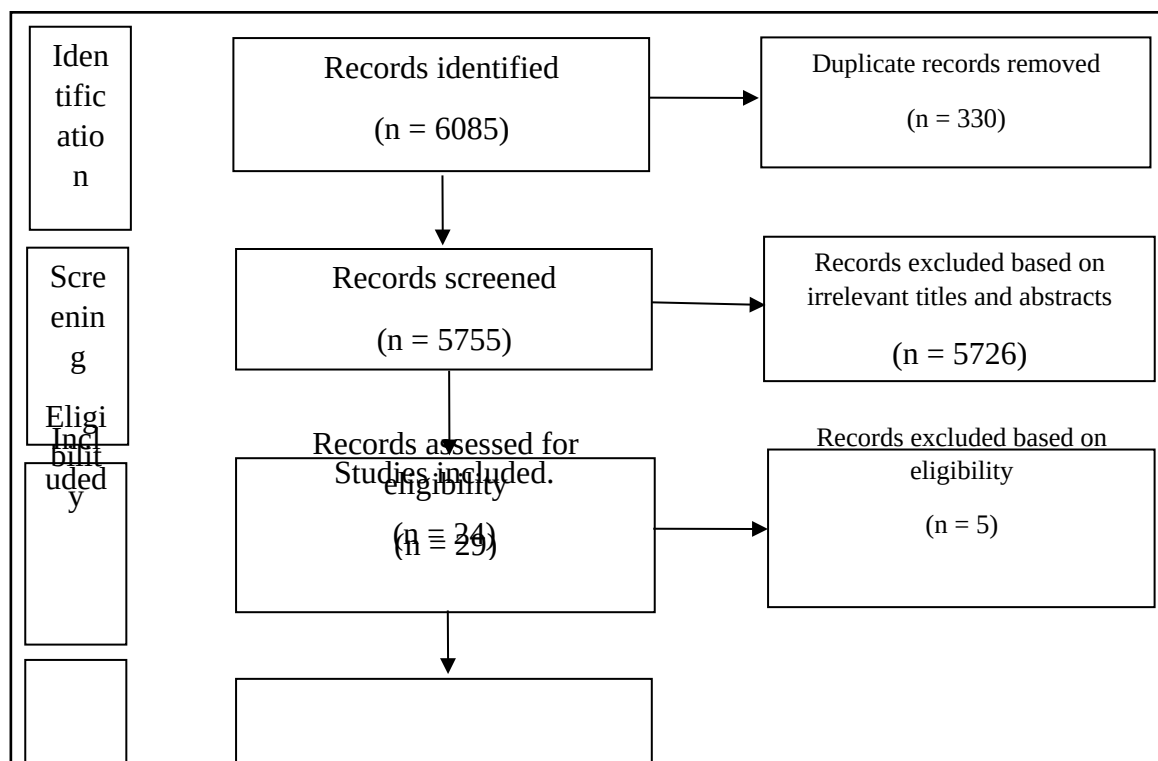


Figure 3: PRISMA flowchart of study selection

The studies were conducted in 15 different countries and 1 in multiple countries. 6 studies were conducted in Ghana, followed by India (n = 3), Tanzania (n = 2) while the rest of the countries had 1 contribution each. The studies were published between 2009 to 2023. There were 6 papers published in 2016, 4 in 2019, and 3 in 2021. 2 papers each were published in 2018, 2017 and 2014. A paper each was published in 2023, 2022, 2020, 2015 and 2009. Figure 4 below shows the countries represented in the studies. The characteristics of the 24 studies are shown in appendix 2.

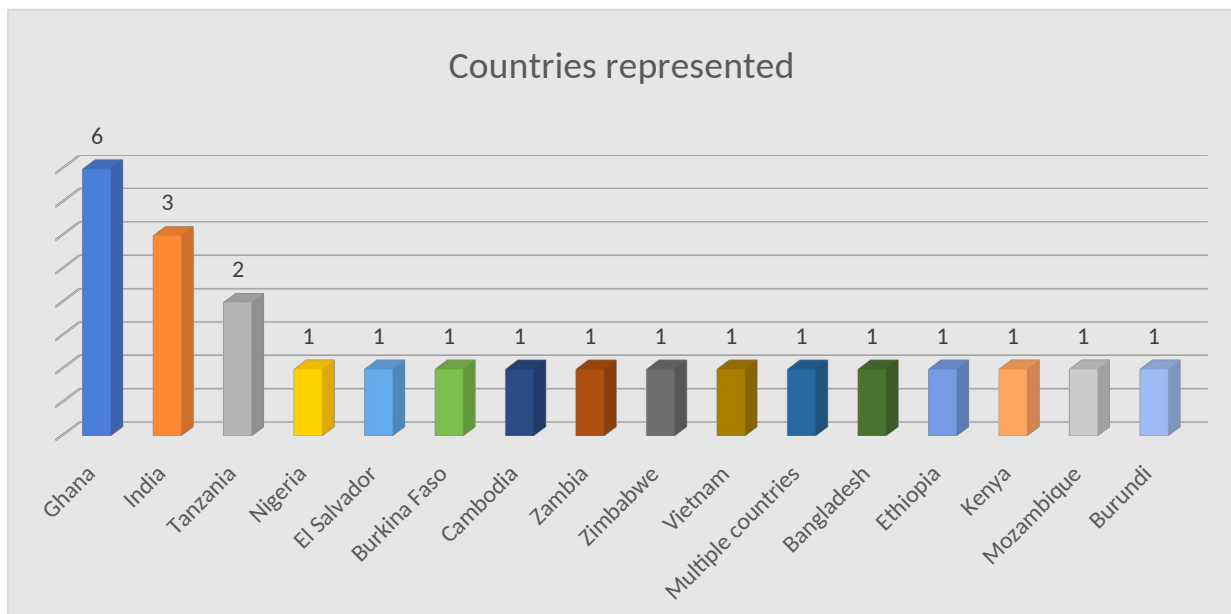


Figure 4: Country representation of studies

2.3.1 Methodological Features

2.3.1.1 Study and Sample Characteristics

The 24 included studies were from Low- and middle-income countries, with the majority (71%) from Africa. Of the 24 studies, 5 were RCTs, 1 was a cohort study and the remaining 18 were cross-sectional studies. All the studies collected primary data except (Ornel et al., 2019). The primary data was collected mainly through focus group discussions, in-depth interviews, and self-administered questionnaires and designed interventions. In addition, Ornel et al. (2019) used existing qualitative datasets from six countries, namely: Bangladesh, Ethiopia, Kenya, Indonesia, Malawi, and Mozambique. Regarding sample characteristics, many of the studies included mostly

community health workers/midwives/nurses. One study focused on only health student trainees (Prust et al., 2019) and five did not indicate the specific cadre of health professionals included in their study (Aninanya et al., 2016; Carmichael et al., 2019; Khim, 2016; Schuster et al., 2018; Thu et al., 2015). The sample size of the studies ranged from 3 to 3600 participants.

The studies included in this review were conducted across a range of healthcare settings and specialities. Several were situated in primary care and community-based contexts, such as vaccination programmes in rural Ghana (Levine et al., 2021), frontline primary healthcare workers in Nigeria (Okereke et al., 2021), and community health workers in Bangladesh, Ethiopia, and Malawi (Ormel et al., 2019; Glenn et al., 2021). Others were focused on hospital-based settings, including public and private hospitals in Ethiopia (Deressa & Zeru, 2019) and provincial hospitals in Burundi (Rudasingwa & Uwizeye, 2017). In terms of specialities, a subset of studies concentrated on maternal and child health, particularly neonatal vaccination (Levine et al., 2021) and infant feeding programmes (Glenn et al., 2021). However, most studies addressed general medical services or broad health system functions, such as performance-based financing (Ye et al., 2016; Bernal & Martinez, 2020), health insurance schemes (Alhassan et al., 2016), and workforce motivation in hospital and community settings (Deressa & Zeru, 2019; Rudasingwa & Uwizeye, 2017). This diversity of contexts highlights the range of incentive mechanisms explored, though direct comparisons across studies are complicated by differences in healthcare systems and service areas.

2.3.1.2 Types of Incentive Packages

The majority of the studies assessed the impact of either financial or non-financial incentives on the outcome of interest, while some of them evaluated the combined effect of both incentive types on their measured outcomes (Chatio et al., 2017; Alhassan et al., 2016; Thu et al., 2015; Chandler et al., 2009; Ormel et al., 2019; Glenn et al., 2021; Deressa & Zeru, 2019). Financial incentives were the most frequently studied and included rural posting allowances (Okereke et al., 2021; Ye et al., 2016), transportation allowances and per diems (Ye et al., 2016), stipends and salary increments (Deressa & Zeru, 2019; Rudasingwa & Uwizeye, 2017), and hardship allowances for rural postings (Njuguna et al., 2014). In contrast, non-financial incentives were more context specific. These included community recognition and respect for service (Ormel et al., 2019; Glenn et al., 2021), provision of household and office items such as computers, microwaves (Bernal & Martinez, 2020;

Grant et al., 2018), and educational packages including training opportunities or scholarships (Prust et al., 2019; Munga et al., 2014). The financial incentives included rural posting monetary allowances, transportation allowances, per diems, stipends, salary increments and hardship allowances. For the non-financial incentives, community recognition, household items and educational packages were the most common incentive packages.

2.3.1.3 Outcomes Measured

Job motivation was the most measured outcome in the included studies (Grant et al., 2018; Khim, 2016; Alhassan et al., 2016; Aninanya et al., 2016; Thu et al., 2015; Chandler et al., 2009; Ormel et al., 2019; Glenn et al., 2021; Tripathy et al., 2016). It was assessed in some studies with a behavioural performance measure- measuring items like taking initiatives and providing equitable services and a psychosocial motivation instrument. This tool sums scores from indicators like teamwork, empowerment, and appreciation (Grant et al., 2018). Four of the studies measured job retention as an outcome and specified it as the likelihood of health care staff to retain their jobs (Taderera et al., 2016; Njuguna et al., 2014, Chatio et al., 2017; Schuster et al., 2017). More specific outcomes measured in the studies were early completion of polio vaccinations within 14 days of infant life (Levine et al., 2021), odds of working in rural health facilities (Prust et al., 2019), rural job uptake (Munga et al., 2014). Others included quality of new-born, child, antenatal and maternal service delivery (Carmichael et al., 2019; Thu et al., 2015; Ye´ et al., 2015), and the number of patients a frontline health worker provides healthcare services to daily for a full-time equivalent of 40 hours/week (Okereke et al., 2021). Appendix 2 provides the outcomes measured and the characteristics of included studies.

2.3.1.4 Risk of Bias Assessment

Figure 5 shows the risk of bias summary for cluster RCTs. The question “bias due to missing outcome data” was most often identified, in part because studies did not clearly report how the missing outcomes were handled. The lack of information reported in studies among certain domains might have disguised underlying biases that could not be identified. Figure 6 shows the risk of bias summary for included individual RCTs. The question “bias arising from the randomization process” was identified because the study (Bernal & Martinez, 2020) did not clearly report how the allocation sequence was concealed rather than because the randomization process itself allowed bias.

		Risk of bias domains					
		D1	D1b	D2	D3	D4	D5
Study	Levine et al., 2021						
	Grant et al., 2018						
	Alhassan et al., 2016						
	Carmichael et al., 2019						
		Domains:			Judgement		
		D1 : Bias arising from the randomization process.			High		
		D1b: Bias arising from the timing of identification and recruitment of Individual participants in relation to timing of randomization.			Low		
		D2 : Bias due to deviations from intended intervention.			No information		
		D3 : Bias due to missing outcome data.					
		D4 : Bias in measurement of the outcome.					
		D5 : Bias in selection of the reported result.					

Figure 5: Risk of bias of cluster randomized controlled trials

		Risk of bias domains					
		D1	D2	D3	D4	D5	Overall
Study	Bernal & martinez, 2020						
		Domains:			Judgement		
		D1: Bias arising from the randomization process.			High		
		D2: Bias due to deviations from intended intervention.			Low		
		D3: Bias due to missing outcome data.					
		D4: Bias in measurement of the outcome.					
		D5: Bias in selection of the reported result.					

Figure 6: Risk of bias of individual randomized controlled trials

Table 3 shows the risk of bias assessment checklist for the cross-sectional studies. All 18 cross-sectional studies indicated their source of information and used standard examination methods. One assessment indicator (classification of caries index and BMI) was not relevant to this study. 15 studies addressed the sampling approach used. 11 studies mentioned the period used for identifying the subjects. Only 1 study mentioned the inclusion/exclusion criteria used. None of the studies reported on the subject exclusions and how confounding was handled. Appendix 3 and 4 shows the risk of bias summary for Cohort studies and AHRQ full checklist for studies respectively.

Table 3: Number of studies that met the AHRQ Checklist

AHRQ Checklist	Number of studies
1. Define the source of information (Survey, record review)	18
2. List inclusion and exclusion criteria for subjects or refer to previous publications	1
3. Indicate whether subjects were consecutive if not population based. Whether subjects are representative of the average in the community?	15
4. Indicate time period used for identifying subjects	11
5. Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants. Are the evaluators professional trained?	5
6. Is the examination method standard?	16
7. Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements)	10
8. Are the assessments and classification of caries index and BMI clearly stated and standard?	NA
9. If any, explain any subject exclusions from analysis	0
10. Describe how confounding was assessed and/or controlled	0
11. Summarize patient response rates and completeness of data collection	5

2.3.1.5 Theoretical Frameworks

Only one of the studies was informed by a theoretical framework (Tripathy et al., 2016). The theory, Existence Relatedness Growth (ERG) model of motivation, developed by Clayton Alderfer in 1969, outlines the multiple ways/levels individuals can be motivated. He explains that these levels/ways are individuals informed and are very fluid, meaning they can change with time with changing priorities and needs. Alderfer's theory categorises the level of motivations undergrowth, relatedness and existence needs. Growth needs include activities that leave one satisfied and fulfilled. These include acts that encourage one to utilise their full capacities or take new initiatives. Relatedness focuses primarily on needs surrounding relationships with family, social and professional networks. According to Alderfer, such healthy relationships could have suitable bearings on self-perception and outlook. Finally, existence needs encompass physiological and material needs like food, money and working conditions. Summarily, the ERG theory posits that a good interaction of these three broad needs could motivate individuals and improve the performance/ output (Moussawi & Koufaris, 2015).

2.3.1.6 Data Analysis and Model Diagnostics

The quantitative studies employed different forms of regression and econometric analysis. For example, Ye et al. (2016) used a discrete choice experiment analysed with multinomial logit models to estimate health workers' preferences for performance-based payment schemes in rural Burkina Faso. Okereke et al. (2021) applied descriptive statistics alongside multiple linear regression to examine how financial incentives influenced productivity in Nigerian primary healthcare. Bernal and Martinez (2020) used difference-in-differences with facility fixed effects to measure the impact of in-kind incentives on health worker performance in El Salvador. Levine et al. (2021) employed a cluster randomised controlled trial with logistic regression models to assess the impact of mobile nudges and financial incentives on timely neonatal vaccination uptake in rural Ghana. Figure 7 below shows the regression analysis used in quantitative studies.

Other studies used mixed-methods or qualitative approaches to provide contextual insights. Deressa and Zeru (2019) combined survey-based regression analysis with thematic coding of interviews, highlighting the link between motivation and organisational performance among Ethiopian nurses. Rudasingwa and Uwizeye (2017) used qualitative semi-structured interviews

analysed with thematic content analysis to capture attitudes towards performance-based incentives in Burundi. Glenn et al. (2021) employed thematic analysis of focus groups to investigate the demotivating effects of removing incentives among Bangladeshi community health workers. Similarly, Ormel et al. (2019) used comparative qualitative case analysis across multiple sites to understand expectation gaps and their influence on motivation. Alhassan et al. (2016), in contrast, adopted a quasi-experimental pre–post survey design with chi-square tests and regression analysis, showing how community engagement altered frontline workers’ perceptions of Ghana’s National Health Insurance Scheme.

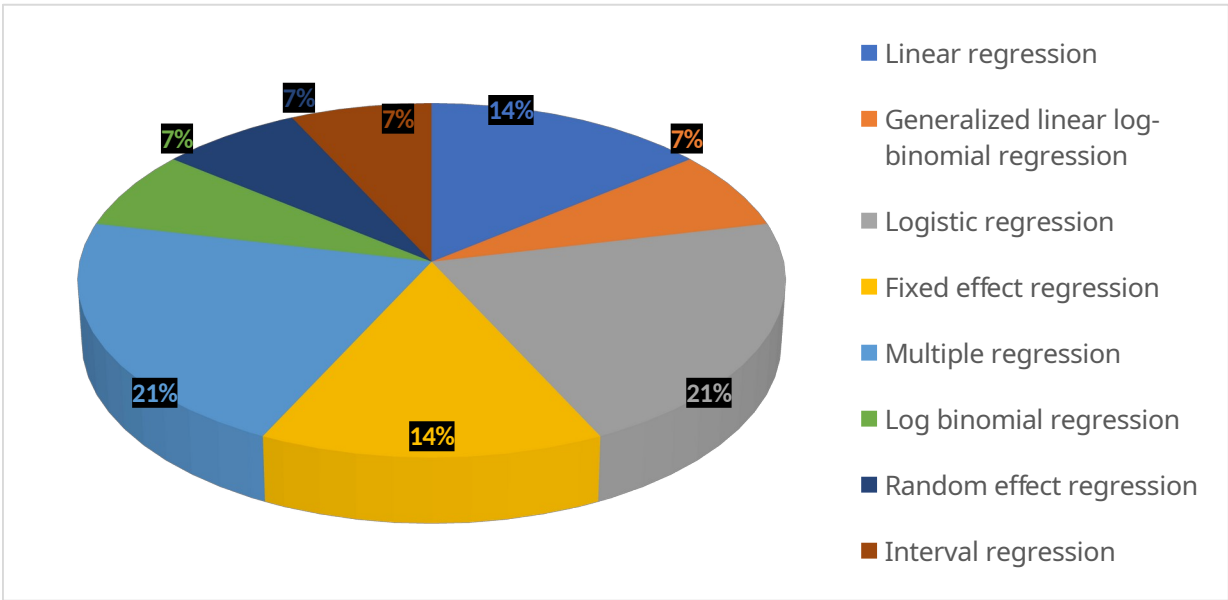


Figure 7: Regression analysis used

All but one of the quantitative included studies did not make use of regression diagnostic tools. The only study (Levine et al., 2021) that made use of model diagnostic tools examined the multicollinearity, normality of residuals, homoscedasticity, and influential observations of the variables.

Table 4: Model diagnostics used

Diagnostic	Method	Outcome
Multicollinearity	Examined VIF values	VIFs < 10 - no multicollinearity concerns
Normality of residuals	Histogram and P-P plot of residuals	Residuals approximately normally distributed
Homoscedasticity	Scatterplot of residuals vs predicted values	No obvious pattern in scatterplot, homoscedasticity assumption met
Influential observations	Calculated Cook's D values	All Cook's D values < 1, no highly influential points

2.3.2 Empirical Findings

All the studies reported that financial and non-financial incentives improve health worker performance and job motivation, except Chandler et al. (2009). They reported an inverse association between financial and non-financial health workers' incentives and attitudes towards work and performance. Conversely, Carmichael et al. (2019) reported that nonfinancial incentives, like household items, are associated with increased antenatal home visits, odds of more mothers receiving iron-folic acid (IFA) tablets, improved attitudes related to coordination and teamwork, and increased provision of advice to mothers related to clean cord care, breastfeeding, complementary feeding, and family planning. This finding was consistent with that of Alhassan et al. (2016). They also discovered that non-financial incentives are highly connected with staff motivation compared to financial incentives. Finally, Ormel et al. (2019) corroborated the significant association between financial and non-financial incentives and workers' performance. They reported that monetary compensation directly motivates CHWs to perform better. It also makes them more dedicated to their jobs, whether in a salaried or volunteering position. Similarly, they indicated that non-financial incentives contribute to CHWs job motivation. However, they further stressed that financial and non-financial incentives must be complementary as each alone may be insufficient to maintain staff.

2.4 Discussion

This literature review aimed to evaluate and synthesize current evidence on the influence of incentive packages on health workers' output. The rationale was to identify critical literature gaps that could provide a research direction for this study. In all, twenty-four studies, mainly from LMICs and exploring the influence of financial and non-financial incentive packages on health workers' outputs, were included in this review. The non-financial incentives included educational packages, household items and office-based equipment, like computers. While most of them focused on job motivation as an outcome, some concentrated on job retention. A few others measured more specific outcomes, such as quality of health service delivery, uptake of maternal and neonatal services, and quality of team-based performances. Generally, many of the studies, except Chandler et al. (2009), reported that financial and non-financial incentives packages positively impact health workers performance and overall quality of care. This finding is consistent with similar literature reviews (Scott et al., 2018; Adzei and Atinga, 2012; Willis-Shattuck et al., 2008).

Evidence suggests that incentive packages help mitigate understaffed rural facilities, loss of experienced staff and most importantly, brain drain, which seems to be the bane of many health systems in LMICs (Chikanda, 2005). Short staffs and brain drain could further increase workloads and increase the triggers for demotivating staff, which could hamper health facilities in LMICS from meeting the Sustainable Development Goals (SDGs). Given the challenges in health service accessibility and availability in most LMICs, these challenges mentioned above could significantly deepen already existing health inequalities (Willis-Shattuck et al., 2008) in these settings. Therefore, it is crucial for health systems in LMICS to constantly find attractive ways to keep health workers motivated and dedicated to their jobs. Comparing financial and non-financial incentives, one of the included studies reported that non-financial incentives are more associated with staff motivation than financial packages (Alhassan et al., 2016). This finding is consistent with that of Mathauer and Imhoff (2006) and Yousaf et al. (2014). For some health professionals, their professional ethos, fair treatment by health managers and conducive work environments, such as availability of work tools, are vital motivating factors than financial incentives (Mathauer and Imhoff, 2006). According to the WHO, unfair treatment at workplaces, regardless of financial incentives, could demotivate health workers and reduce their overall work output (Dieleman and Harnmeijer, 2006). A case in point is the findings from the study by Songstad et al. (2011) that

found that health workers in Tanzania perceive unfair treatment in job promotions as the number demotivating factor in job performance and overall work output.

Similarly, other studies reported that poor health facility management is more likely to demotivate health workers and affect their service delivery (Aberese-Ako et al., 2018; Chipeta et al., 2016) than a lack of financial incentives. Nonetheless, evidence also indicates that financial incentives are major motivating factors for health service delivery and health staff retention (Vilendrer et al., 2021). Thus, both types of incentives must be complimented to ensure improved staff well-being to promote quality health service, especially as none of the incentive types is sufficient on its own to fully motivate health staff (Ormel et al., 2019; Malik et al., 2010).

2.4.1 Strengths and Limitations of the Review

The key strength of the review is the systematic search strategy performed, making it less likely to miss important studies on outcome measurements of incentive interventions. Whilst relatively few outcome intervention studies were identified, most of those included had used at least some objective outcomes of the incentive intervention. The review is based on a rigorous methodology that follows predefined inclusion criteria and quality assessment processes. This allows policymakers, healthcare administrators, and researchers to make informed decisions and recommendations based on the synthesized evidence.

The heterogeneity of study designs across the included studies represents a key limitation of this review. Variations in study design, methodology, and quality, as well as differences in the components and implementation strategies of incentive packages, presented challenges for synthesizing and comparing findings. Despite these variations, a rigorous methodology with predefined inclusion criteria and quality assessments was employed to ensure the inclusion of studies meeting specific standards of methodological rigor. Given the variability in healthcare settings and contextual factors influencing the implementation of incentive interventions, a narrative synthesis was adopted to identify key patterns and common outcomes. This approach allowed for the extraction of broader conclusions while recognizing the limitations inherent in the diversity of study designs. Although sensitivity analyses were not conducted, careful interpretation of findings within their respective contexts was prioritized.

2.4.2 Implications

There are questions about the design and implementation of incentives schemes. Experimental studies are inadequate. This is largely due to the nature of the intervention (i.e., payment models), which often precludes experimental study designs. In addition, out of the 24 included studies, only 5 studies used RCT. For the rest of the studies, the quality of the outcomes of the incentive schemes has a limited scientific base.

Another gap in this research area concerns the generalization of the findings. First, comparing different outcome measures is not ideal. Some outcome indicators may have more improvement potential than others. Second, the effects of the outcomes are likely to be influenced by contextual factors. The introduction of incentives is often part of a larger policy package, such as increased retention or implementation of feedback systems. Effects can also be influenced by the healthcare system of the involved country. The fact that the incentive models are from different countries leads to challenges in drawing conclusions. However, it must be highlighted that 16 out of the 24 incentive schemes in this review are from Africa. Although this makes a comparison between these 16 incentive schemes easier, there exists heterogeneity in African countries owing to the diverse health models. Consequently, extrapolation of findings from the African based studies to the other healthcare systems is difficult. As with every intervention, it is necessary to evaluate its cost-effectiveness to ensure long-term sustainability. Also, such evaluations help with important health decisions that are consequential to both health service providers and consumers. There is a clear need for more experimental research, and we suggest that studies should be done on harder to measure outcomes such as the interpersonal aspects of care.

2.5 Gaps Identified in the Review

2.5.1 Paucity of Studies Evaluating Health Workers Incentive Packages in Ghana

The literature search did not yield any study examining the influence of health incentive packages on health workers performance in Ghana. The lack of such studies limits the implementation of crucial incentive related health reforms specific to the Ghanaian context, particularly given the importance of geographic context as a driver of policy acceptability and workability (Waage et al., 2010). Additionally, for a country like Ghana that largely suffers from health workers brain drain, findings from health staff retention studies could be the needed catalyst to sustain and increase the health workforce and improve quality of service

(Dovlo, 2003). Thus, this study will address this critical gap in the subsequent section of this thesis.

2.5.2 Lack of Studies Exploring Facilitators of Health Workers Incentive Schemes

None of the studies included in this review examined drivers of incentive schemes aimed at retaining health workers. However, examining the facilitators/drivers of critical policies, like health workers incentive packages, is essential to ensure the policy is effective, sensitive, and achieving its overarching purpose (Priebe et al., 2010). Therefore, this study would also explore the facilitators of health workers incentive schemes in Ghana in the ensuing chapter to contribute new knowledge on the defined topic.

2.5.3 Lack of Economic Evaluation Studies on Health Workers Incentives Packages

As with every intervention, it is necessary to evaluate its cost-effectiveness to ensure long-term sustainability. Also, such evaluations help with important health decisions that are consequential to both health service providers and consumers. An economic evaluation of these packages in Ghana has not been conducted within the scope of this study.

2.5.4 Inadequate Theoretical Models and Model Diagnosis

Only one of the included studies was guided by a theoretical framework. This gap will also be addressed in the chapter, especially given the importance of theoretical frameworks in helping research consumers understand the concept and context of research and ensuring that they situate the relevance of the research findings (Grant & Osanloo, 2014). Furthermore, as already explained in section 2.2.1.5, only one of the included quantitative studies that performed regression analysis conducted a model diagnosis to ensure model fit and robust research.

2.6 Conclusion

This study's overarching aim was to evaluate the effect of incentive packages on health workers performance to identify literature gaps to inform the subsequent empirical chapter in this thesis. Following this, several literature gaps were identified. These gaps include the paucity of studies evaluating health workers incentive packages in Ghana, lack of studies exploring facilitators of health workers incentive schemes and dearth of economic evaluation studies on health workers incentives packages. However, the gap related to the economic

evaluation of health workers' incentive packages remains open, and further research is needed to assess the cost-effectiveness and sustainability of these interventions.

CHAPTER THREE

FRAMEWORK FOR EMPIRICAL ANALYSIS

3.1 Introduction

The preceding chapter identified key gaps in the literature on health worker incentives in Ghana and comparable contexts. First, there is a paucity of evidence evaluating the effectiveness of incentive packages in retaining health professionals, particularly within the Ghanaian healthcare system. Second, little is known about the key drivers and facilitators of incentive schemes that shape healthcare workers' willingness to remain in service, especially in rural and underserved areas. Finally, the existing body of work demonstrates limited use of theoretical models to interpret how and why incentive schemes influence workforce behaviour, leaving much of the evidence largely descriptive.

This chapter sets out the framework for the empirical analysis designed to address these gaps. It introduces Alderfer's Existence, Relatedness and Growth theory as the conceptual lens through which the study interprets findings. The chapter describes the data sources used: the Early Study Leave with Pay dataset, which provides quantitative evidence of policy impacts, and the Delphi study, which captures expert perspectives on drivers and barriers. In addition, reflexivity and positionality are discussed to acknowledge the researcher's background and potential influence on the collection and interpretation of data. The overall aim of this chapter is therefore to provide a clear and coherent framework that links theory, data sources, and methodology to the research

objectives. In doing so, it ensures that the subsequent empirical analyses are firmly grounded in both the gaps identified in the literature and in a transparent methodological foundation.

3.2 Overview of the Identified Gaps in the Literature

A number of gaps in the available literature on incentive scheme intervention in Ghana were observed by the systematic literature review presented in Chapter 2. Hence, the scope of this research is clearly defined by these identified gaps in the literature. A series of research questions has been formulated to direct this analysis in light of the identified gaps. This is illustrated in Table 5 below.

Table 5: Overview of identified gaps

Gap identified	Research question	Design	Analytical method	Thesis chapter
Paucity of evidence on the evaluation of the effectiveness of incentive packages to retain health professionals in Ghana	How effective are interventions in motivating staff to accept postings in rural areas and staying?	Quasi-experimental	Interrupted time series	4,5 and 6
Lack of evidence and research on the key drivers or facilitators of incentive schemes for retaining healthcare workers in Ghana	What are the key drivers and barriers to incentive adoption in attracting and retaining healthcare workers for rural practice?	Delphi survey	Content analysis Median (Inter-quartile range)	7
Inadequate use of theoretical models	What theoretical model can be used?			3

In answering these questions, a theoretical model and data are required.

3.3 Theoretical Model

The study used the Existence Relatedness Growth (ERG) theory of motivation. This theory was developed by psychologist Clayton Alderfer as an alternative to Maslow's Hierarchy of Needs, can be applied to health incentives in various ways to promote and sustain desired health system outcomes. The ERG model categorizes human needs into three core categories: Existence, Relatedness, and Growth. Existence needs are the most basic physiological and material needs, including food, shelter, and physical well-being. In the context of health, incentives can be used to encourage individuals to make choices by providing rewards or discounts. For example, earning points or discounts for moving into rural practice. Incentives can also support basic physical needs by promoting regular exercise. For instance, providing cash rewards for meeting weekly or monthly goals. Relatedness needs involve social interactions, relationships, and a sense of belonging. It can also be used to encourage group activities where participants receive rewards for achieving collective goals. This fosters a sense of camaraderie and relatedness. Growth needs relate to personal development, self-improvement, and realizing one's potential. Incentive programs can support growth needs by offering rewards for further education.

The ERG model helps to recognize that individuals may have different needs and motivations. Therefore, incentive schemes must be tailored to accommodate diverse preferences and goals. It helps to provide regular feedback and recognition for participants' efforts and achievements. Acknowledging their progress can fulfil relatedness and growth needs. It also helps to design incentives with long-term sustainability in mind by focusing on creating lasting behaviour change rather than short-term compliance. Further, it helps leverage the relatedness aspect by incorporating social support networks, such as good amenities and suitable infrastructure, into incentive programs. Finally, it helps consider the principles of self-determination theory, where individuals are more motivated when they feel a sense of autonomy.

The choice of the Existence-Relatedness-Growth theory of motivation for this study was informed by the need to understand and address the intrinsic and extrinsic factors influencing health workers' behaviour, particularly their decisions regarding job uptake in underserved or rural areas. However, it is important to critically examine the scope and limitations of motivation theories, such as ERG, in explaining the complexities of behaviour change in health workers. Motivation is undoubtedly a key driver in behaviour change; however, it is not a sufficient condition for sustained behavioural

transformation. The decision to take up a job in a rural area or remain in a particular healthcare setting is influenced by a multifaceted array of factors that extend beyond individual motivation. These include contextual variables such as the availability of healthcare infrastructure, government policies, socio-economic conditions, and the broader healthcare system dynamics. Thus, while motivation is a necessary element in influencing health workers' decisions, it must be understood within the context of these additional determinants, which shape the feasibility and attractiveness of job uptake in rural settings.

While the ERG model provides valuable insights into the psychological needs that motivate behaviour, it does not fully encapsulate the broader structural and contextual factors that influence health workers' decisions. Motivational theories such as ERG, when applied in isolation, risk oversimplifying the complex decision-making processes involved in job uptake, particularly in rural areas. For instance, financial incentives alone may fail to account for the absence of professional development opportunities, inadequate healthcare infrastructure, or lack of social support networks that can undermine motivation and hinder long-term behaviour change.

Despite these limitations, the ERG model was selected for its capacity to offer a structured understanding of the diverse psychological needs that motivate behaviour. The focus on Existence needs, which encompass basic physiological, and material needs such as salary, job security, and working conditions, is particularly relevant in the context of rural health worker retention. Addressing these needs through financial incentives, housing provisions, and improvements in working conditions is essential for attracting and retaining health workers in underserved regions. By prioritizing existence needs, incentive programs can provide immediate and tangible benefits that address the most pressing concerns of health workers in rural settings.

The Relatedness needs focus on social connections and the sense of belonging that individuals derive from their work environment. For health workers, fostering positive relationships with colleagues, supervisors, and the community is crucial for job satisfaction and long-term retention. The ERG model highlights the importance of social support networks, and by incorporating group-based incentives or recognition programs, health systems can create a sense of community that enhances workers' emotional well-being and job commitment. This is especially important in rural settings, where health workers may face isolation or lack of professional networks.

The Growth needs relate to personal development, career advancement, and the realization of one's potential. In the healthcare sector, opportunities for professional growth are key factors in health workers' decisions to remain in or relocate to rural areas. The ERG model's emphasis on growth needs aligns with the need to provide health workers with opportunities for further education, skill development, and career progression. By offering incentives for continued professional development, health systems can not only address workers' intrinsic desires for self-improvement but also enhance the overall quality of care in rural areas by ensuring that health workers remain competent and up to date with medical practices.

A notable strength of the ERG model is its flexibility. Unlike other frameworks that assume a fixed hierarchy of needs, the ERG theory acknowledges that individuals may experience multiple needs simultaneously, and that these needs can change in priority over time. This flexibility makes the ERG model particularly valuable in the context of health worker incentives, where the relative importance of existence, relatedness, and growth needs may differ based on the individual worker's career stage, life circumstances, or specific challenges faced in a rural setting. This dynamic understanding of human needs allows for the design of more tailored and responsive incentive programs that can adapt to the varying preferences and motivations of health workers.

Moreover, the ERG model's emphasis on addressing multiple layers of needs simultaneously aligns well with the objective of fostering sustainable behaviour change. By focusing not only on material incentives (existence needs) but also on social and developmental aspects (relatedness and growth needs), the model encourages comprehensive approaches to improving health worker satisfaction and retention. This holistic view is essential for creating incentive schemes that are not only effective in the short term but also capable of generating lasting changes in behaviour and job satisfaction.

3.3.1 Alternative theories

In selecting the ERG as the conceptual framework for this study, several motivational theories were considered as potential lenses for understanding the dynamics of healthcare worker incentives in Ghana. Herzberg's Two-Factor Theory was initially examined because of its distinction between hygiene factors and motivators, which provides a useful framework for exploring workplace satisfaction. However, its binary categorisation was found to be too rigid for the context of this

study, as it does not adequately capture the overlapping and dynamic nature of doctors' motivations in resource-constrained environments.

Maslow's Hierarchy of Needs was also considered given its widespread application in health workforce motivation research. While Maslow's model offers a structured view of human needs, it assumes a strictly hierarchical progression from lower-order to higher-order needs. Evidence from health workforce studies in low- and middle-income countries, however, suggests that workers often pursue different categories of needs simultaneously, rather than sequentially, making Maslow's framework less adaptable to the Ghanaian context.

Self-Determination Theory (SDT) was reviewed as well, particularly because of its focus on intrinsic and extrinsic motivation. While SDT provides valuable insights into autonomy, competence, and relatedness, its focus on psychological needs was found to be less comprehensive for analysing financial and career-based incentive structures, which are critical components of this study.

Against this background, Alderfer's Existence Relatedness Growth theory was chosen as the guiding framework. Unlike Maslow, ERG theory recognises that individuals may pursue multiple needs at the same time and that frustration at one level may increase motivation at another. This flexibility makes ERG theory especially suited for understanding the complex interplay of financial, professional, and social factors that influence doctors' decisions to accept and remain in rural postings in Ghana. ERG theory therefore provided a more practical and context-sensitive framework for analysing the drivers, barriers, and outcomes of the Early Study Leave with Pay policy.

3.3.2 Operationalization of the ERG

In operationalizing this framework, the thesis adopts a two-stage approach. First, chapters four to six focus on the empirical evaluation of the Early Study Leave with Pay scheme at the national, regional/district, and hospital levels. The findings are presented primarily in descriptive and analytical terms, but their discussion is guided by the ERG framework. In these chapters, ERG serves as a conceptual backdrop, helping to interpret how workforce responses relate to existence needs, relatedness needs and growth needs. This approach ensures that even where the analysis is quantitative, the interpretation remains grounded in the broader motivational framework provided by ERG.

Second, chapter seven is explicitly designed to complement the earlier empirical chapters by applying the ERG framework in a more deliberate way to interpret the findings in greater depth. This interpretive stage allows for the examination of why doctors respond to rural service incentives in particular ways, by situating their behaviours and attitudes within the categories of existence, relatedness, and growth needs. For instance, existence needs are reflected in demands for adequate salaries, allowances, and infrastructural support; relatedness needs emerge in the importance of professional networks, mentorship, and recognition; while growth needs are tied to access to specialist training, career progression, and opportunities for further education. By structuring the discussion through ERG, chapter seven highlights how unmet needs in one domain (e.g., poor living conditions undermining existence needs) can shift emphasis toward others (e.g., prioritizing career development through study leave).

The operationalization of ERG in this study, therefore, serves a dual purpose: it anchors the thesis within a broader theoretical tradition while also offering a structured lens through which the empirical findings can be interpreted. In doing so, the framework not only illuminates the underlying motivations of healthcare workers in relation to rural service but also provides a systematic way to derive policy-relevant insights. The complementary use of empirical analysis (chapters four to six) and theoretical interpretation (chapter seven) strengthens the coherence of the thesis, ensuring that both observed outcomes and their underlying drivers are fully addressed.

In summary, while the ERG theory is not without its limitations, particularly in terms of its focus on motivation as the primary driver of behaviour, it offers a valuable framework for understanding the diverse psychological needs of health workers. Despite this limitation, the ERG theory remains a strong and insightful tool for informing the design of health incentive schemes that aim to improve job uptake and retention in rural healthcare environments.

Figure 8 shows the diagrammatic representation of the ERG model of motivation.

ERG Theory of Motivation

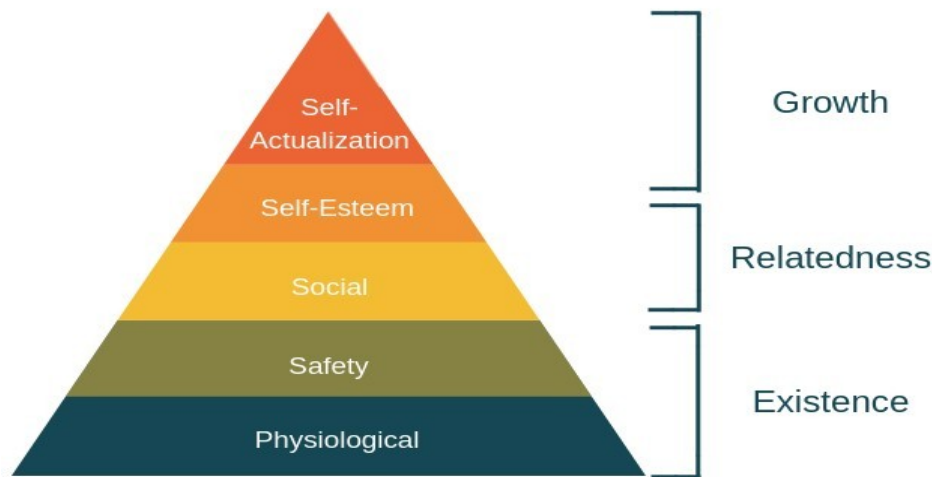


Figure 8: The Existence Relatedness Growth (ERG) model of motivation

Source: Acquah et al. (2021)

3.4 Data Sources

In statistical research, data is the fundamental unit. Collecting high-quality data is critical for providing reliable evidence for the problems under investigation, allowing for an analytical view of the issues and, as a result, solutions. The type of data to be used in any analysis is a crucial decision.

3.4.1 Early Study Leave with Pay Dataset

The Ghana Health Service Early Study Leave with Pay data is used to answer the research question about how effective interventions are in motivating staff to accept postings in rural areas and staying. The data was obtained from the Ghana Health Service and covered the period 2011 to 2022 (134 months). The data points for these periods cover the following variables: date of attendance, facilities, regions, districts, and daily Caesarean sections cases. This data is used in Chapters 4 to 6.

3.4.2 Primary Delphi Study

A Delphi study was conducted to ascertain the facilitators and barriers to incentive adoption in Ghana. This is to answer the research question on the key drivers and barriers to incentive adoption in attracting and retaining healthcare workers for rural practice. Content analysis, median and

Inter-quartile range analysis were used as statistical methods in evaluating the responses. This is provided in chapter 7.

The choice of the Delphi method was driven by its capacity to elicit expert judgment in areas where empirical data may be limited, as is often the case in resource-constrained settings like Ghana. While other research methods, such as surveys, focus groups, or interviews, could have been used to explore the facilitators and barriers to incentive adoption, the Delphi method offered distinct advantages in this context. Surveys, while useful for gathering a broad range of responses, often do not facilitate the deeper exploration and refinement of ideas needed to reach consensus. Similarly, while focus groups and interviews allow for rich, qualitative insights, they may be subject to group dynamics or social desirability bias that could skew the results.

In contrast, the Delphi method involves multiple rounds of feedback, allowing experts to refine their responses based on the input of other participants, which is particularly valuable when dealing with complex, multi-faceted issues such as the adoption of incentive schemes. This iterative process helps to overcome the limitations of individual biases, promotes thoughtful reflection, and encourages convergence toward a shared understanding, making it an ideal method for uncovering the facilitators and barriers to policy adoption in a nuanced and reliable manner. Furthermore, the anonymity of the Delphi process reduces the influence of dominant participants or power dynamics, which can be particularly important when engaging a diverse group of stakeholders.

3.5 Reflexivity and Positionality

An important consideration in interpreting the findings of this research is my own position as a Ghanaian medical doctor practising within the same health system that the Early Study Leave with Pay incentive policy sought to influence. This positionality shaped both the opportunities and the challenges encountered during the study and requires critical reflection to ensure transparency and enhance trustworthiness.

Being an insider provided several advantages. My first-hand familiarity with the challenges of rural postings, health workforce shortages, and the career aspirations of doctors gave me deep contextual insight. This insider knowledge informed the framing of the research questions and the interpretation of results in ways that are grounded in the practical realities of Ghana's healthcare

delivery. It also facilitated trust and credibility with participants, who may have been more willing to engage openly given our shared professional background.

At the same time, my positionality carried the risk of bias. My professional experiences and values may have predisposed me to certain interpretations, particularly regarding the effectiveness or fairness of incentive policies. For example, I may have been more sympathetic to the frustrations of doctors navigating rural service or more inclined to view policy interventions as insufficient, based on personal exposure to system-level challenges. These risks were addressed in several ways. First, the structured and iterative nature of the Delphi technique reduced reliance on my individual interpretations by privileging consensus across multiple experts. Second, I consistently grounded my analysis in participants' own words and prioritised transparency through documentation of analytic decisions.

Another possible influence of my positionality relates to data collection. Participants were informed that I was a practising doctor, and this awareness may have shaped their responses. Some may have emphasised shared frustrations, while others may have withheld critical views of the policy to avoid perceived judgement. Conducting the Delphi survey online, with anonymity preserved throughout, helped to minimise these risks by reducing direct personal influence.

Reflecting on these dynamics, I recognise that the findings of this study were co-shaped by both the participants and my position as a researcher embedded in the Ghanaian healthcare system. Rather than undermining the study, this reflexivity adds depth by highlighting how the research process itself is situated within the same context it seeks to analyse. By acknowledging these influences, I aim to enhance the credibility of the findings and provide a more transparent account of how knowledge was generated.

3.6 Conclusion

This chapter has provided the framework that underpins the empirical analysis of the study. It began by highlighting the major gaps in the literature, namely, the paucity of evaluations of incentive effectiveness in Ghana, the limited understanding of drivers and facilitators of retention, and the inadequate application of theoretical models. In response, Alderfer's ERG theory was introduced as the guiding conceptual framework. The chapter also outlined the two primary sources of data employed in this study. The Early Study Leave with Pay dataset allowed for an examination of measurable trends in service delivery outcomes, while the Delphi study provided

expert perspectives on the broader drivers and barriers shaping health worker attraction and retention. Finally, reflexivity and positionality were discussed, ensuring transparency regarding the researcher's standpoint and the potential influence of their role as a Ghanaian doctor on the research process.

CHAPTER FOUR

EVALUATING THE EFFECTIVENESS OF THE INCENTIVE PACKAGE INTERVENTION FOR DOCTORS AT THE NATIONAL LEVEL

4.1 Introduction

Building on the analytical framework outlined in chapter three, this chapter turns to the national-level evaluation of the Early Study Leave with Pay incentive package. The specific focus here is on assessing the extent to which the Early Study Leave with Pay scheme has influenced service delivery outcomes, using Caesarean section provision as the primary outcome measure at the national level.

4.2 Methods

4.2.1 Study Design

The evaluation of Ghana's Early Study Leave with Pay scheme employs an interrupted time series analysis (ITSA), a robust quasi-experimental design that is particularly appropriate when randomized controlled trials are neither feasible nor ethical in policy evaluation. ITSA enables the assessment of pre-post trends and changes in outcome measures (Bernal et al., 2017). The choice of ITSA for this evaluation is justified by several methodological strengths. Firstly, ITSA effectively captures the natural experiment created by the policy introduction, allowing for evaluation in real-world conditions without disrupting the healthcare system's normal operations (Kontopantelis et al., 2015). This natural implementation setting is crucial, as it ensures the findings are directly applicable to the policy's actual rollout. Secondly, the design establishes a clear temporal relationship between the intervention (Early Study Leave with Pay) and the outcome (CS rates as a proxy for physician presence), strengthening causal inference by demonstrating that the intervention precedes any observed changes (Bernal et al., 2018). Finally, the ITSA design allows the researcher to easily conduct stratified analyses to evaluate the differential impact of the intervention on subpopulations, such as by geographic region, and facility type (Penfold & Zhang, 2013). In this study, the ITSA design is operationalised through a clearly defined intervention point

and time points before and after the intervention. This enables the establishment of pre-intervention trends, detection of immediate policy effects, assessment of gradual changes, and evaluation of effect sustainability.

While ITSA provides a robust framework as a quasi-experimental design for assessing the long-term effects of interventions (Boudewyns et al., 2018; Fouche et al., 2021; Roh et al., 2022; Schweizer et al., 2016; Zhang et al., 2022), there are limitations that warrant consideration. One key limitation is the requirement for 8 observations minimum per pre- and post-intervention period after the policy implementation to ensure sufficient statistical power for reliably estimating the level and slope changes (Penfold & Zhang, 2013). This study exceeds the recommended minimum, using 60 monthly data points as discussed in the data subsection. The lack of a suitable control population is an additional potential limitation of ITS designs (Penfold & Zhang, 2013). Yet, this study employs a counterfactual control approach, as described in the data section, which helps address the absence of an external comparison group by projecting the expected trend in the absence of the intervention.

4.2.1.1 Control

The study employs a counterfactual control approach to strengthen causal inference (Turner et al., 2021; Bernal et al., 2018; Bernal et al., 2017). The counterfactual represents the expected outcome trajectory in the absence of intervention, which in this study is constructed through pre-intervention trend analysis. Specifically, the baseline trends in Caesarean Section rates are established using historical data from the pre-intervention period. These trends are then projected forward to create the expected outcomes that would have occurred without the implementation of the Early Study Leave with Pay scheme (Lopez Bernal et al., 2018). This counterfactual model helps isolate the specific effect of the intervention by comparing the observed post-intervention outcomes against the projected scenario based on pre-existing patterns (Lopez Bernal et al., 2018).

4.2.1.2 Outcome

The primary outcome measure is the monthly rate of Caesarean Sections performed in hospitals, which serves as a proxy indicator for physician presence. This proxy measure was selected based on the policy objective of the Early Study Leave with Pay scheme, which was explicitly aimed at increasing the number of CS procedures conducted (Ghana Health Service, 2015). CS procedures require the expertise of physicians and cannot be performed by lower-level healthcare workers. As

such, CS rates directly reflect the availability and utilization of physician services. Additionally, CS represents a critical emergency surgical service that indicates both physician presence and the functional capacity of healthcare facilities.

The rationale behind this approach is that the presence (or absence) of doctors can be indirectly measured through the number of CS cases performed, as rural hospitals without sufficient medical personnel would struggle to perform such procedures. Over time, the expectation is that the intervention will lead to an increase in the number of CS cases in these areas, reflecting the enhanced capacity of rural healthcare facilities due to the presence of more doctors. Thus, by examining trends in CS cases before and after the introduction of the Early Study Leave with Pay scheme, this study aims to gauge both the presence of doctors and the overall effectiveness of the intervention in improving rural healthcare services.

4.2.2 Data

The data was obtained from the Ghana Health Service and covered an 11-year and 2-month period (2011–February 2022), with 5 years and 7 months before the intervention (January 2011–July 2016) and 5 years and 7 months after the intervention (August 2016–February 2022). The intervention point is defined as August 2016, when the Early Study Leave with Pay scheme was implemented.

The dataset was sourced after receiving ethics approval from the College of Health, Medicine and Life Sciences Research Ethics Committee of Brunel University London and the Ethics Committee of the Ghana Health Service. The data points for these periods cover the following variables: date of attendance, facilities, regions, districts, and monthly CS cases.

4.3 Statistical Analysis

The primary approach for analysing the data is segmented regression analysis, a technique underpinned by Ordinary Least Squares (OLS) regression. Segmented regression, commonly employed in single-group ITSA, is a robust approach to examining changes in both the level and trend of an outcome variable before and after an intervention especially when there is no known control (Turner et al., 2021; Hudson et al., 2019; Linden, 2017; Linden & Ray, 2017; Bernal et al., 2017; Box et al., 2016). Segmented regression allows for the estimation of changes in both the level

(immediate effect) and slope (long-term trend) of the outcome variable—Caesarean Section cases following the intervention of the Early Study Leave with Pay. The regression model is of the form;

$$Cases_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \varepsilon_t \quad (1)$$

where $Cases_t$ is the cumulated number of caesarean cases of t (time index), T_t is the time since the study began, X_t is a dummy variable for the intervention (incentive package) (i.e., X assumes 0 for pre-intervention, and 1 for post-intervention), and $X_t T_t$ is the interaction between T_t and X_t , with the coefficients β_1 , β_2 and β_3 , respectively. In this setting, the intercept β_0 denotes the starting value of the cases; the slope term β_1 is the trend of the pre-intervention variable up to when the incentive package was introduced. β_2 is the change in the level of pre-intervention that occurs immediately after the incentive package was launched, and β_3 denotes the difference between the slope of pre-incentive package (pre-intervention) and the slope post- incentive package (post-intervention) of the aggregated interventions. Following the focus of the study, the researcher focused on the significant immediate impact of the incentive packages (β_2) and incentive packages effect over time (β_3).

The segmented regression in a single-group ITSA is appropriate in this study because there is no separate control group for comparison. The pre-intervention period serves as the counterfactual. The post-intervention period reflects the time during which the intervention (Early Study Leave with Pay) was active.

Major estimation issues such as heteroscedasticity and autocorrelation were considered (Bernal et al., 2017). To obtain consistent parameter estimates in the presence autocorrelation and heteroscedasticity, the researcher employed the Newey–West variance estimator (Tsiachristas et al., 2024; Brault et al., 2023). For robustness checks, the researcher performed Cumby-Huizinga test for autocorrelation to determine the order of autoregressive order to adjust the parameters. Additionally, the number of CS cases were estimated while explicitly controlling for the effects of seasonality.

4.4 Findings

4.4.1 Descriptive Statistics

At the national level, cumulative analysis of the cases shows a significant increase in the total number of CS cases in the post-intervention period compared to the pre-intervention period. The pre-intervention period saw 13242 cases as compared to the post-intervention period figure of 48675 cases. In terms of the monthly number of cases, the highest monthly total of CS cases occurred in the fourth month of 2020, followed by the fifth, tenth, and sixth months of the same year. According to the data, February 2019 was the month with the fifth-highest number of confirmed cases of CS out of the 134 months analysed. The lowest number of CS cases was recorded in month 3 of 2011 out of a total of 134 months. Figure 9 shows the distribution of the data.

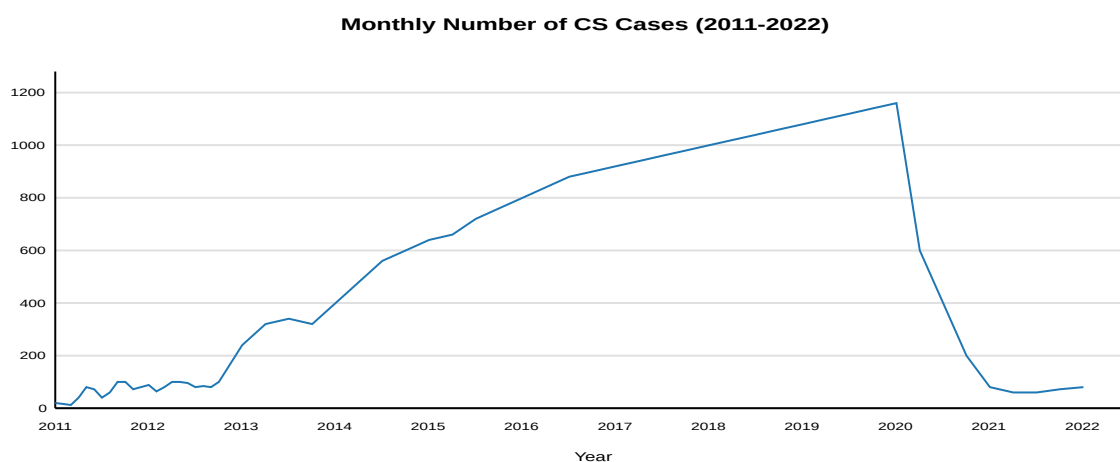


Figure 9: Monthly Number of Cases from (2011-2022)

Source: Ghana Health Service (2022)

4.4.2 Single Group Analysis (Monthly)

The single group analysis was chosen for the study in large part due to the fact that the intervention was implemented all throughout the country and there was not a pilot run of the intervention in order to compare the pilot run and the countrywide rollout of the intervention. The ITSA included a total of 134 observations spanning 67 months before and 67 months after the intervention. The Newey-West standard errors with a maximum lag of 1 was applied. The overall model was statistically significant, with an F -statistic of 174.49 and a Prob > F of 0.000. The overall

significant model indicates that the intervention led to meaningful changes in CS. The use of Newey-West adjustment ensured that the results were robust to autocorrelation and heteroskedasticity. Table 6 shows the Newey-West parameter estimate for the national level monthly test statistics.

Table 6: Newey –West Parameter Estimates (National Monthly)

	Coefficient	Std. error	t-value	P> t 	[95% conf. interval]
Intercept	84.7309	21.54688	-3.93	0.000	127.3588, 42.10299
Pre-intervention slope	8.552678	0.5696844	15.01	0.000	7.425625, 9.67973
Level change	278.0878	63.84333	4.36	0.000	151.7814, 404.3942
Slope change	-10.08496	2.318745	-4.35	0.000	-14.67232, -5.497602

Source: Results from ITSA Stata (2022)

As shown in Table 6, the baseline (intercept) value of the CS before the intervention was 84.73 ($p < 0.001$; CI = 127.36, 42.10). This value represents the starting point of the CS at time zero (pre-intervention period) and cases appeared to significantly increase a rate of 8.55 units per month ($p < 0.001$). This change in the pre-intervention slope indicated a positive trend. Following the intervention in August 2016 (level change), the CS experienced an immediate increase of 278.09 units ($p < 0.001$; CI = 151.78, 404.39). This result suggests a significant and abrupt shift in the level of the CS at the time of the intervention. After the intervention, the rate of increase (slope change) in CS decreased by 10.08 units per month ($p < 0.001$), indicating a significant change in the trend. This negative slope change (CI = -14.67 to -5.50) suggests that the intervention not only caused an immediate level shift but also influenced the trajectory of the CS over time, slowing down the upward trend that preceded it. At the national level, the intervention resulted in a 228.2% immediate increase in the number of CS cases with a 217.9% reduction in the rate of growth post-intervention ($p < 0.001$). Appendix 5 provides the Cumby-Huizinga test for autocorrelation for the national level single group monthly level analysis.

It is also evident from Table 7, the results for the post-intervention linear trend show that the treated group experienced a negative slope change of -1.53 units per time month, suggesting a decrease in the rate of change of the CS after the intervention. However, this result was not statistically significant ($p = 0.497$, CI = 5.99 to 2.92, $t = -0.68$).

Table 7: Post-Intervention Linear Trend (National Monthly)

Linear Trend	Coefficient	Std. error	t-value	P> t	[95% Conf. Interval]	
Treated	-1.532285	2.251224	-0.68	0.497	5.986063	2.921493

Source: Results from ITSA Stata (2022)

The regression with Newey–West standard errors in Figure 10 lends credence to Table 6 and confirms the fall in the number of cases from 2011 to 2022. This is in spite of the rise from the first months of the intervention. This and future number of cases is further demonstrated in Table 7 with a projected annual fall of 1.53 cases. This fall is however projected to be higher according to the Prais–Winsten AR (1) Regression in Table 8.

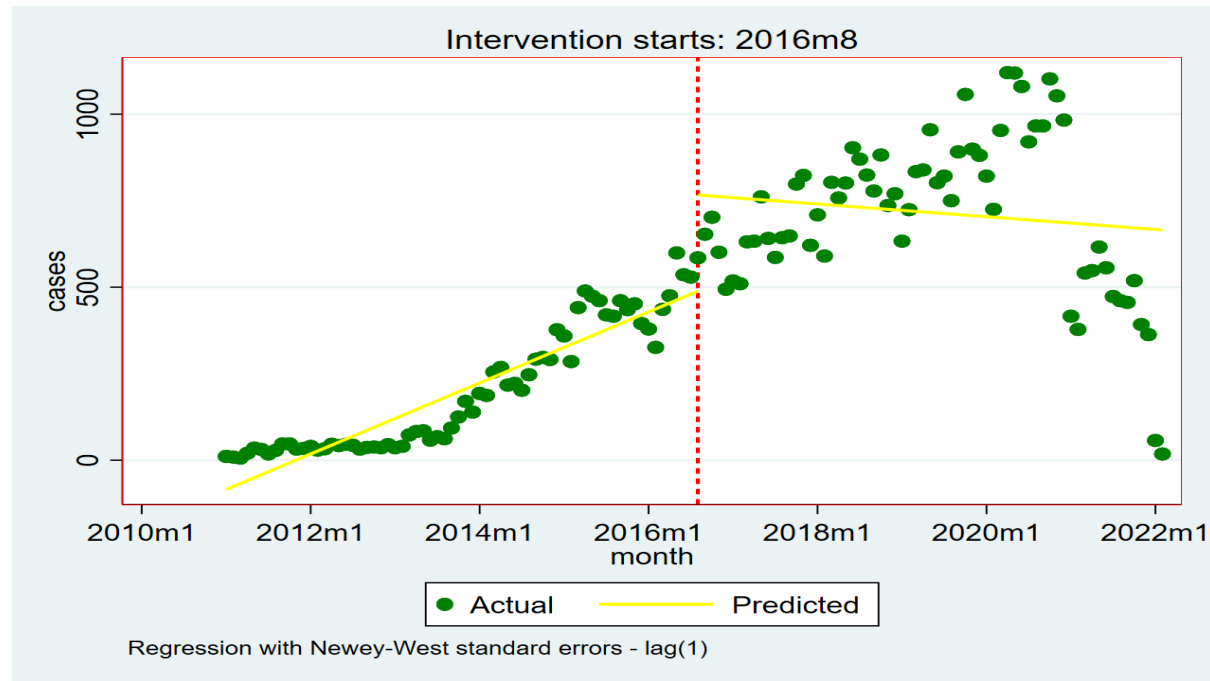


Figure 10: Newey-West Standard Errors Plot (National Monthly)

The Prais–Winsten test, a confirmatory test to the choice of lag showed an improved Durbin–Watson Statistic from 0.332 to 1.810. This presents different outcomes from those in Table 6. This clearly confirms the superiority of the AR(1) process. The results show a significant pre-intervention trend, with the CS increasing by 10.54 units per time month ($p < 0.001$). However, the intervention did not lead to a statistically significant level change ($\beta = 127.44$, $p = 0.156$). While the

immediate effect was not significant, the post-intervention trend was significantly altered, with the rate of increase in CS decreasing by 12.98 units per month ($p = 0.003$). This suggests that the intervention had a long-term effect, reducing the upward trend in the CS over time.

Table 8: Prais-Winsten AR (1) Parameter Estimates (National Monthly)

	Coefficient	Std. error	t	P> t 	[95% conf. interval]
Intercept	108.6984	108.1289	-1.01	0.317	322.6186, 105.2217
Pre-intervention slope	10.53884	2.55626	4.12	0.000	5.481584, 15.59609
Level change	127.4421	89.26167	1.43	0.156	-49.15139, 304.0357
Slope change	-12.98272	4.240911	-3.06	0.003	-21.37285, -4.592583

Durbin–Watson statistic (original) = 0.331861; Durbin–Watson statistic (transformed) = 1.8095980

This notwithstanding, Figure 10 and Figure 11 present similar outcomes in terms of the trajectory of the number of cases before and after the intervention.

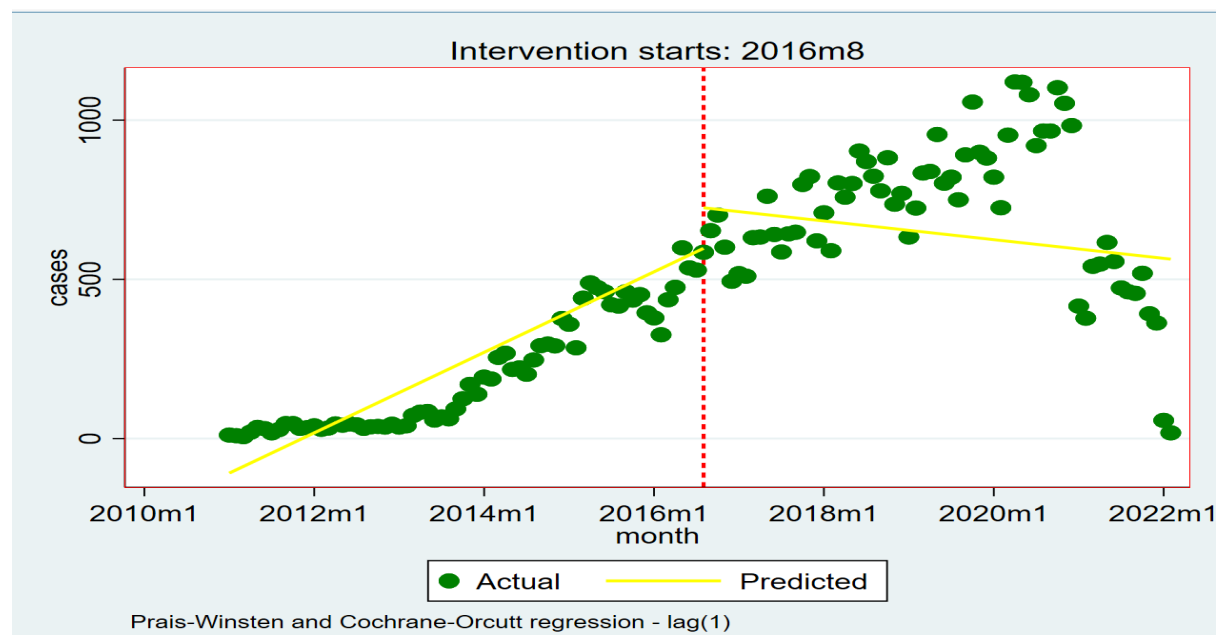


Figure 11: Prais-Winsten and Cochrane-Orcutt Regression (National Monthly)

Adjusting for the effects of autocorrelation and heteroskedasticity, the outcome in Table 7 and Table 9, the Post-intervention Linear Trend for Regression with Newey–West standard errors and Prais–Winsten AR(1) Regression respectively appear different (-1.53 and -2.44 cases), a further

demonstration of the difference between and AR(1) process for the Newey–West and an AR(1) for the Prais–Winsten post estimate.

Table 9: Prais–Winsten AR (1) Post-Intervention Linear Regression (National Monthly)

Linear Trend	Coefficient	Std. error	t-value	P> t	[95% Conf. Interval]	
Treated	-2.443881	2.55626	-0.96	0.341	-7.501135	2.613373

Source: Results from ITSA Stata (2022)

Figure 12 provides a clearer trajectory accounting for both the actual and projected fall in cases presented in Figure 10 and Figure 11. In Figure 12, it can be observed that there was a sharp fall in January 2021 and thereafter continued to decline in November 2021 through February 2022 with a slight variation in the months after January 2021 to November 2021.

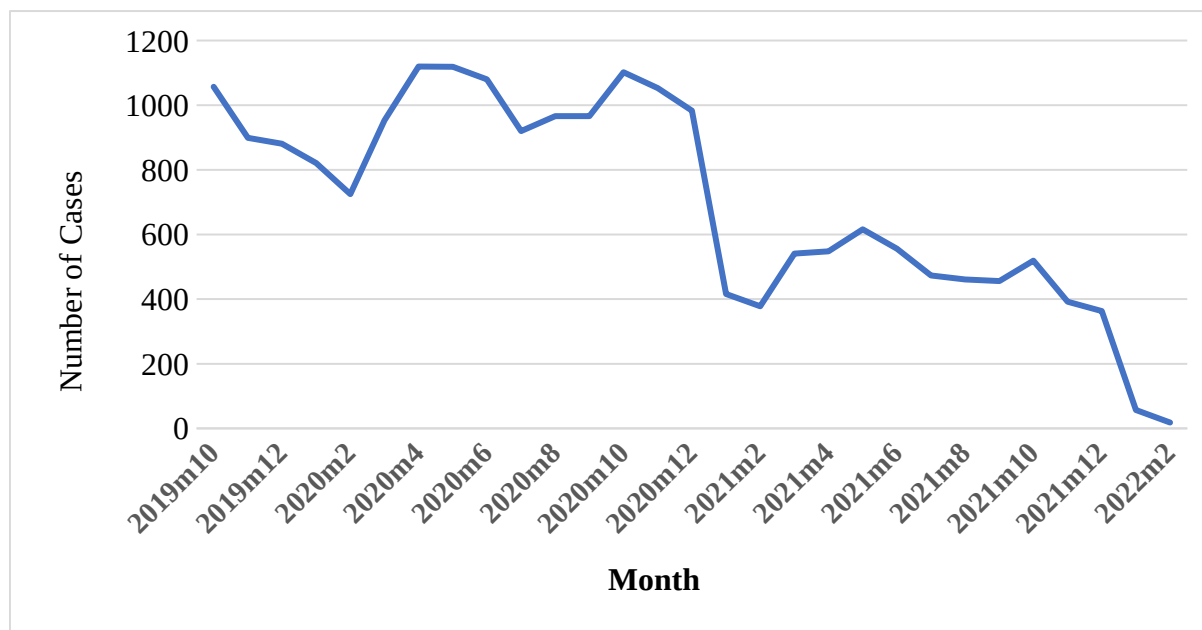


Figure 12: Prais–Winsten and Cochrane–Orcutt trajectory (National Monthly)

4.4.3 Single Group Analysis (Daily)

Table 10 shows the Newey-West parameter estimate for the national level daily test statistics. The overall model was statistically significant, with an F -statistic of 2327.5 and a Prob > F of 0.000. The overall significant model indicates that the intervention led to meaningful changes in daily CS.

Table 10: Newey –West Parameter Estimates (National Daily)

	Coefficient	Std. error	t-value	P> t 	[95% conf. interval]	
Intercept	-2.918099	.1650862	-17.68	0.000	-3.241758	-2.594439
Pre-intervention slope	0.092839	.0001889	49.16	0.000	0089136	.0096542
Level change	-.0107507	.0005808	-18.51	0.000	-.0118894	-.009612
Slope change	-10.08496	2.318745	-4.35	0.000	-14.67232,	-5.497602

Source: Results from ITSA Stata (2022)

The estimated intercept of -2.9181 is statistically significant ($p < 0.001$), indicating that, before the intervention, the CS was significantly below zero. The coefficient for the pre-intervention slope is 0.0928 ($p < 0.001$), which is highly significant. This suggests that before the intervention, the CS increased at a rate of approximately 0.0928 units. The coefficient for the level change is -0.0108 ($p < 0.001$), indicating a significant decrease in the CS following the intervention. The coefficient for the slope change is -10.085 ($p < 0.001$), indicating a substantial reduction in the rate of change of the CS post-intervention. Appendix 6 provides the Cumby-Huizinga test for autocorrelation for the national level single group daily level analysis.

The results for the post-intervention linear trend (Table 11) show that the treated group experienced a negative slope change of -1.53 units per time month, suggesting a decrease in the rate of change of the CS after the intervention. This result was statistically significant ($p = 0.003$, CI = -0.003.99 to -0.0004, $t = -2.67$).

Table 11: Post-Intervention Linear Trend (National Daily)

Linear Trend	Coefficient	Std. error	t-value	P> t 	[95% Conf. Interval]
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Treated	-.0014668	.0005493	-2.67	0.003	-.0025436	-.0003899
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Source: Results from ITSA Stata (2022)

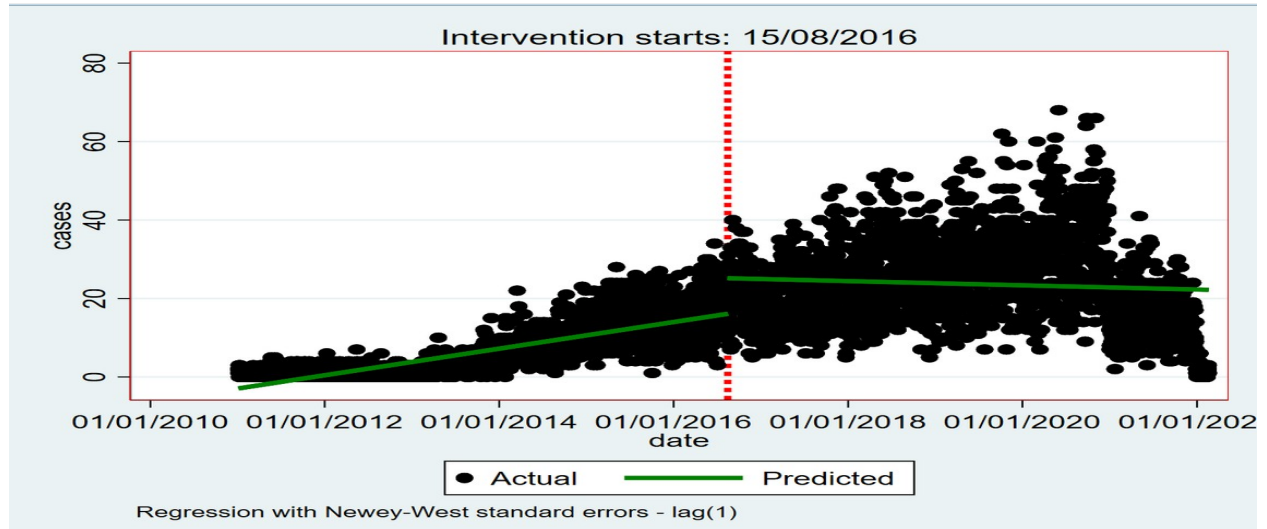


Figure 13: Newey-West Standard Errors Plot (National Daily)

Figure 13 shows that the average daily number of cases was already rising before the intervention began. This linear trend following the intervention shows a projected daily fall of 0.0014668 in instances after 2020, further illustrating the trajectory shown in Table 10. Results in Table 12 show a significant baseline effect of the CS before the intervention, with a negative value ($\beta = -2.90$, $p < 0.001$). Prior to the intervention, the CS increased significantly ($\beta = 0.01$, $p < 0.001$) which significantly resulted in a positive level change ($\beta = 9.14$, $p < 0.001$). Post-intervention, the rate of increase in the CS significantly decreased ($\beta = -0.01$, $p < 0.001$). The Durbin-Watson test's transformed result has increased from 0.996657 to 2.084228 thanks to the use of the appropriate AR (1) method (see appendix 5).

Table 12: Prais-Winsten AR (1) Parameter Estimates (National Daily)

	Coefficient	std. error	t	P> t	[95% conf. interval]	
Intercept	-2.89703	.6392317	-4.53	0.0000	-4.150275	-1.643785
Pre-intervention slope	.0092601	.0005404	17.13	0.0000	.0082005	.0103196
Level change	9.141882	.9056761	10.09	0.0000	.36626	-10.9175

Slope change	-.0107757	.0007752	-13.90	0.0000	-.0122955	-.0092559
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Durbin–Watson statistic (original) = 0.996657; Durbin–Watson statistic (transformed) = 2.084228

Having adjusted for autocorrelation and heteroskedasticity, in Table 13, the post-intervention linear trend resulting from both the Newey–West estimates and Prais–Winsten for AR (1) estimates appear very similar, -0.0014668 and -0.0015156 in Table 11 and Table 13 respectively with both suggesting a downward trend in the number of cases. The results in Table 13 indicate that the intervention leads to a significant reduction in the CS. Specifically, the negative coefficient (-0.0015156) suggests that the intervention has a small but statistically significant negative effect on the dependent variable, with the effect being highly significant ($p = 0.004$). This is represented graphically as shown in Figure 14.

Table 13: Prais–Winsten AR (1) Post-Intervention Linear Regression (National Daily)

Linear Trend	Coefficient	Std. Error	t	P> t	[95% Conf. Interval]
Treated	-.0015156	.0005541	-2.74	0.004	-.002602, -.0004292

Source: Results from ITSA Stata (2022)

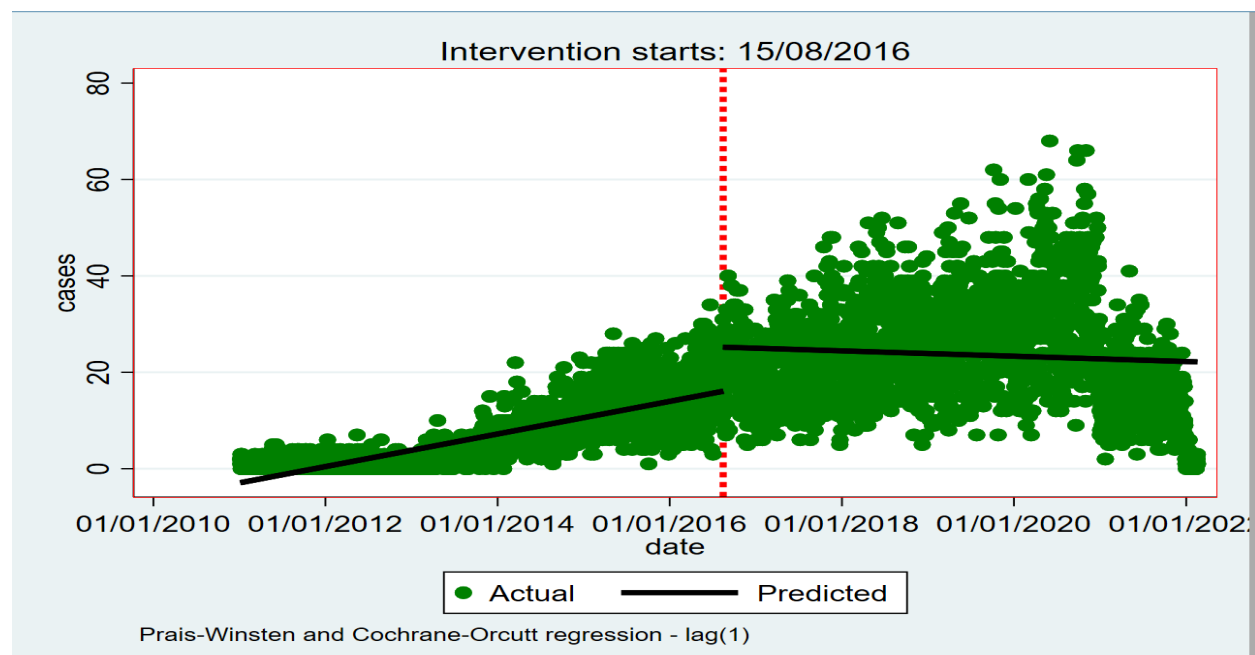


Figure 14: Prais–Winsten and Cochrane–Orcutt Regression (National Daily)

4.5 Discussion

4.5.1 Summary of Overarching Findings

The study evaluated the national impact of the Early Study Leave with Pay scheme on the number of Caesarean Section cases performed across Ghana. The results revealed a 228.2% immediate increase in CS cases following the intervention in August 2016. However, the rate of growth in CS cases slowed post-intervention, with a reduction of 217.9% after the intervention. These findings suggest that while the intervention led to an immediate positive impact, the long-term effectiveness was less pronounced.

A critical question arises regarding whether the observed decline in growth post-intervention remains consistent with the scheme's overarching objectives. It is common for interventions of this nature to witness an initial surge in interest and outcomes, as the intervention captures attention and garners participation. Over time, however, enthusiasm often wanes, leading to a decline in the initial growth trajectory. Importantly, this decline does not necessarily indicate the failure of the intervention; rather, it prompts an evaluation of whether the new levels of performance (in this case, CS cases) remain above the pre-intervention baseline or meet the programme's intended targets.

In this study, while the growth in CS cases decelerated post-intervention, the analysis revealed that the performance levels following the intervention remained significantly above the pre-intervention baseline. This finding suggests that the intervention's core objective—to increase access to critical maternal health services such as Caesarean sections—was still being achieved, albeit at a moderated growth rate. The intervention succeeded in establishing a higher level of service delivery, even though the rate of increase did not persist at the same pace as the immediate post-intervention period.

4.5.2 Interpretation of the Findings

The significant immediate increase in caesarean section cases following the introduction of the Early Study Leave with Pay scheme demonstrates the intervention's short-term effectiveness in achieving its primary objective of increasing the availability of skilled healthcare workers for critical procedures like CS. The initial surge can be understood through the lens of Alderfer's ERG theory. The scheme directly addressed existence needs by providing financial security and material stability. Doctors, particularly those posted to rural or underserved regions, were motivated to stay

at their duty stations because their basic needs such as salaries, allowances, and access to training leave with pay were being secured. This immediate improvement in conditions likely explains the strong initial response, reflected in the rising CS numbers across multiple facilities.

However, the subsequent reduction in the growth rate of CS cases requires deeper interpretation. From an ERG perspective, this pattern illustrates how motivation evolves once initial existence needs are met. Over time, healthcare professionals began to look beyond immediate financial incentives toward relatedness and growth needs. Relatedness needs, such as collegial support, professional recognition, and integration into networks of practice, may not have been adequately addressed in the design of the scheme. Similarly, growth needs such as opportunities for career progression, skill acquisition, and personal development remained limited in many rural postings. When these higher-order needs were not fulfilled, doctors may have experienced frustration, leading to the classic ERG “frustration-regression” effect: professionals regressed to prioritising existence needs, such as financial security or urban amenities, and became less engaged in service delivery. This helps explain why the surge in performance was not sustained and why CS growth stabilised or slowed after the initial gains.

The findings also resonate with broader evidence from the systematic review, which indicated that interventions relying predominantly on financial incentives often produce short-term impacts but struggle with sustainability. Financial security is a powerful motivator, yet its impact diminishes if not coupled with opportunities for professional growth and stronger relational ties in the workplace. For example, the systematic review showed that recognition, supportive supervision, and structured career pathways are critical for sustaining motivation. In the case of the incentive policy, the limited provision of such non-financial elements may have undermined long-term engagement, contributing to the slowing trend in CS volumes.

External and systemic factors further complicate this picture. The COVID-19 pandemic, which overlapped with the intervention period, created severe disruptions in Ghana’s healthcare system. Staff absences, resource shortages, and restrictions on movement all likely constrained CS performance, independent of workforce availability. Supply-side challenges, such as the availability of theatre space, blood supply, or anaesthetic support, also placed limits on the potential impact of additional doctors. From an ERG standpoint, these systemic deficits impaired the fulfilment of both existence needs (e.g., reliable working conditions) and growth needs (e.g.,

opportunities to practice advanced skills in fully resourced settings). The result was a dampening of the scheme's longer-term effect.

Ultimately, the findings highlight the need for a multi-pronged approach to sustaining workforce engagement and service delivery improvements over time. Strategies such as integrating financial and non-financial incentives, addressing systemic healthcare barriers, and establishing robust monitoring systems could enhance the long-term impact of similar interventions. Moreover, a more granular analysis of performance thresholds and contextual factors is essential to determine whether the reduced growth rate in CS cases genuinely reflects a decline in effectiveness or simply a natural stabilisation following an initial surge.

4.5.3 Comparison with Related Evidence in the Literature

The study's findings align with previous literature that demonstrates the positive effect of incentives on increasing healthcare worker presence and motivation (Munga & Mbilinyi, 2008; Pandya et al., 2018). The immediate rise in CS cases reflects similar outcomes in other studies where financial incentives were shown to have an immediate impact on healthcare worker retention and activity. However, the subsequent slowdown in the rate of CS case growth contrasts with findings in Pandya et al. (2018), who suggested that financial incentives could maintain motivation even during challenging times. This discrepancy suggests that the long-term impact of financial incentives can be influenced by factors outside the scope of the intervention itself, such as global crises like the COVID-19 pandemic. Additionally, the study reinforces the importance of combining financial incentives with non-financial motivators, such as career development opportunities and improved working conditions, as emphasized by Ankomah et al. (2016). The positive initial impact of the intervention supports the idea that such combined approaches are more effective than financial incentives alone.

4.5.4 Strengths and Limitations of the Research

The main strength of this study lies in its use of interrupted time series analysis ITSA, which provides a robust framework for evaluating the long-term effects of the intervention on CS rates across the country. The significant increase in CS cases immediately following the intervention is a notable strength, showing the intervention's immediate success. However, a limitation of the study is that it was conducted at the national level, which means it is difficult to identify specific regional or district-level variations in the effectiveness of the intervention. While the national-level trends provide useful insights, further analysis at more localized levels is needed to explore the full impact of the intervention.

4.5.5 Implication of the Study to Policy and Research

The findings suggest that the intervention was effective in increasing healthcare worker presence in the short term. However, for continued success, the intervention may need to be adapted to address challenges in sustaining these improvements over time, particularly in the face of external disruptions like the COVID-19 pandemic. Policymakers should consider implementing additional strategies that support long-term workforce retention, such as continuous professional development opportunities, improved working conditions, and strengthening the resilience of healthcare systems.

4.6 Conclusion

The findings of this study demonstrate that the Early Study Leave with Pay intervention was effective in achieving its primary objective of increasing access to critical healthcare services, such as Caesarean sections, by addressing healthcare workforce shortages. The intervention successfully incentivised healthcare workers to take up postings in underserved areas, leading to a marked improvement in healthcare delivery at the national level. However, the long-term sustainability of the intervention's impact was less pronounced, with evidence of a slowdown in the growth of Caesarean section cases over time. Despite this, the intervention's outcomes remained above pre-intervention levels, indicating that it still fulfilled its core purpose of enhancing healthcare access. This underscores its value as a policy tool while highlighting the need to address systemic and contextual factors that may influence its sustained effectiveness.

The next chapter builds on these national-level findings by focusing on the regional and district-level impact of the intervention. This shift allows for a more granular analysis of how the intervention was applied across different regions and districts, providing deeper insights into the varying effects of the intervention. By linking national-level trends to regional-district outcomes, the study will offer a clearer understanding of how national-level incentives translate into actual improvements in healthcare delivery at the localized level.

CHAPTER FIVE

ASSESSING THE EFFECTIVENESS OF THE HEALTH INTERVENTION PACKAGE AT DISTRICTS AND REGIONS

5.1 Introduction

In chapter four, the effectiveness of the Early Study Leave with Pay intervention was examined across Ghana. The findings indicate that the intervention had a significant impact. However, it is not reasonable to conclude that the intervention was uniformly successful across all districts and regions in Ghana. Understanding regional and district-level variations is critical because such differences could highlight disparities in access, resource allocation, or implementation efficacy. Evaluating these differential effects provides insights into the challenges and limitations of the intervention and allows policymakers to target areas that may not have benefited as intended.

Without such an analysis, we risk overgeneralizing the results and overlooking inequities that could undermine the overall success of the intervention.

As a result of this, the effectiveness of the health intervention at the district and regional levels is evaluated in this chapter to ascertain its success at those levels. Examining the regional and district-level outcomes is not merely an exercise in disaggregation but a crucial step in identifying disparities in the intervention's impact. Such an analysis allows for a nuanced understanding of whether specific areas were disproportionately advantaged or disadvantaged, which can inform more equitable health policy decisions. By situating this evaluation within the broader national framework, the discussion critically assesses whether the intervention's design and implementation met its intended goals or inadvertently exacerbated existing inequities. This approach ensures that the findings contribute to a more informed and contextually relevant discourse on health interventions in Ghana.

5.2 Methodology

The methodology employed in this chapter builds upon the analytical framework established in the previous chapter, with adaptations to explore the intervention's impact at regional and district levels. The outcome variable (Y_{it}) represents the number of monthly CS cases in region or district i at time t . The model includes three key predictors: time (T) to capture baseline trends, intervention (I) to mark the onset of the policy, and an interaction term ($T \times I$) to assess changes in trend following the intervention. Mathematically, the model is specified as:

$$Y_{it} = \beta_0 + \beta_1 T + \beta_2 I + \beta_3 (T * I) + \gamma_i + \varepsilon_{it}$$

Where γ_i captures unobserved time-invariant characteristics such as healthcare infrastructure fixed effect for region or district i and t is the time index. ε_{it} is the error term adjusted for autocorrelation and heteroscedasticity. β_0 , β_1 , β_2 and β_3 represent the coefficient of the intercept, the pre-intervention trend, immediate change in level post-intervention and slope change attributable to the intervention respectively. The regional and district models incorporate fixed effects to control for unobserved heterogeneity across administrative units. These effects account for structural differences, such as variations in healthcare infrastructure and socioeconomic conditions, that could influence baseline trends and intervention responses. Weighted regression was employed to

address disparities in caseloads across districts and regions, ensuring that estimates accurately reflect the intervention’s relative impact.

These modifications enhance the study’s ability to identify nuanced patterns and causal relationships. For instance, the interaction between spatial fixed effects and the intervention term provides insights into whether policy impacts were consistent or varied across geographic areas. By addressing such variations, this chapter situates its findings within the broader context of equity and effectiveness in health interventions, contributing to the literature on targeted health policy analysis (Bernal et al., 2017; Linden, 2015).

5.3 Findings

5.3.1 Descriptive Statistics

Table 14 illustrates the regional distribution of cases before and after the implementation of the Early Study Leave with Pay intervention. The Volta region is recorded to have the highest cases of CS both before and after the intervention followed by the Ashanti and the Western region. The combined cases of the Northern, Upper East, and West regions accounted for 20% of the total number of CS from 2011 to 2022 demonstrating a clear indication of the presence of doctors in the less developed regions in Ghana.

Table 14: Regional distribution of CS cases

Region	CS cases before intervention	CS cases after intervention	Total CS Cases	Type of locality
Ashanti	1927 (14.55%)	7963 (16.36%)	9890	Largely urban
Brong Ahafo	842 (6.36%)	1772 (3.64%)	2614	Largely rural
Central	1235 (9.33%)	4425 (9.09%)	5660	Largely rural
Eastern	992(7.49%)	3539 (7.27%)	4531	Largely urban
Greater Accra	1388 (10.48%)	5310 (10.91%)	6698	Largely urban
Northern	691 (5.22%)	889 (1.83%)	1580	Largely rural
Upper East	1582 (11.95%)	6196 (12.73%)	7778	Largely rural
Upper West	870 (6.57%)	2653 (5.45%)	3523	Largely rural
Volta	1945 (14.69%)	8849 (18.18%)	10794	Largely rural
Western	1769 (13.36%)	7082 (14.55%)	8851	Largely rural

Total	13241	48678	61919
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Source: Results from ITSA Stata (2022)



Figure 15: Map of Ghana showing the 10 administrative regions

Source: <https://onlinelibrary.wiley.com/doi/full/10.1155/2019/3813298>

Table 15 shows the before and after district distribution of CS cases. The total number of CS cases increased from 24,142 before the intervention to 37,777 after the intervention, highlighting the positive impact of the intervention in enhancing access to CS services across the districts. Several districts made notable contributions to the overall number of CS cases. For example, Manhyia accounted for the highest percentage of total cases, with 10.44% of the overall number, showing a

significant increase from 3,103 cases before the intervention to 3,361 cases afterward. Similarly, Kpando and Dangme West represented 9.24% and 8.98% of the total cases, respectively, demonstrating a significant rise in their contributions post-intervention. Bawku, which recorded 2,703 cases both before and after the intervention, also remained a significant contributor at 8.73% of the total. Elembelle (6.87%), Sunyani (6.36%), and Mfantseman (5.70%) also exhibited substantial growth in CS cases, reflecting the broader impact of the intervention. Conversely, districts such as Sissala East and Awutu showed relatively minimal contributions, representing only 0.08% and 0.06% of the total cases, respectively.

Table 15: District distribution of CS cases

District	CS cases before intervention	CS cases after intervention	Total CS Cases	Type of locality
Afigya Sekyere	705	1431	2136 (3.45%)	Rural
Amansie East	143	266	409 (0.66%)	Rural
Awutu	17	20	37 (0.06%)	Rural
Bawku	2703	2703	5406 (8.73%)	Urban
Bolga	69	80	149 (0.24%)	Urban
Dangme West	2724	2836	5560 (8.98%)	Rural
Elembelle	1787	2467	4254 (6.87%)	Rural
Ho	486	759	1245 (2.01%)	Urban
Jirapa	422	1689	2111 (3.41%)	Rural
Kasena-Nankana	333	1518	1851 (2.99%)	Rural
Keta	788	1342	2130 (3.44%)	Urban
Kpando	2002	3719	5721 (9.24%)	Urban
Kpeshie	437	492	929 (1.50%)	Urban
Manhyia	3103	3361	6464 (10.44%)	Urban
Mfantseman	1267	2262	3529 (5.70%)	Rural
Nadowli	382	1526	1908 (3.08%)	Rural
Oguaaman	906	1304	2210 (3.57%)	Urban
Okwahu South	575	793	1368 (2.21%)	Rural
Okwahu West	1338	1925	3263 (5.27%)	Rural
Sagnarigu	135	261	396 (0.64%)	Rural
Sissala East	13	38	51 (0.08%)	Rural
Sunyani	1103	2835	3938 (6.36%)	Urban

Region	Number of Observations	Maximum Lag	F	Prob>F
Ashanti	9890	1	347.91	0.0000
Brong Ahafo	2614	1	347.91	0.0000
Central	5660	1	201.3	0.0000
Eastern	4530	1	191.89	0.0000
Greater Accra	6698	1	347.71	0.0000
Northern	1577	1	63.65	0.0000
Upper East	7779	1	63.65	0.0000
Upper West	3523	1	35.56	0.0000
Volta	10794	1	283.26	0.0000
Western	8851	1	433.5	0.0000

NB: Maximum Lag: the highest lagged observation included in the analysis to account for autocorrelation in the data; F: F-statistic from the regression model, indicating the ratio of explained to unexplained variance in the data; Prob > F: The p-value associated with the F-statistic, assessing the significance of the overall model.

The results presented in Table 17 outline the Newey–West parameter estimates for regional analyses. Ashanti and Brong Ahafo had relatively high intercepts (0.5156), suggesting high CS cases before the intervention. In contrast, the Western region had a much smaller intercept (0.0692), indicating a lower number of CS cases. These differences highlight regional disparities in the initial conditions prior to the intervention, which may have influenced the observed effects.

The pre-intervention slope reflects the trend in the CS cases before the intervention. Greater Accra (0.0034) and Central (0.0025) exhibited relatively steep positive trends, indicating consistent growth in the CS cases. In contrast, the Northern and Upper East, with slopes of 0.0003, showed much slower growth before the intervention. These findings suggest that the regions were evolving at different rates, which may have influenced the extent of the intervention’s impact.

The level change measures the immediate effect of the intervention, capturing any abrupt shifts in CS cases. Positive level changes were observed in Ashanti and Brong Ahafo (1.9328) Western (1.6954), Upper West (0.1905) and Eastern (0.1751) indicating that the intervention led to a significant immediate increase in CS in these areas. However, Central (-0.4805) and Greater Accra (-0.3331), Volta (-0.1443), Northern and Upper East (-0.0754) experienced immediate declines post-intervention, signalling that the intervention may not have had a uniform positive impact across all regions.

The slope change quantifies how the post-intervention trend deviated from the pre-intervention trend. In most regions, including Ashanti (-0.0021), Volta (-0.0019), and Greater Accra (-0.0025), negative slope changes were observed, indicating that the rate of growth in CS slowed down after the intervention. This finding suggests that while the intervention may have had an immediate effect, its influence on the longer-term trend was less pronounced. Notably, in the Northern and Upper East, the slope changes were negligible (0.0000), suggesting minimal alteration to the trend in these areas.

Overall, significant positive changes in CS cases were observed in Western, Ashanti, Brong Ahafo, and Upper West, with percentage increases ranging from 32% to 2451% ($p < 0.001$). In contrast, Greater Accra, Central, Northern, Upper East and Volta experienced negative impacts, with decreases in CS cases from -15% to -2623% ($p < 0.001$).

Table 17: Newey –West Parameter Estimates (Regional)

	Intercept	Pre-intervention slope	Level change	Slope change
Ashanti	0.5156***	0.0014***	1.9328***	-0.0021***
Brong Ahafo	0.5156***	0.0014***	1.9328***	-0.0021***
Central	0.2358***	0.0025***	-0.4805***	-0.0025***
Eastern	0.000***	0.0016***	0.1751***	-0.0028***
Greater Accra	0.0127***	0.0034***	-0.3331***	-0.0025***
Northern	0.4847***	0.0003***	-0.0754***	0.0000***
Upper East	0.4847***	0.0003***	-0.0754***	0.0000***
Upper West	0.5871***	0.0018***	0.1905***	-0.0020***
Volta	0.4699***	0.0014***	-0.1443***	-0.0019***
Western	0.0692***	0.0020***	1.6954***	-0.0030***

*** $p < 0.001$

Source: Results from ITSA Stata (2022)

To ensure that the level of errors in unequal variance is reduced, the study conducted an adjustment using the Newey-West standard error test for autocorrelation and heteroskedasticity, the post-intervention linear trend appears to have improved, with only Ashanti, Brong Ahafo, Upper West,

Volta, and Western Regions exhibiting declines (Table 18). The Eastern region had the highest increment in CS cases post-intervention ($\beta = 0.00161$), followed by the Greater Accra region ($\beta = 0.00088$). The Northern (0.00033) and Upper East (0.00033) regions also experienced growth in CS cases, indicating a positive impact of the intervention in some rural and underserved areas.

Table 18: Post-Intervention Linear Trend (Regional)

Region	Coefficient	Std. error	t-value	P> t	95% Conf. Interval	
					Min	Max
Ashanti	-0.00071	0.00011	-6.48000	0.000	-0.00093	-0.00050
Brong Ahafo	-0.00071	0.00011	-6.48000	0.000	-0.00093	-0.00050
Central	0.00002	0.00007	0.33000	0.738	0.73800	0.00016
Eastern	0.00161	0.00012	13.85000	0.000	0.00000	0.00138
Greater Accra	0.00088	0.00013	6.59000	0.000	0.00061	0.00114
Northern	0.00033	0.00006	5.72000	0.000	0.00022	0.00044
Upper East	0.00033	0.00033	5.72000	0.000	0.00022	0.00044
Upper West	-0.00013	0.00007	-1.84000	0.066	-0.00026	-0.00008
Volta	-0.00054	0.00008	-7.01000	0.000	-0.00069	-0.00039
Western	-0.00103	0.00010	-9.90000	0.000	-0.00123	-0.00083

Source: Results from ITSA Stata (2022)

5.3.3 Single Group Analysis (Districts)

All Newey–West model diagnostics (Table 19) are significant ($p < 0.001$), except for Afigya Sekyere, Awutu, and Ho, which were insignificant. The overall significance of the model indicates that the intervention led to meaningful changes in CS, while the insignificant results in these districts suggest variability in the intervention’s impact across different areas.

Table 19: Newey –West Model Diagnostics (District)

District	Number of Observations	Maximum Lag	F	Prob>F
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Afigya Sekyere	2136	1	2.28	0.0779
Amansie East	409	1	5.3	0.0012
Awutu	37	1	0.32	0.8102
Bawku	5405	1	167.9	0.0000
Bolga	149	1	26.87	0.0000
Dangme West	5560	1	404.5	0.0000
Elembelle	4254	1	62.58	0.0000
Ho	1245	1	0.61	0.6080
Jirapa	2111	1	41.42	0.0000
Kasena-Nankana	1851	1	67.14	0.0000
Keta	2130	1	132.3	0.0000
Kpando	5721	1	132.3	0.0000
Kpeshie	929	1	76.55	0.0000
Manhyia	6464	1	193.1	0.0000
Mfantsiman	3529	1	23.9	0.0000
Nadowli	1907	1	21.55	0.0000
Oguaaman	2210	1	4.84	0.0000
Okwahuman South	1368	1	70.32	0.0000
Okwahuman West	3263	1	293.8	0.0000
Sagnarigu	396	1	42.96	0.0000
Sissala East	50	1	5.62	0.0008
Sunyani	3938	1	7.17	0.0001
Takoradi	2693	1	6.9	0.0001
Tamale	2842	1	28.58	0.0000
Wassa-West	1319	1	17.69	0.0000

NB: Maximum Lag: the highest lagged observation included in the analysis to account for autocorrelation in the data;
F: F-statistic from the regression model, indicating the ratio of explained to unexplained variance in the data; Prob > F:
The p-value associated with the F-statistic, assessing the significance of the overall model.

Table 20: Newey–West Parameter Estimates (District)

Intercept	Pre-intervention slope	Level change	Slope change
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Afigya Sekyere	1.6526	-0.0116	0.6318	0.0115
Amansie East	0.0544***	0.0021***	-0.0646***	-0.0021***
Awutu	0.0443	-0.0001	0.0179	0.0001
Bawku	0.4909***	0.0008***	-0.2041***	-0.0002***
Bolga	0.0225***	0.0000***	0.0545***	0.0001***
Dangme West	-0.0269***	0.0025***	-0.3118***	-0.0012***
Elembelle	0.2960***	0.0079***	-0.2361***	-0.0071***
Ho	0.4175	0.0001	-0.0281	0.0000
Jirapa	0.2029***	0.0011***	-0.2445***	-0.0008***
Kasena-Nankana	0.7279***	-0.0004***	-0.1517***	0.0011***
Keta	-0.0847***	0.0017***	-0.4566***	-0.0020***
Kpando	-0.0847***	0.0017***	-0.4566***	-0.0020***
Kpeshie	0.5516***	0.0001***	0.1571***	-0.0006***
Manhyia	0.6762***	0.0010***	-0.0436***	0.0002***
Mfantsiman	0.6491***	0.0018***	-0.3171***	-0.0017***
Nadowli	0.3948***	0.0007***	0.2037***	-0.0008***
Oguaaman	0.5568***	0.0003***	-0.1950***	-0.0003***
Okwahuman				
South	0.6305***	0.0011***	0.0000***	0.0000***
Okwahuman West	0.5866***	0.0014***	0.0000***	0.0000***
Sagnarigu	0.2174***	-0.0002***	0.0684***	0.0003***
Sissala East	0.2417***	-0.0250***	0.1195***	0.0251***
Sunyani	2.4255***	-0.0315***	0.7147***	0.0317***
Takoradi	0.5780***	0.0003***	-0.0162***	-0.0003***
Tamale	0.9610***	-0.0004***	0.0922***	0.0007***
Wassa-West	1.0340***	-0.0007***	-0.0697***	0.0007***

*** $p < 0.001$

Source: Results from ITSA Stata (2022)

It can be seen from Table 20 above that most districts had positive intercepts suggesting an increase in CS cases before the intervention. While the pre-intervention trends remained relatively stable, some districts experienced declines in CS cases. For instance, Sunyani, Afigya Sekyere and Wassa-

West had high CS cases before the intervention, but the trend declined subsequently in the pre-intervention slope. Others, like Bolga and Ho showed minimal trend pre-intervention. Several districts (e.g., Amansie East, Bawku, Dangme West) experienced negative level changes, suggesting the intervention led to immediate reductions in the CS cases. A few districts, such as Afigya Sekyere and Sunyani observed positive level changes, indicating immediate increases. These findings suggest that the intervention's effects were heterogeneous across districts as is further illustrated in Figure 17.

Overall, key districts showing significant positive changes in CS cases include Dangme West (1159.1%), Keta/Kpando (539.1%), Bolga (242.2%), Nadowli (51.6%), Sissala East (49.4%) and Sagnarigu (31.5%).

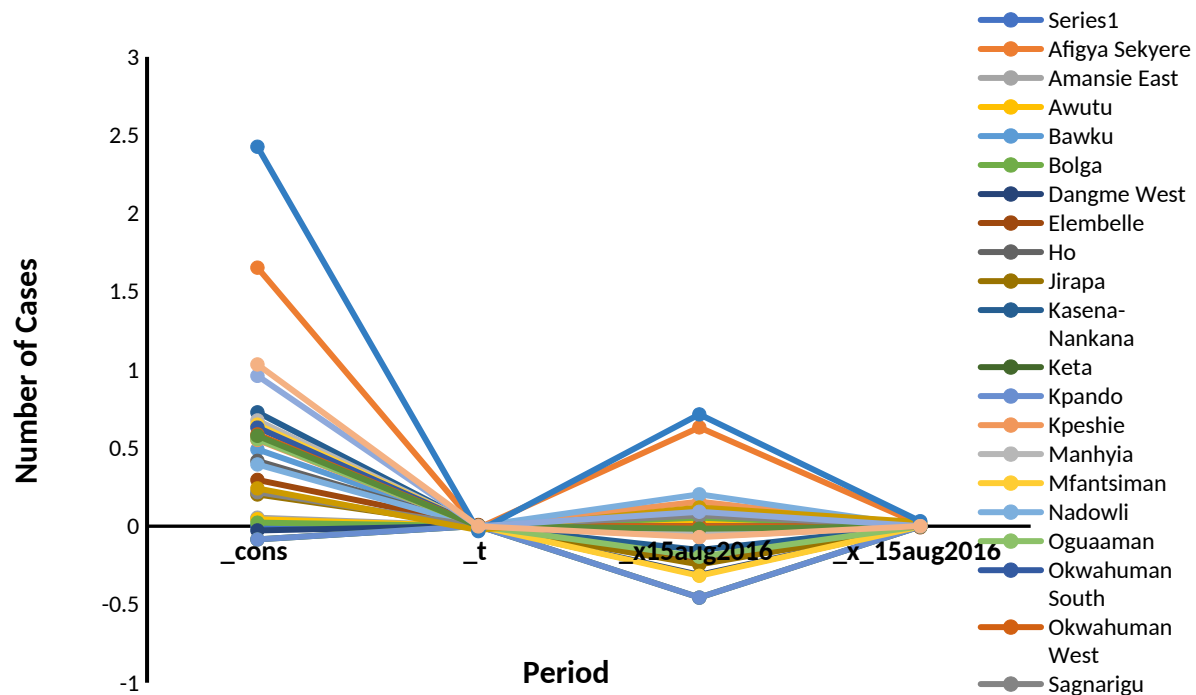


Figure 17: Plot of Newey –West Parameter Estimates (District)

Figure 17 depicts a trajectory showing that there were rises in the number of times previous to the intervention. This trend mostly lasted for a while after the intervention, but then it started to decrease. This dip can be attributed to the general decrease in the number of cases of CS that occurred after the year 2020. The decline in total instances from 2020 to 2021 skews the curve in an unfavourable direction.

Table 21 shows that Dangme West (0.001367), Okwahuman West (0.001440), and Manhyia (0.001185) recorded the highest positive coefficients, indicating strong upward trends in CS cases post-intervention. These trends are statistically significant given their high t-values (e.g., Dangme West: $t=10.85$, Okwahuman West: $t=17.14$). Other districts with significant positive trends include Kasena-Nankana (0.000645), Tamale (0.000340), and Elembelle (0.000810). These increases suggest that the intervention was particularly effective in these areas.

Some districts saw declines in CS cases, such as Keta (-0.000275), Kpando (-0.000275), and Kpeshie (-0.000494). The negative coefficients and significant t-values (Kpeshie: $t=-12.46$) indicate a consistent decrease in these districts. Others, such as Afigya Sekyere (-0.000041), Awutu (0.000000), and Takoradi (-0.000021) exhibit coefficients close to zero with t-values below the threshold for significance. This indicates that the intervention had little to no measurable effect on CS cases in these districts.

Districts in relatively urban or better-developed regions, such as Manhyia (Ashanti) and Dangme West (Greater Accra), showed strong positive trends, reflecting possible synergy between the intervention and existing healthcare infrastructure. Conversely, districts with significant negative trends, like Keta and Kpando, are in the Volta Region, which might suggest challenges unique to that area despite being in a medium Human Development Index (HDI) region.

Table 21: Post-Intervention Linear Trend (District)

District	Coefficient	Std. error	t-value	95% Conf. Interval	
				Min	Max
Afigya Sekyere	-0.000041	0.000046	-0.890000	-0.000131	0.000049
Amansie East	0.000062	0.000020	3.170000	0.000024	0.000100
Awutu	0.000000	0.000011	-0.050000	-0.000021	0.000020
Bawku	0.000678	0.000069	9.880000	0.000544	0.000813
Bolga	0.000043	0.000019	2.260000	0.000006	0.000081
Dangme West	0.001367	0.000126	10.850000	0.001120	0.001615
Elembelle	0.000810	0.000109	7.420000	0.000596	0.001023
Ho	0.000032	0.000043	0.750000	-0.000052	0.000117
Jirapa	0.000325	0.000055	5.880000	0.000216	0.000433
Kasena-Nankana	0.000645	0.000051	12.620000	0.000545	0.000745

Keta	-0.000275	0.000061	-4.510000	-0.000395	-0.000156
Kpando	-0.000275	0.000061	-4.510000	-0.000395	-0.000156
Kpeshie	-0.000494	0.000040	-12.460000	-0.000572	-0.000417
Manhyia	0.001185	0.000119	9.920000	0.000950	0.001419
Mfantseman	0.000082	0.000058	1.410000	-0.000032	0.000195
Nadowli	-0.000063	0.000059	-1.060000	-0.000179	0.000053
Oguaaman	0.000067	0.000040	1.670000	-0.000012	0.000146
Okwahuman South	0.001142	0.000136	8.390000	0.000875	0.001410
Okwahuman West	0.001440	0.000084	17.140000	0.001275	0.001605
Sagnarigu	0.000126	0.000022	5.870000	0.000084	0.000168
Sissala East	0.000054	0.000014	3.870000	0.000027	0.000082
Sunyani	0.000287	0.000079	3.650000	0.000133	0.000441
Takoradi	-0.000021	0.000045	-0.470000	-0.000109	0.000066
Tamale	0.000340	0.000058	5.880000	0.000227	0.000453
Wassa-West	-0.000008	0.000047	-0.160000	-0.000100	0.000085

Source: Results from ITSA Stata (2022)

5.4 Discussion

5.4.1 Summary of Overarching Findings

The intervention showed notable regional disparities in its impact. While the intervention succeeded in increasing the number of doctors practicing in rural areas, the effects varied by regions. Significant positive changes in CS cases were observed in Western, Ashanti, Brong Ahafo, and Upper West, with percentage increases ranging from 32% to 2451% ($p < 0.001$). In contrast, Greater Accra, Central, Northern, Upper East and Volta experienced negative impacts, with decreases in CS cases from -15% to -2623% ($p < 0.001$). Key districts showing significant positive changes in CS cases include Dangme West (1159.1%), Keta/Kpando (539.1%), Bolga (242.2%), Nadowli (51.6%), Sissala East (49.4%) and Sagnarigu (31.5%). Temporal trends highlighted a steady increase in CS cases before the COVID-19 pandemic, after which a decline occurred, likely due to pandemic-related disruptions.

5.4.2 Interpretation of the Findings

The regional variation in caesarean section cases sheds light on how the intervention played out differently across Ghana's diverse socio-economic and healthcare landscapes. The most pronounced improvements occurred in rural regions such as the Northern and Upper East, areas historically characterised by acute shortages of skilled staff, low Human Development Index scores, and constrained healthcare access. From the perspective of ERG theory, this can be interpreted as evidence that the scheme strongly addressed the existence needs of healthcare workers in these settings. For doctors working in remote and resource-poor areas, the assurance of financial stability and guaranteed leave with pay met their most immediate concerns. Consequently, their willingness to remain in post and contribute to service delivery translated into measurable improvements in CS performance.

In contrast, urbanised regions such as Greater Accra and Ashanti experienced plateauing or even declines in CS volumes. These regions are relatively advantaged, with more established infrastructure, stronger professional networks, and better baseline staffing levels. In these settings, doctors' existence needs were already comparatively satisfied prior to the intervention. Thus, the marginal effect of additional financial incentives was weaker. Instead, doctors in urban centres were more motivated by relatedness and growth needs, such as opportunities for specialist training, recognition from peers, and access to advanced medical technologies. Since the incentive policy did little to expand these higher-order motivators, doctors in urban areas may have seen less reason to alter their behaviour in response to the policy. In some cases, the intervention may have even redirected personnel away from urban hospitals toward rural assignments, reflecting the scheme's redistributive intent but leaving urban facilities with stagnant or reduced outputs.

This interpretation reflects a broader policy paradox. While the scheme's success in rural regions demonstrates its effectiveness at addressing existence needs and correcting geographic inequities, it also raises the risk of unanticipated consequences in urban areas. Urban hospitals continued to face high demand, and reduced staffing could exacerbate existing bottlenecks, particularly in large referral centres. The ERG framework helps explain this trade-off: incentives that primarily target existence needs will have stronger effects in deprived areas, but unless they also satisfy relatedness and growth, their impact in urban regions will be modest, and may even produce imbalances.

Another important dimension is the role of frustration-regression. In rural regions, once basic existence needs were secured, unmet relatedness and growth needs may have gradually resurfaced, potentially leading to dissatisfaction or attrition over time. This may explain why the strong rural gains were most visible in the short-to-medium term, with questions remaining about their sustainability. In urban regions, the frustration of growth needs such as limited opportunities for specialist advancement due to redistribution may have contributed to declines in performance, as doctors focused their energies elsewhere or resisted transfers.

The COVID-19 pandemic adds another layer to this interpretation. Regions with weaker health systems may have been more severely disrupted by the pandemic, affecting CS volumes irrespective of staff redistribution. At the same time, urban centres, which bore the brunt of case surges, may have had to divert surgical staff toward emergency COVID response, further influencing observed trends. These contextual factors interact with ERG needs, as pandemic disruptions undermined both existence (safe and stable working conditions) and growth (opportunities to practice and advance skills).

Taken together, the findings illustrate that the effectiveness of incentive schemes is profoundly context dependent. The intervention succeeded where existence needs were most pressing but faltered where higher-order motivators dominated. Future policies should be more adaptive, layering financial security with robust professional networks, specialist training pathways, and systemic strengthening to ensure that both rural and urban healthcare workers can have their needs met in a balanced and sustainable manner.

5.4.3 Comparison of Findings with Related Evidence in the Literature

The study's findings align with prior research on the impact of incentives in healthcare delivery. Levine et al. (2021) found that community-based health interventions with incentives were particularly effective in rural regions, a result mirrored in the increased CS cases in Ghana's Northern and Upper East regions. Similarly, Ankomah et al. (2016) highlighted the importance of non-monetary incentives, such as a conducive working environment, which aligns with this study's finding that regions with better infrastructure, like the Volta region, recorded higher CS cases. However, McGrail et al. (2018) emphasized the role of medical graduates with regional ties in sustaining rural healthcare services, a factor that was not explicitly examined in this study but could provide insights into the varying regional outcomes observed. Furthermore, the decline in CS cases during the COVID-19 pandemic underscores systemic vulnerabilities, contrasting with studies like Pandya et al. (2018), which reported the robustness of financial incentives in maintaining motivation during crises.

5.4.4 Strengths and Limitations of the Research

A key strength of this research is its comprehensive analysis of both regional and temporal trends, providing granular insights into the intervention's impact. The use of Interrupted Time Series Analysis allowed for robust evaluation of pre- and post-intervention trends. However, the lack of a comparison group (except the use of counterfactual) limits the ability to draw causal inferences. Additionally, the emergence of COVID-19 and its associated lockdowns were not accounted for, which could confound the observed effects. While the analysis demonstrates significant changes in Caesarean section provision across regions and districts, it is important to note that the results are based on absolute case counts. These figures do not account for differences in population size across regions or districts. As a result, the interpretation of changes in service delivery should be treated with some caution, since regions with larger populations may naturally record higher numbers of cases. Population-standardised rates (e.g., cases per 1,000 deliveries or per capita) would have provided additional nuance and may have altered the relative magnitude of observed effects. However, due to data constraints, such population-adjusted estimates could not be calculated.

5.4.5 Implication of the Study to Policy and Research

The current study examined the effectiveness of the health intervention at the district and regional levels. The findings demonstrate that the presence of doctors at institutions across all districts and regions led to a measurable increase and decrease in the number of Caesarean section cases. While the magnitude of the increases and decreases varied by region and district, it reflects the intervention's capacity to address disparities in healthcare delivery, particularly in underserved areas. To assess effectiveness, the increase must be considered relative to pre-intervention baselines and the specific objectives of the intervention, such as redistribution of healthcare workers and improved access to critical procedures in rural districts. The observed changes suggest that the intervention achieved its core objectives, especially in rural and underserved areas, although some regions displayed more significant gains than others.

This study contributes to both research and policy in several ways. First, it addresses a critical gap identified in the systematic review: the scarcity of studies evaluating the effectiveness of health interventions at the district and regional levels in Ghana. By providing empirical evidence on the regional and district-level impact of the Early Study Leave with Pay intervention, the study adds valuable data to an otherwise underexplored area of health policy research in Ghana. This evidence is crucial for understanding how national-level policies translate into localised healthcare outcomes.

Second, the findings offer actionable insights for policymakers and programme formulators. The study underscores the importance of region-specific factors, such as healthcare infrastructure, socio-economic conditions, and the availability of resources, in shaping the outcomes of health interventions. By focusing on these critical factors, policymakers can better tailor interventions to maximise their impact across diverse regions. The findings also highlight the need for continuous monitoring and evaluation to ensure that the intervention remains effective and adaptable to changing circumstances.

Future research should investigate the long-term sustainability of such interventions, particularly in maintaining healthcare delivery during crises such as pandemics or resource shortages. Comparative studies involving control groups or neighbouring countries could provide stronger causal evidence of intervention effectiveness. Additionally, further exploration into the role of regional ties, community engagement, and other contextual factors in sustaining healthcare

delivery would provide a more comprehensive understanding of the mechanisms driving the success of such interventions, as suggested by McGrail et al. (2018).

5.5 Conclusion

The findings of this study have highlighted the significant regional and district-level effects of the intervention, revealing both positive and negative trends. Several rural regions and districts, particularly those with historically limited access to healthcare services, experienced a notable increase in Caesarean section cases post-intervention. This suggests that the programme successfully incentivised healthcare workers to perform more critical procedures in underserved areas, thereby addressing inequities in service delivery. Conversely, certain urban regions saw a decline in CS cases, reflecting the intended redistribution of healthcare workers to rural and underserved regions. While this decline aligns with the intervention's goal of improving rural healthcare, it underscores the importance of ensuring that urban centres remain adequately resourced to prevent unintended service gaps.

These mixed findings highlight the complexity of healthcare interventions, which are influenced by local healthcare infrastructure, socio-economic conditions, and resource allocation. These variations call for a more nuanced approach to intervention design and implementation, ensuring that both rural and urban needs are met equitably.

The next chapter builds on these regional and district-level findings by focusing on the intervention's effectiveness at the hospital level. This shift in focus enables a more granular analysis of how the intervention influenced healthcare provision within specific facilities, which are the frontline providers of care. By linking regional and district-level trends to hospital-level outcomes, the study provides a clearer understanding of how national-level interventions translate into tangible improvements in healthcare delivery at the hospital level.

CHAPTER SIX

INVESTIGATING THE EFFECTIVENESS OF HEALTH INTERVENTION AT HOSPITALS IN GHANA

6.1 Introduction

Building on the district and regional analysis in chapter five, this chapter delves deeper into the health intervention's impact by examining data at the hospital level. While the prior analysis provided an aggregate understanding of the intervention's effects, analysing hospital-level data allows for a more granular assessment of the dynamics driving these outcomes. This approach is essential for uncovering micro-level variations that might be obscured in district and regional aggregates. The hospital-level perspective is particularly valuable for understanding how individual health facilities responded to the intervention, whether patterns of change were consistent across hospitals, and how these changes may have contributed to broader regional trends. Thus, the purpose of this chapter is to assess the immediate and long-term impacts of the intervention at the hospital level, identifying differential responses and their implications for health service delivery. By focusing on individual hospitals, this chapter aims to provide a nuanced understanding of the intervention's operational impact and to highlight potential gaps or inconsistencies that may not have been apparent in the higher-level analyses. The insights gained here will contribute to refining health policies and ensuring that interventions are designed to address the specific needs of health facilities, ultimately improving service delivery and health outcomes.

6.2 Methodology

The methodology for the hospital-level analysis follows a similar structure to the regional and district-level analysis but is adapted to accommodate the unique challenges and opportunities presented by the granular nature of hospital-level data. The focus remains on evaluating the intervention's impact over time, using interrupted time series analysis with Newey–West standard errors to account for serial correlation and heteroscedasticity. However, several key modifications were introduced to align with the hospital-level context and to address potential issues related to the heterogeneity of health facilities. Unlike the aggregated district or regional data, hospital-level data often exhibits greater variability, requiring additional adjustments in the model specification. Hospital-specific fixed effects were included to control unobserved heterogeneity across facilities, such as differences in staffing, or patient demographics. This adjustment ensures that the observed effects can be more confidently attributed to the intervention itself rather than to intrinsic differences between hospitals. In addition, this chapter adopts a more granular approach to model validation and robustness checks, given the increased susceptibility of hospital-level data to outliers and missing observations. Multiple imputation approach was used to impute missing values (Van Buuren, 2018). This approach was used over simpler methods such as mean/mode/median imputations due to its ability to produce unbiased and efficient estimates. It also preserves the variability in the data and avoids the potential underestimation of standard errors (Azur et al., 2016).

The analytical model retains the segmented regression structure used in previous chapters, capturing pre-intervention trends, immediate level changes, and post-intervention slope changes. By refining the methodology to suit the hospital-level context, this chapter provides a detailed examination of how the intervention functioned at the operational level. The results aim to bridge the gap between the broader patterns observed in chapter four and five. Through this approach, the analysis offers actionable insights for enhancing the design and implementation of future health interventions.

6.3 Findings

6.3.1 Description of hospitals

The nine hospitals included in this study are primarily first-level referral hospitals, reflecting a mix of government, faith-based, private, and NGO-supported facilities. Four of them (Cape Coast Metropolitan, Manhyia Government, Tamale West, and War Memorial hospitals) are designated district hospitals, forming the backbone of district-level healthcare delivery under the Ghana Health Service. The remaining facilities, although not formally classified as district hospitals, serve a similar primary hospital function, providing essential inpatient and surgical services and acting as referral points for surrounding health centres and clinics.

The facilities are distributed across Ghana's major ecological and socioeconomic zones, covering the northern savannah (Bawku, Navrongo, Bolgatanga, Tamale), the middle belt (Kpando, Kumasi, Ho), and the southern coastal zone (Takoradi, Cape Coast). This variation reflects diverse socioeconomic contexts, ranging from agrarian, low-income rural catchments in the north to mixed-income urban populations in southern cities. Urban hospitals, while often better resourced and accessible, serve large volumes of urban poor alongside middle-income groups, while the more rural and semi-urban facilities cater to predominantly low-income, farming-based populations. Table 22 shows the characteristics of the hospitals included in the study.

Table 22: Characteristics of Hospitals Included in the Study

	Facility Type	Setting	Rural/Urban	Service-user Population	Socioeconomic status (SES) of Users
Afrikids Medical Centre	Primary hospital	Community hospital, NGO-supported	Urban	General population, including women & children; draws from surrounding rural areas	Predominantly low-income; informal traders and craftmanship
Cape Coast Metropolitan Hospital*	Primary hospital	Government hospital	Urban	Mixed population, including traders, fishers, students	Mixed SES; includes low-income fishing communities and middle-income groups linked to education and commerce
Manhyia Gov't Hospital*	Primary hospital	Government hospital	Urban	Urban residents of Kumasi Metropolis, traders, artisans	Mixed SES; significant urban poor but also middle-income population
Margret Marquant Hospital	Primary hospital	Faith-based hospital	Peri-Urban	Serves Kpando township and rural communities	Low SES; farming and fishing-based economy

Presbyterian Hospital, Bawku	Primary hospital	Faith-based hospital	Urban	Broad catchment across Bawku and nearby rural communities	Low SES; subsistence farming, conflict-affected area with poverty and vulnerability
Royal Hospital- Ho	Primary hospital	Private hospital	Urban	Middle-class and low-income populations in Ho township	Mixed SES; peri-urban farmers, traders, and civil servants
Takoradi Hospital	Primary hospital	Government hospital	Urban	Mixed urban population including port workers, traders, and migrants	Mixed SES; includes industrial workers (oil, port) alongside urban poor
Tamale West Hospital*	Primary hospital	Government hospital	Urban	Urban and peri-urban residents of Tamale Metropolis	Low–middle SES; predominantly trading, farming, and migrant populations
War Memorial Hospital	Primary hospital	Government hospital	Rural	District-level catchment with rural farming communities	Low SES; agrarian economy with high rural poverty

Note: * refers to district hospitals

6.3.2 Single Group Analysis (Hospitals)

Table 23 provides the diagnostic results for the ITSA models applied at the hospital level, assessed using Newey–West robust standard errors. The table reports the number of observations, the maximum lag used in the estimation, the F-statistic, and its corresponding p-value (Prob > F). These diagnostics are essential for evaluating the statistical adequacy and robustness of the models for each hospital. The number of observations provided an indication of the number of years for each hospital that were taken into consideration. The F-statistic evaluates the joint significance of the predictors in the model, with higher values indicating a better fit. Facilities such as Afrikids Medical Centre (F = 451.02) and Manhyia Government Hospital (F = 298.66) have high F-statistics, suggesting that the predictors explain a substantial proportion of the variance in the CS cases. In contrast, Tamale West Hospital (F = 4.07) exhibits lower F-statistics, indicating a weaker model fit.

Most hospitals exhibit significant p-values (e.g., Afrikids Medical Centre, $p = 0.0002$; Margret Marquant Hospital, $p = 0.0001$), affirming the reliability of the models. However, Tamale West Hospital ($p = 0.0823$) does not meet the 0.05 threshold, suggesting that the model may not adequately capture significant relationships for this facility. War Memorial Hospital ($p = 0.0260$) has a marginally significant model, which, while statistically valid, indicates a weaker fit relative to other hospitals.

Table 23: Newey –West Model Diagnostics (Hospitals)

Facility	Number of Observations	Maximum Lag	F	Prob>F
Afrikids Medical Centre	6	1	451.02	0.0002
Cape Coast Metropolitan Hospital	10	1	20.36	0.0015

Manhyia Gov't Hospital	8	1	298.66	0.0000
Margret Marquant Hospital	11	1	40.58	0.0001
Presbyterian Hospital, Bawku	9	1	32.52	0.0011
Royal Hospital- Ho	8	1	65.38	0.0007
Takoradi Hospital	10	1	16.37	0.0027
Tamale West Hospital	9	1	4.07	0.0823
War Memorial Hospital	9	1	7.62	0.0260

NB: Maximum Lag: the highest lagged observation included in the analysis to account for autocorrelation in the data; F: F-statistic from the regression model, indicating the ratio of explained to unexplained variance in the data; Prob > F: The p-value associated with the F-statistic, assessing the significance of the overall model.

Table 24 presents the Newey–West parameter estimates at the hospital level. Margret Marquant Hospital ($\beta = 344.6$) and Manhyia Government Hospital ($\beta = 249.67$) show significantly higher baseline values compared to others like Royal Hospital, Ho ($\beta = 56.83$) and Afrikids Medical Centre ($\beta = 4$). At the pre-intervention trend, positive slopes, such as for Manhyia Government Hospital ($\beta = 217$) and Cape Coast Metropolitan Hospital ($\beta = 146$), indicate increasing trends over time before the intervention, while smaller slopes, such as Afrikids Medical Centre ($\beta = 7.1$), suggest minimal pre-intervention changes. These trends provide insight into the baseline trajectory of performance at each facility.

Only two hospitals experienced an immediate improvement (Manhyia Government Hospital: $\beta = 245.47$ and Afrikids Medical Centre: $\beta = 2.7$), the rest experienced declines (Margret Marquant Hospital: $\beta = -235.08$ and Royal Hospital, Ho: $\beta = -129.13$). For the change in the trajectory post-intervention, all hospitals exhibited significant negative slopes suggesting a reversal or slowdown in the growth rate of the CS cases except Afrikids Medical Centre. Afrikids Medical Centre ($\beta = 0$) show no significant change, indicating stability in trends post-intervention.

Table 24: Newey –West Parameter Estimates (Hospitals)

Facilities	Intercept	Pre-intervention	Level change	Slope change
------------	-----------	------------------	--------------	--------------

	slope			
Afrikids Medical Centre	4***	7.1***	2.7***	0***
Cape Coast Metropolitan Hospital	24.6667***	146***	-164.5238***	-165.7143***
Manhyia Gov't Hospital	249.6667***	217***	245.4667***	-46***
Margret Marquant Hospital	344.6***	69.2***	-235.0762***	-35.34286***
Presbyterian Hospital, Bawku	192.8333***	171.5***	-230.0476***	-79.21429***
Royal Hospital, Ho	56.8333***	73.5***	-129.1333***	-64***
Takoradi Hospital	169.5**	78.5**	-35.5**	-110.2857**
Tamale West Hospital	77.5	117.5	-230.8095	-62.64286
War Memorial Hospital	85.5**	83.5**	-258.8571**	-26.15714**

*** $p < 0.001$, ** $p < 0.05$

Source: Results from ITSA Stata (2022)

Figure 18 further demonstrates the general increases in the number of cases before the introduction of the intervention.

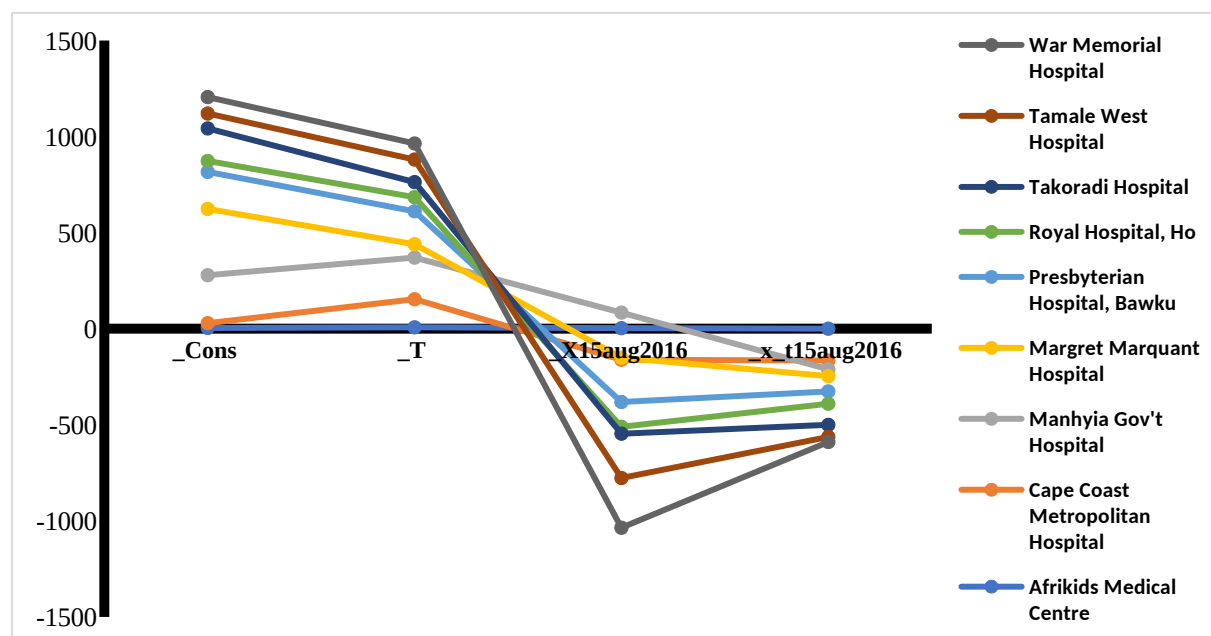


Figure 18: Plot of Newey –West Parameter Estimates (Hospitals)

After making the necessary adjustments for the uneven error caused by the unequal variation, most of the hospitals exhibited noticeable signs of improvement. Based on the post-intervention linear trend, Table 25 shows that significant positive coefficients, such as for Manhyia Government Hospital ($\beta = 171.000$, $p < 0.001$) and Presbyterian Hospital, Bawku ($\beta = 92.286$, $p < 0.001$), indicate a substantial and consistent upward trend in CS cases post-intervention. Similarly, Margret Marquant Hospital ($\beta = 33.857$, $p < 0.001$) and War Memorial Hospital ($\beta = 57.343$, $p < 0.001$) show moderate but statistically significant positive trends, underscoring their continued progress post-intervention. Royal Hospital, Ho ($\beta = 9.532$, $p < 0.005$) and Tamale West Hospital ($\beta = 54.857$, $p < 0.05$) exhibit trends of marginal significance. These increases are consistent with the depiction in Figure 19. Conversely, negative coefficients, such as for Cape Coast Metropolitan Hospital ($\beta = -19.714$, $p > 0.05$) and Takoradi Hospital ($\beta = -31.786$, $p > 0.05$), suggest potential declines in CS cases.

Table 25: Post-Intervention Linear Trend (Hospitals)

Facility	Coefficient	Std. error	t-value	P> t	95% Conf. Int	
					Min	Max
Afrikids Medical Centre	7.100	0.910	7.8000	$P < 0.001$	4.203	9.997
Cape Coast Metropolitan Hospital	-19.714	17.871	-1.1000 28.490	$P > 0.05$	-63.442	24.013
Manhyia Gov't Hospital	171.000	6.003	0	$P < 0.001$	154.333	187.667
Margret Marquant Hospital	33.857	5.240	6.4600	$P < 0.001$	21.468	46.247
Presbyterian Hospital-Bawku	92.286	12.005	7.6900	$P < 0.001$	61.426	123.146
Royal Hospital, Ho	9.532	639.000	2.9500	$P < 0.005$	0.566	18.434
Takoradi Hospital	-31.786	21.005	-1.5100	$P > 0.05$	-83.183	19.612
Tamale West Hospital	54.857	25.177	2.1800	$P < 0.05$	-9.863	119.577
War Memorial Hospital	57.343	15.915	3.6000	$P < 0.001$	16.433	98.253

Source: Results from ITSA Stata (2022)

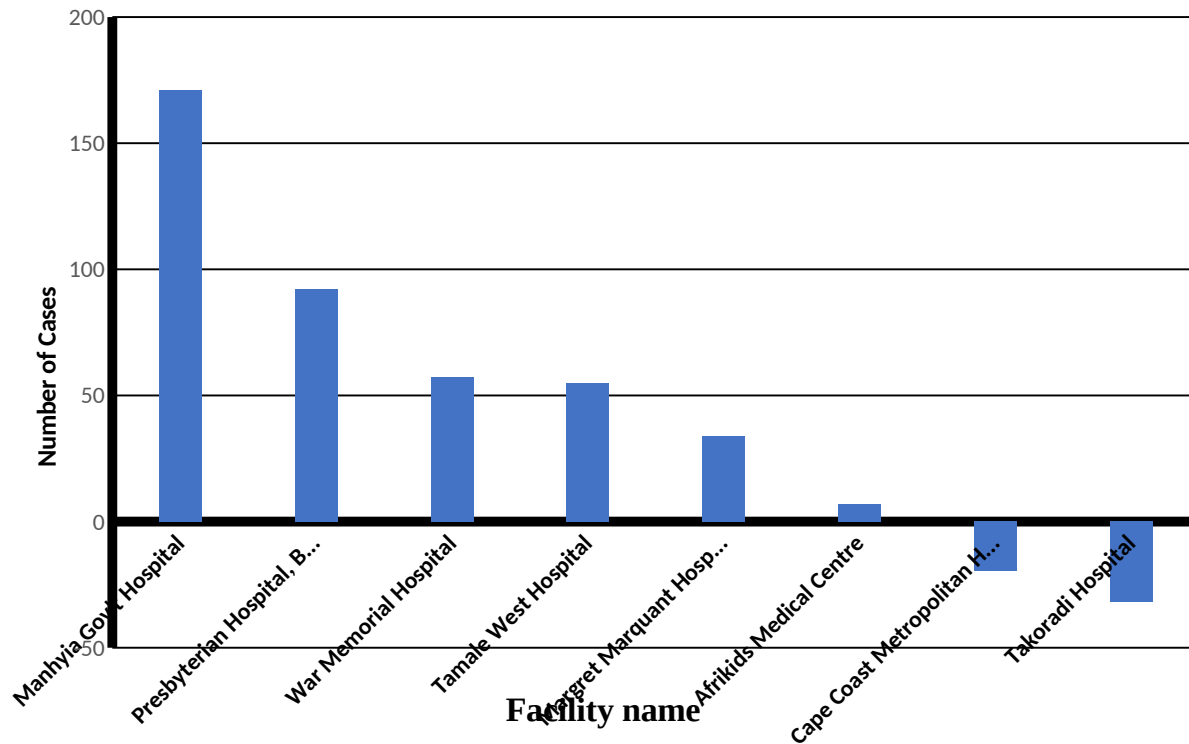


Figure 19: Plot of Newey –West Post-Intervention Trend (Hospitals)

6.4 Discussion

6.4.1 Summary of Overarching Findings

This study evaluated the 2016 intervention's impact at the hospital level, providing a granular understanding of how it influenced healthcare delivery across different types of settings. Findings revealed that hospitals in rural and underserved regions, such as Presbyterian Hospital-Bawku, War Memorial Hospital, and Tamale West Hospital, experienced a significant increase in Caesarean section cases. This suggests that the intervention effectively addressed the long-standing issue of inadequate healthcare provision in rural areas by successfully redistributing doctors to these underserved regions. Such redistribution aligns with the intervention's overarching goal of enhancing rural healthcare capacity.

In contrast, urban hospitals such as Takoradi Hospital and Cape Coast Metropolitan Hospital experienced a decline in CS cases, which reflects the intended consequences of the intervention. The reduced availability of doctors in these urban facilities is likely attributable to the prioritisation of rural placements, a key objective of the policy. However, the trends observed in other urban centres, such as Manhyia Government Hospital and Royal Hospital in Ho, suggest a more complex dynamic. These hospitals recorded increases in CS cases despite the rural focus of the intervention.

Such increases may be attributed to the pre-existing infrastructure, resources, or local policies that enabled these urban centres to maintain or even improve their service capacity irrespective of the intervention's rural emphasis.

These findings underscore the dual impact of the intervention: the achievement of rural healthcare equity through increased service delivery in underserved areas, and the resulting adjustments required in urban healthcare systems to ensure continued service quality despite resource redistribution. This nuanced understanding provides valuable insights into the broader implications of such interventions, particularly the need for complementary measures to mitigate potential gaps in urban healthcare services

6.4.2 Interpretation of Findings

The hospital level analysis deepens understanding of how the incentive intervention reshaped healthcare delivery. Rural focused hospitals such as Tamale West Hospital, Presbyterian Hospital-Bawku, and War Memorial Hospital demonstrated significant increases in CS cases, confirming that incentives were effective in drawing doctors to underserved areas. From an ERG perspective, these hospitals benefited because the scheme provided strong support for doctors' existence needs such as stable income, leave security, and employment continuity in areas where such assurances had historically been scarce. This immediate fulfilment of existence needs translated into higher service volumes and more equitable access to surgical care.

At the same time, the findings show that location mediate how higher-order needs are met. For example, district hospitals in rural areas offered limited opportunities for professional development and specialisation, restricting the fulfilment of growth needs. Even when doctors responded positively to existence incentives, their long-term retention and engagement depended on whether the facility could also support career progression and recognition. In cases where rural hospitals lacked sufficient training infrastructure or mentorship opportunities, frustration-regression risks emerged. Doctors who initially accepted rural postings may have later sought opportunities to relocate, not because their existence needs were unmet, but because their growth needs remained unfulfilled.

Urban hospitals such as Manhyia Government Hospital presented a different picture. Despite their stronger infrastructure and patient demand, these hospitals showed less pronounced improvements. Here, existence needs were already well catered for, and doctors' primary concerns may have

centred on relatedness and growth such as peer recognition, access to cutting-edge training, and participation in specialist networks. Because the intervention primarily targeted financial security and not these higher-order needs, the intervention's impact might have been weaker in such hospitals. This underscores the ERG insight that once existence needs are satisfied, workers will not be strongly motivated unless relatedness and growth are simultaneously supported.

Margret Marquant Hospital in Kpando, illustrate a hybrid case. The hospital is neither as resource rich as urban centres nor as deprived as rural district hospitals. The observed improvements in CS volumes suggest that the intervention had a tangible impact here, but sustaining such gains would depend on expanding the scope of motivational supports. Investments in infrastructure, mentorship, and specialist outreach could help align both relatedness and growth needs with professional opportunities, making it an attractive long-term placement.

The COVID-19 pandemic again complicates interpretation. Resource and staff reallocation during the pandemic may have disproportionately affected hospitals depending on their role in the national response. For example, urban hospitals were often designated as COVID-19 treatment centres, pulling staff away from surgical duties and suppressing CS activity. In rural hospitals, interruptions to supply chains and referral pathways may have dampened the full potential of the intervention. These systemic shocks highlight how fragile incentive-driven improvements can be if broader systemic resilience is lacking.

6.4.3 Comparison of Findings with Related Literature

The study findings align with prior research emphasizing the role of incentives in improving rural healthcare outcomes. Bonenberger et al. (2014) and Cheng & Agyeiwaah (2021) noted that career advancement opportunities and improved working conditions significantly influence healthcare worker retention in rural areas. This study expands on these findings by providing hospital-level evidence, demonstrating how incentives can increase access to critical services such as CS procedures in underserved areas. In contrast, the persistence of urban bias in some hospitals echoes

challenges highlighted in earlier studies, where health workers' preferences for urban environments have been a barrier to achieving equitable healthcare distribution (Cheng & Agyeiwaah, 2021).

6.4.4 Strengths and Limitations of the Chapter

The study provides a granular, hospital-level analysis of intervention outcomes, filling a notable gap in existing literature. The findings are supported by robust statistical adjustments, including heteroscedasticity corrections, ensuring reliability. A key limitation of the hospital level analysis is that only seven hospitals were included, which is substantially fewer than the total number of districts and regions in Ghana. This restricted coverage reflects both feasibility constraints and data availability challenges, rather than an intentional narrowing of scope. Unlike the national, regional, and district level analyses, which drew on routine data compiled by the Ghana Health Service through DHIMS2 and therefore benefited from comprehensive coverage, the hospital level analysis relied on locally maintained hospital records. In many cases, these records were incomplete, inconsistent, or inaccessible for the full study period, thereby reducing the number of hospitals that could be robustly analysed. The seven hospitals selected were those with sufficiently reliable and continuous caesarean section data, and they were intended to serve as illustrative case examples rather than as a representative sample of all hospitals. While this inevitably limits the generalisability of the hospital level findings, the inclusion of these nonetheless adds depth and nuance by highlighting local variations that complement the broader national and district level results. Consequently, the hospital level analysis should be viewed as exploratory and illustrative, providing valuable contextual insights alongside the more comprehensive analyses at the higher administrative levels captured in chapters 4 and 5.

6.4.5 Implications of the Study to Policy and Research

The findings underline the importance of sustained incentives to address healthcare disparities. Policymakers should prioritize expanding similar interventions to other underserved areas, while also addressing urban bias through measures like improved rural infrastructure and career support. Efforts should be made to integrate hospital-level data into national policy planning to ensure targeted resource allocation.

This study highlights the need for further research into the drivers and barriers affecting health worker participation in incentive programs. Specifically, qualitative studies exploring health

worker perspectives can complement quantitative findings and provide deeper insights. Future studies should also evaluate the long-term sustainability of interventions, focusing on whether the redistribution of healthcare workers leads to improved health outcomes.

6.5 Conclusion

While this chapter has highlighted the effectiveness of the Early Study Leave with Pay intervention at the hospital level, particularly in rural areas, it is also necessary to reflect on several contextual and methodological issues that shaped the interpretation of the results across chapters four to six. These reflections provide important nuance to the findings and help situate the policy's impact within broader health system dynamics.

One key issue is that caesarean section rates were already increasing in Ghana prior to the introduction of the intervention. This growth reflected wider improvements in healthcare delivery, including gradual expansions in infrastructure, the presence of more trained doctors, and evolving clinical practices. The introduction of the intervention therefore built upon an existing upward trajectory. The significant increase immediately following the policy demonstrates that it accelerated this progress, yet it is important to acknowledge that not all observed gains can be attributed solely to the intervention. In the longer term, the results should be understood as a combination of the policy's effect and the ongoing improvements already underway in the health sector.

A second consideration relates to differences in population size across regions and facilities. Larger urban centres such as Greater Accra and Ashanti, with their more extensive infrastructure and bigger populations, naturally recorded higher absolute numbers of caesarean section procedures compared to less densely populated regions. The use of interrupted time series analysis was appropriate for detecting changes in outcome trajectories, but the reliance on absolute numbers rather than population-adjusted indicators limited the precision of comparisons across regions. While the analysis placed emphasis on trend changes rather than volumes, incorporating denominators such as Caesarean sections per 1,000 live births in future studies would allow for a more accurate understanding of regional equity and disparities in policy outcomes.

Finally, the analysis must be considered in light of the COVID-19 pandemic, which significantly disrupted healthcare delivery during the latter years of the study period. Redeployment of health

workers, shortages of essential supplies, and reduced patient attendance at facilities all contributed to interruptions in service delivery. These pressures likely influenced the observed slowdown in caesarean section growth rates during the post-intervention period. It is therefore plausible that the policy's effect was partly masked by the broader health system disruptions created by the pandemic. While the available data did not permit a direct estimation of this impact, the pandemic represents a critical contextual factor in interpreting the longer-term outcomes of the intervention.

Taken together, these reflections highlight the importance of interpreting the policy's effectiveness within its wider context. The Early Study Leave with Pay intervention produced a clear and immediate improvement in access to essential surgical services, particularly in underserved areas, but its longer-term impact was influenced by pre-existing healthcare improvements, demographic differences, and global disruptions. These insights point to the value of adopting more comprehensive approaches in future evaluations, including the use of population-adjusted indicators and the integration of contextual analysis. They also provide a stronger foundation for the next chapter, which turns to the perspectives of experts in the field to identify the underlying drivers and barriers of rural attraction and retention of doctors.

CHAPTER SEVEN

DRIVERS AND BARRIERS OF WORKING IN RURAL AND URBAN SETTINGS: A DELPHI STUDY

7.1 Introduction

While chapters 4 through 6 offered a comprehensive evaluation of the Early Study Leave with Pay intervention impact on healthcare delivery, they primarily focused on the quantitative outcomes at

national, regional, district, and hospital levels. However, understanding why the intervention succeeded or faced challenges is equally crucial. Examining the facilitators/drivers of health policies is essential to ensuring effective policies that are sensitive, and purposeful (Priebe et al., 2010). Identifying the drivers and barriers of working in rural and urban settings will provide valuable context to the quantitative findings, enabling a more holistic view of the effect of interventions meant to attract and retain healthcare workers in rural areas.

To address this, this chapter employs a Delphi study to gather qualitative insights from key stakeholders—doctors and regional directors about factors that facilitate or obstruct the uptake of interventions to attract and retain doctors in rural areas of Ghana. By examining these drivers and barriers, this chapter aims to uncover contextual challenges that might not be apparent in the previous quantitative analyses. These insights will complement the findings from chapters 4-6 and help inform policy adjustments, ensuring the sustainability of interventions as well as offering valuable lessons for future healthcare workforce interventions in Ghana. Given this, the aim of this chapter is to explore consensus on the most important drivers and barriers of attracting and retaining doctors in rural service and the extent of this consensus among the implementers (regional health directors) and consumers (doctors). One of the standard approaches in exploring consensus in health literature is the Delphi study (Carter et al., 2023; Arakawa et al., 2022; Falzarano & Zipp, 2013).

7.2 Delphi Technique

The concept of achieving a solution to a strategic or operational challenge via a "group decision" or "consensus building" process is a well-established management technique. Focus group sessions and the Delphi method are two popular strategies for reaching group decisions. When comparing the focus group method to the Delphi methodology, the most notable distinction is that with the former, participants gather in a central location (a physical or online medium) to discuss the topic at hand, which might lead to the most powerful member of the group exerting undue influence (Ogbeifun et al., 2016). While in the Delphi method, participants take on the role of independent contributors to the "consensus opinion of a group of experts by a series of intensive questionnaires interspersed with controlled feedback" (Hasson & Keeney, 2011). Although Hasson and Keeney (2011) list eleven distinct kinds of Delphi designs, practitioners often divide the approaches they use into three broad categories: classical, decision-making, and policy Delphi (Franklin & Hart,

2007). The traditional Delphi technique is used to determine the truth about a given issue or subject via a group discussion. The Delphi method of decision making is used to facilitate group consensus. The policy Delphi is a method used to generate ideas about a certain subject (Franklin & Hart, 2007). The Delphi approach is effective in situations when it is difficult to collect information and input from stakeholders owing to their busy schedules, geographical constraints, or the requirement to ensure anonymity (Geist, 2010).

The Delphi approach is helpful when objective data are unachievable, empirical evidence is lacking, experimental research is impossible or immoral, or when the heterogeneity of the participants must be maintained to ensure the validity of the conclusions or the problem under consideration does not lend itself to exact analytical procedures but may benefit tremendously from subjective judgements on a collective basis (Grisham, 2009). Since many individuals are less likely to arrive at a mistaken judgment than a single person, the Delphi method for reaching agreement rests on this premise. The Delphi method differs from other methods in that judgments are made by consensus rather than by polling many people who may or may not have relevant expertise (Grisham, 2009). The Delphi technique has numerous advantages, one of which is that it may include many people from different locations. It is cheap and provides the highest level of anonymity, which helps prevent any one person from becoming too powerful, but it may stifle open dialogue and debate (Humphrey-Murto et al., 2017).

Limitations of the Delphi technique is that since expert surveys do not account for any trustworthy results on observable cause-effect linkages, they are deemed inferior to evidence-based techniques in intervention research in the health sciences (Bödeker & Kreis, 2006). Furthermore, Delphi methods do not fit well into any existing paradigm. As a result, there is no set standard for evaluating quality (Guzys et al., 2015). It is feasible, from a normative stance, to raise serious doubts about the reliability of the verdicts, the make-up of the expert panels, and the way in which dissenting opinions are handled. There are also concerns regarding the method's viability, the potential domination of thought collectives, and the possibility of repetition of power systems (Niederberger & Spranger, 2020). There is also no way to know for sure that every group is intelligent (Surowiecki, 2004; Jorm, 2015). Despite these limitations, there is the consensus that Delphi studies are more robust and offer avenues for reassessment of opinions.

The Delphi approach fosters stakeholder participation and ensures that outcomes are used by end users effectively. Despite the growing utilization of this approach in health research, there exists a notable scarcity of its application in low and middle-income nations (Kapririri, 2018). This methodology utilizes a sequential series of questionnaires to gather data from experts (Hsu & Sandford, 2019). The Delphi technique is recognized for its ability in ensuring participant anonymity, facilitating a controlled feedback process, and enabling the utilization of various statistical analysis techniques for data interpretation (Holey et al., 2007). The Delphi technique works at obtaining a consensus as an answer to a research question or as a material for filling an identified gap, by going through a series of rounds involving experts (participants). The first round usually solicits the perspectives of participants regarding an issue, in this case, the barriers and facilitators for adopting an incentive program. The second round usually collates the responses obtained in the first round and puts them back to the participants to rank the themes mentioned in the first round through scoring in a design framework referred to as the Likert scale. If the scoring among the participants in the second round agrees on the themes (established using median and inter-quartile ranges) in order of priority (that is if a consensus is reached), the study ends at round two. If a consensus is not reached, and the scoring of the themes is varied amongst the participants, there arises the need to reorganise responses and send them back to the participants for the purpose of reevaluating their positions with the help of the organized responses in the previous round. If the participants largely agree on the majority of the themes, in the third round, a consensus could be reached, and the study ends at that round.

In a synthesis reporting the use of Delphi guidelines in studies, Spranger et al. (2022) showed that selected studies formed nine main categories: “Justification, Expert panel, Questionnaire, Survey design, Process regulation, Analyses, Results, Discussion, Methods reflection & Ethics.” There were subclasses within each of the major categories. Within the justification category, the reporting rules necessitate the provision of information on the research topic or purpose of using Delphi approaches, the consideration of the evidence basis, and the rationale behind the selection of the Delphi methodology. The category reports of the expert panel include several aspects, including the selection process of the experts, the makeup of the panel, the sample size used, the technique employed, the protocols for maintaining anonymity, and the provision of essential background information. The category of a questionnaire pertains to the survey instrument, including its structure, breadth, and the research questions that constitute the foundation for the formulation of

its items. The survey design category includes considerations related to the specification of the number of surveys rounds and the display of the feedback design. Process regulation refers to the management and control of various procedures associated with activities such as data collecting, item deletion or addition, and the inclusion or exclusion of non-responders, among other related tasks (Spranger et al., 2022).

The analytics category includes the delineation and management of consensus, disagreement, and methodologies for data analysis. In the results section, it is necessary to include information on response rates and display the findings in a manner that distinguishes them based on the different Delphi rounds. It is also advisable to describe the methodological technique in a visual format, such as a flowchart. The discussion section encompasses the analysis and interpretation of findings, suggestions for the application of these findings in practical settings, and identification of potential avenues for further study. The ethics and methods reflection category pertains to the evaluation of the data's quality, as well as the identification and consideration of any potential restrictions or biases. According to Spranger et al. (2022), it is advisable to include in the report a description of the procedures used to ensure the anonymity of the respondents, as well as an indication of whether ethical considerations were taken into account throughout the survey administration.

7.2.1 Overview of Delphi Techniques in Health Sciences

A rapid review (Appendix 7) was undertaken to find studies that have used the Delphi approach within the field of health sciences. The objective was to analyse and consolidate the typical reporting protocols used in Delphi investigations, with the purpose of making a well-informed choice about the technique to be utilized in the present research.

The search was conducted using the Web of Science and Scopus databases. The purpose of using these databases was to get a comprehensive assortment of Delphi investigations across several disciplines. The search was conducted with the phrase "Delphi" as a textual keyword. The scope of the findings was restricted to scholarly publications that were published between the time frame of 2017 to 2023 and were written in the English language. 2017 to 2023 was used to get up-to-date published articles reporting on the use of the Delphi technique.

A cumulative count of 22 items was obtained. Following the process of deduplication and eligibility checks, a total of nine (9) articles were retained and used for the purpose of conducting a

sample analysis on Delphi research within the field of health sciences. The selection process and analysis of the rapid review are shown in Appendix 2.

The papers included in this analysis provided detailed explanations of the methodology used for expert selection, as well as the criteria used to determine their suitability and expertise in relation to the study being conducted. All nine studies specifically stated the inclusion of a controlled feedback process, information about the number of rounds, the number of experts involved, and the specific kind of Delphi approach used. In three out of the total number of studies, which accounts for a proportion of 33.33%, the criteria for consensus, as indicated by a clear statement outlining the method of assessment, were not adequately provided. The Delphi investigations lacked a comprehensive discussion of the epistemological framework in all of the studies that were included. According to Spranger et al. (2022), it is recommended that researchers explicitly acknowledge the specific epistemological underpinnings of their Delphi approach. It is important to explicitly establish the epistemological underpinning in a Delphi investigation, since it has the potential to influence the ultimate conclusion of the study's findings. The selection between critical rationalism and constructivism may have an impact on the findings derived from Delphi research, as shown by Campbell et al. (2004). Most of the studies aimed to achieve a consensus. Table 26 shows the basic characteristics of included studies.

Table 26: Basic characteristics of included studies

Authors and year	Expert selection	Controlled feedback	Consensus criteria	Number of rounds	Number of experts	Epistemology	Delphi variant
Barwood et al. (2020)	Yes	Yes	Yes	3	10	Not stated	Modified Delphi
Blanco-Mavillard et al. (2023)	Yes	Yes	Yes	3	16	Not stated	e-Delphi
Coyne et al. (2023)	Yes	Yes	Yes	2	26	Not stated	Modified Delphi
de Vries et al. (2021)	Yes	Yes	Yes	3	88	Not stated	e-Delphi

du Toit et al. (2020)	Yes	Yes	Unclear	3	8	Not stated	Modified Delphi
Lissauer et al. (2020)	Yes	Yes	Unclear	3	66	Not stated	Modified Delphi
Norris et al. (2022)	Yes	Yes	Unclear	3	24	Not stated	e-Delphi
Stennett et al. (2018)	Yes	Yes	Yes	4	70	Not stated	Classic Delphi
Wilson et al. (2020)	Yes	Yes	Yes	3	45	Not stated	Modified Delphi

All the included studies provided the appropriateness for selecting experts. Again, controlled feedback was an important core element in the included studies. All the studies provided feedback to participants in each round of the studies. Clear reporting was also made of the items deleted and or added to each round for those studies that had them (e.g., Norris et al., 2022). Most of the studies (66.66%) had a consensus criteria set a priori. Studies used a Median and Inter-quartile range (Blanco-Mavillard et al., 2023; de Vries et al., 2021), a set value of greater than or equal to 80% affirmative votes (Barwood et al., 2020; Coyne et al., 2023), mean cut-off (Wilson et al., 2020) and Kendall's coefficient of concordance (Stennett et al., 2018). For some studies (n= 3), there was no clear statement of consensus criteria. For instance, du Toit et al. (2020) qualitatively looked for majority agreement and consistency in responses across the Likert scale ratings and free text examples in the first two rounds, but they did not provide an explicit threshold or criteria for determining consensus.

Concerning the number of rounds, most studies (n= 7) used three rounds with (n=1) for two and four rounds respectively. Given that the majority of the studies used three rounds, this will also inform the choice of three rounds for this present study. The number of experts varied greatly across the selected studies. The reported number of experts is based on the number reported for the final round of studies. The number of experts ranged from 8 to 88. All the included studies mentioned the variant of the Delphi technique used. The modified Delphi was the most used (n=5) followed by the e-Delphi (n=3) and classical Delphi(n=1). Based on the purpose of this research, the e-Delphi technique was used.

7.3 Methodology

7.3.1 Study Design

A three-round Delphi study (Barwood et al., 2020; Blanco-Mavillard et al., 2023; de Vries et al., 2021; du Toit et al., 2020; Lissauer et al., 2020; Norris et al., 2022; Wilson et al., 2020) will be conducted among doctors and implementers of incentive programs in Ghana to identify and prioritise the drivers and barriers of working in rural and urban settings within Ghana's healthcare system. This Delphi study will in particular utilize the e-Delphi technique. The e-Delphi technique conducts the iterative Delphi process fully online using electronic questionnaires (Cole et al., 2013). This technique has been used by the included studies (Blanco-Mavillard et al., 2023; de Vries et al., 2021; Norris et al., 2022). Microsoft Forms was used to conduct the e-Delphi survey.

7.3.2 Participants and Sampling

Ghanaian professionals encompassing doctors and regional directors working with the Ghana Health Service were selected as experts for this study. Doctors were chosen because they play a critical role in healthcare delivery, and their work placement decisions significantly impact the distribution of healthcare services across the country. Regional directors were included because they are responsible for workforce management and decision-making at the regional level, influencing the deployment and retention of healthcare professionals. Doctors were typically graduates of medical schools in Ghana. Regional directors are mostly doctors with a background in public health.. Purposive sampling was used to select participants (de Vries et al. 2021). This technique maximized the potential for obtaining comprehensive and detailed information since the sample included individuals who could provide rich and in-depth insights into the facilitators and barriers to the workplace placement decisions. Since the sampling method used in this study is a non-probability sampling method, sample size estimation was not required. Again, there is no generally agreed cutoff point for a Delphi study. While some researchers, for example, Toma and Picioreanu (2016) suggested a range of no more than 50 experts, others such as De Loe et al. (2016) in a systematic review of 63 Delphi studies reported a diverse range of experts from less than 10 to more than 1000. Based on these precedents, a minimum of 10 participants was targeted for the consumer (doctor) group and 8 for the implementer (regional director) group. The theoretical maximum was set at 5,404 doctors reflecting the approximate number of doctors on Government of

Ghana payroll in 2021 (Ministry of Health, 2022) and 16 regional directors (the total number of regional health administrators).

7.3.3 Recruitment and Screening process

Recruitment was facilitated by the Ghana Health Service, which acted as a Gatekeeper. Invitations were sent via official communication channels of the Service to all doctors and regional directors, ensuring broad coverage of the intended professional groups. Because the Gatekeeper managed this process, the researcher was not privy to the exact number of individuals who received the invitation.

Screening took place at the point of survey entry. Participants were first presented with the study information sheet and were asked to provide informed consent. They were then required to self-confirm their eligibility, which included: (i) being a medical doctor in active service since 2016, or (ii) being a regional director with. Only participants meeting these criteria were able to proceed with the survey. This ensured that participants were well abreast of the Ghanaian health ecosystem.

7.3.4 Data Collection

Participants were informed about the purpose of the research and their right of withdrawing consent from the study. All participants were requested to complete the informed consent form for the study at the start of the online questionnaire. Study approval was given by the ethics committee of the College of Health, Medicine and Life Sciences of Brunel University London (42304-LR-Sep/2023- 47156-5).

7.3.4.1. Delphi First Round

The first-round survey consisted of two parts. The first part assessed the age, gender, area of medical specialty practiced (only for doctor questionnaire) and setting of the facility for the two groups of experts. This approach has been used by (de Vries et al., 2021; Wilson et al., 2020). The second part involved open-ended questions (de Vries et al., 2021) assessing [1]: ‘what made you move to the rural area?’ [2]; ‘what made you move to the urban area?’ [3]; ‘what made you not to opt for the rural area?’ for the doctor questionnaire (Consumer group). For the regional director’s questionnaire (Implementer group), questions were [1]: ‘what makes doctors in your region choose the urban areas?’ [2]; ‘what are the reasons given by doctors who accepted posting to rural areas?’ [3]; what should be the characteristics of an incentive program meant to motivate doctors to move

to rural areas?’ E-mail reminders were sent to non-responders after one week within the posting of questions.

Descriptive analysis through reporting frequencies and percentages was used to analyse the sociodemographic characteristics of participants. Content analysis was also used in round 1 of the Delphi survey. Content analysis was performed by the researcher via the process of evaluating the replies provided by the experts for each of the questions, with the aim of identifying recurring phrases and sentences (de Vries et al., 2021; Stennett et al., 2018; Wilson et al., 2020). The researcher identified the key themes from the raw data and merged similar factors. Merged factors from the participants were used to formulate the second-round questionnaire (Okoli & Pawlowski, 2004). Results of round 1 were analysed per stakeholder group to identify group similarities and differences.

7.3.4.2. Delphi Second Round

In the second round, demographic characteristics (similar to the first round) were presented to the experts in the online questionnaire. Participants were asked to rate the importance of each factor identified in the first round on a seven-point Likert scale, ranging from 1 (fully disagree) to 7 (fully agree). In addition, experts were invited to optionally provide any other drivers or barriers that might have been missed in the first round. Email reminders were sent to non-responders after a week. Results of round two was also analysed per stakeholder group to identify group similarities and differences.

Descriptive analysis through reporting frequencies and percentages was used to analyse the sociodemographic characteristics of participants in round two. Content analysis was also used to identify any feedback from round 1. Inferential statistics using median (Mdn) and interquartile range (IQR) was performed in this round. The median score was calculated and a score of ≥ 6 was considered important (agreement with the factor being important) (Cheung et al., 2017). IQR was used to gain an indication of the degree of consensus between experts on the factors. An IQR value of ≤ 1 (more than half of the opinions fall within one point of the scale) indicated good consensus among the experts. Factors which received the IQR of ≤ 1 were removed from the third-round questionnaire. This approach has been used by (Cheung et al., 2017; de Vries et al., 2021; Blanco-Mavillard et al., 2023). Statistical Package for Social Sciences (SPSS) was used to calculate averages, standard deviations (SDs), percentages, Mdn scores and IQRs.

7.3.4.3 Delphi Third Round

The objective of the third round was to establish the final ranking. All participants who completed the second-round questionnaire were sent an invitation to reassess the criteria that did not achieve agreement during the second round. The questionnaire was tailored to each stakeholder group, as the survey provided controlled feedback of the group's answer shown as Mdn score. This approach ensured that participants were aware of the particular group's input while keeping the anonymity of the group. The experts evaluated the list of obstacles and enablers using an electronic poll. In this round, they were given their personal round 2 ratings as well as the panel median rating and summarized remarks for each item. Email reminders were sent to those who do not respond within a span of one week. SPSS was used to calculate averages, SDs, percentages, Mdn scores and IQRs.

7.3.4.4 Data Management

Prior to the commencement of the online survey, potential participants who voluntarily responded to the invite were given the participant information sheet to read and consent form to sign. These forms clearly stated their right to withdraw at any point before and during the survey. Contact details of participants in each round of study were kept confidential and password protected in a word document. Information sheets and consent forms were given to participants at each round of study to read and sign. Data collected was made anonymous via coding and the removal of identifying information. Data was stored on a password protected file and retained for 10 years.

7.4 IQR and Median Thresholds

The median is defined as the central number when a dataset is sorted in ascending order. In datasets containing an odd number of observations, the median is the value located in the centre of the dataset. According to Anderson et al. (2017), in cases when there is an even number of observations and no single middle value, the median is calculated as the average of the values for the two middle observations. The interquartile range is a statistical measure of variation that mitigates the influence of extreme results. The IQR is numerical difference between the third quartile, denoted as Q3, and the first quartile, denoted as Q1. It represents the range of values inside the middle 50% of a dataset, as stated by Anderson et al. (2017).

The IQR demonstrates a less susceptibility to extreme outliers and functions as a beneficial tool for determining the variability of data points inside the central area of the data distribution. A value

IQR less than or equal to 1 suggests that there is a steady level of agreement or consensus among the members of a group. This means that most data points tend to cluster closely around the median value. A zero IQR signifies complete agreement among the respondents, whereas a larger IQR number (e.g., more than 2) shows a greater degree of dispersion of the responses. Mdn 6 refers to the sixth observation in the data, and the IQR of ≤ 1 suggests that the values from the first quartile to the third quartile span a limited range, and the median falls relatively close to the centre of this range. In other words, there is not much variability or dispersion in the responses between the 25th and 75th percentiles.

Although the use of the median and interquartile ranges is well known in the Delphi literature as a means of measuring consensus (Cheung et al., 2017; de Vries et al., 2021; Blanco-Mavillard et al., 2023), it is associated with some disadvantages. In situations where the opinions of experts are polarized, the median might present an overly simplified view of consensus. While the IQR provides a measure of dispersion, it only focuses on the middle 50% of the data, ignoring the tails. This can be misleading in cases where the outer responses are significant for understanding the full range of expert opinions (Okoli & Pawlowski, 2004). Again, a small IQR could be interpreted as a sign of consensus. However, it could also result from a lack of diversity in the panel or the presence of other biases. Thus, a small IQR does not always equate to true consensus (Linstone & Turoff, 2002). The median and IQR indicate where the central agreement lies and how spread out the opinions are, but they do not provide information on the intensity or strength of these opinions (Rowe & Wright, 1999). Finally, in Delphi studies, the consensus measured in early rounds may be different from later rounds due to the 'round effect', where panellists' adjust their opinions based on the feedback from previous rounds. Median and IQR may not adequately capture these dynamic changes (Hasson et al., 2000).

7.5 Results

The sociodemographic characteristics and response rates per stakeholder group are presented in Table 27. Fifty-five (55) respondents registered their interest in the study. Thirty-nine (39) of them were doctors and sixteen (16) were regional directors. 47 experts (85.5% response rate) took part in the first round, which consisted of 31 doctors and 16 regional directors. In total, 51 unique factors were identified and used as input for the second and third round surveys, consisting of barriers to rural placement (8 factors), drivers of rural placement (25) and drivers of urban placement (18

factors). A total of 42 experts were included in the second and third rounds. The response rate for the second round was 89.4% and the third round was 100%.

The reduction in the number of participants between the first and second rounds of the Delphi exercise (from 47 to 42) was due to participant attrition, which is a recognised feature of Delphi studies. In this case, five participants did not respond to the second-round questionnaire, despite receiving reminders. Reasons included time constraints, competing professional commitments, and loss of interest in continued participation. No new participants were added after the first round in order to maintain consistency and comparability of expert opinions across rounds. Importantly, participation remained stable between the second and third rounds ($n = 42$), which indicates a strong level of sustained engagement among those who completed the first follow-up round.

The results represent broader perspectives from doctors on the general factors that would incentivise them to accept or remain in rural postings, regardless of participation in any specific policy. These findings therefore provide valuable insight into what conditions and incentives are perceived as necessary to attract and retain doctors in rural areas. In this sense, the results are not a direct measure of adoption of the Early Study Leave with Pay scheme, but rather a reflection of the wider drivers and barriers to rural service that can inform incentive policy design more generally.

Table 27: Socio-demographic characteristics of the experts and response rates

Expert group	Characteristics	1 st round ($n = 47$)	2 nd round ($n = 42$)	3 rd round ($n = 42$)
Doctors	Number invited	39	31	27
	Number participated (% response rate)	31(79.5)	27(87.1)	27(100)
	Age in yrs (SD)	58.2(1.99)	45(6.72)	45(6.72)
	Gender			
	Male (%)	17(54.8)	13(48.1)	13(48.1)
	Females (%)	14(45.2)	14(51.9)	14(51.9)
	Setting of facility			
	Rural (%)	11(35.5)	10(37)	10(37)
	Urban (%)	20(64.5)	17(63)	17(63)

Regional directors	Number invited	16	16	15
	Number participated (% response rate)	16(100%)	15(93.75)	15(100)
	Age (mean in years)	54.5(3.27)	53.07(4.91)	53.07(4.91)
	Gender			
	Male	14(87.5%)	13(86.7)	13(86.7)
	Females	2(12.5%)	2(13.3)	2(13.3)
	Setting of region (predominant)			
	Rural	12(75%)	11(73.3)	11(73.3)
	Urban	4(25%)	4(26.7)	4(26.7)

7.5.1 Round 1: Expert Generation of Drivers and Barriers

7.5.1.1 Doctors' Perspective on Drivers of Rural Posting Adoption

In total, 11 doctors provided 47 factors that could incentivise them to go to rural areas. Following an initial review to merge similar items, the list was reduced to 18 items that were grouped into four themes (Table 28). The themes were: financial incentives, Professional development and career advancement, Work-life balance and Community and lifestyle factors. Each of these themes contains 5 items except Community and lifestyle factors.

Table 28: Drivers of rural practice adoption by doctors

Themes	Number of items	Item
Financial incentives	1	Higher salaries or bonuses for rural postings
	2	Student loan repayment assistance programs
	3	Relocation allowances or housing subsidies
	4	Tax breaks for rural practice
	5	Allowances to purchase vehicle
Professional development and career advancement	1	Access to continuing medical education opportunities
	2	Mentorship and support from experienced rural physicians
	3	Opportunities to specialize or subspecialize in rural

		medicine
	4	Participation in rural research or clinical trials
	5	Recognition and awards for rural practice excellence
Work-life balance	1	Flexible work schedules, shorter commute times and reduced call frequency
	2	Supportive and collegial work environment
	3	Opportunities for community engagement and leadership
	4	Access to outdoor activities, recreational facilities, and cultural attractions
	5	A sense of purpose and fulfilment derived from serving underserved communities
Community and lifestyle	1	Strong sense of community and belonging among rural residents
	2	Safe and family-friendly living environment
	3	Affordable housing and cost of living

7.5.1.2 Doctors' Perspective on Drivers of Urban Posting Adoption

20 doctors provided 39 items for factors that could incentivise them to go to urban areas. This list was reviewed to merge similar items together. The list was reduced to 9 items that were grouped into four themes (Table 29). The themes were: financial incentives, Professional development and career advancement, Work-life balance and Better infrastructure. Better infrastructure and Work-life balance contained three items each, professional development and career advancement and financial incentives contained two and one items respectively.

Table 29: Drivers of urban practice adoption by doctors

Themes	Number of items	Item
Financial incentives	1	Higher salaries through 'locum'
Professional development and	1	Opportunity to attend more conferences and workshops
	2	Mentorship and support from experienced urban

career advancement		physicians
Work-life balance	1	Access to a variety of cultural and entertainment options
	2	Opportunities for socialization and networking
	3	Access to quality childcare and educational opportunities
Better infrastructure	1	Availability of safe drinking water
	2	Better transport network
	3	Well-resourced health facilities

7.5.1.3 Doctors' Perspective on Barriers of Rural Posting Adoption

20 doctors provided 25 items that could disincentivise them to go to rural areas . This list was reviewed to remove duplicates. The list was reduced to 8 items that were grouped into four themes (Table 30). The themes were: Poor infrastructure, limited source of extra work, Career development and Road map. Poor infrastructure had four items, career development had two items while limited source of extra work and road map had one item each.

Table 30: Barriers of rural practice adoption by doctors

Themes	Number of items	Item
Poor infrastructure	1	Poor road networks
	2	Poor drinking water
	3	Unavailable electricity
	4	Substandard educational facilities for wards
Limited source of extra work	1	Little opportunity to do extra work at private health facilities for extra income
Career development	1	Inadequate professional support and guidance as a result of few specialists in rural areas
	2	Few opportunities to specialise since most rural facilities offer primary care compared to the big hospitals in the cities with specialist departments that offer training
Road map	1	No assurance of release from rural duty post in the future

7.5.1.4 Implementors' Perspectives on Drivers of Urban Posting Adoption

For the implementor group (regional directors), 16 respondents provided 18 items that incentives doctors to operate in urban areas.. These 18 items were reduced to 9 items following the merging of similar items. Table 31 provides the results. The items were organized into four themes. The themes were: financial incentives, Professional development and career advancement, Work-life balance and Better infrastructure. Better infrastructure contained four items, professional development and career advancement and work-life balance contained two items each while financial incentives contained only one item.

Table 31: Regional directors' perspectives on drivers of doctors' adoption of urban incentives

Themes	Number of items	Item
Financial incentives	1	Opportunity to do extra work for more income
Professional development and career advancement	1	Motivation to learn more from more experienced doctors
	2	Ability to specialise in diverse fields due to complexity of services rendered in urban facilities
Work-life balance	1	Proximity to family and friends support groups
	2	No late-night calls except those that are already scheduled
Better infrastructure	1	Availability of safe drinking water
	2	Better transport network
	3	Well-resourced health facilities
	4	Quality educational facilities for wards

7.5.1.5 Implementors' Perspectives on Drivers of Rural Posting Adoption

16 regional directors also provided 24 items as drivers for rural duty post acceptance by doctors. These 24 items were reduced to 7 items following the merging of similar items. Table 32 provides the results. The items were organized into four themes. The themes were: Professional development and career advancement, Work-life balance and Community and Lifestyle. Work-life balance and Community and Lifestyle contained three items each while Professional development and career advancement contained one item.

Table 32: Regional directors' perspectives on drivers of doctors' adoption of rural incentives

Themes	Number of items	Item
Professional development and career advancement	1	Opportunity to complete 'housemanship' faster
Work-life balance	1	Flexible work schedules, shorter commute times and reduced call frequency
	2	Supportive and collegial work environment
	3	Opportunities for community engagement and leadership
Community and lifestyle	1	Low cost of living
	2	Chance to give back to the rural communities
	3	Enjoy serenity and nature

7.5.2 Doctors' Perspective on Drivers of Rural Posting Incentive Adoption

After the third round, experts reached consensus on eleven important drivers of rural incentive adoption descriptors (Table 33). A consensus was reached on only one important financial incentive theme (higher salaries or bonuses for rural postings). The median score for opportunities to specialize or subspecialize in rural medicine was higher than the other professional development and career advancement theme descriptors indicating higher importance. Moreover, access to continuing medical education opportunities and recognition and awards for rural practice excellence were deemed important as well. Experts reached consensus that supportive and collegial work environment is not an important professional development and career advancement descriptor. Consensus was reached for all the descriptors of Work-life balance theme. Opportunities for community engagement and leadership as well as a sense of purpose and fulfilment derived from serving underserved communities were deemed the most important descriptors. For community and lifestyle theme, affordable housing and cost of living was the most important descriptor. Overall, opportunities to specialize or subspecialize in rural medicine, opportunities for community engagement and leadership, a sense of purpose and fulfilment derived from serving underserved communities and affordable housing and cost of living were the most important descriptors on which consensus were reached.

Table 33: Importance and consensus on doctors' perspective on drivers of rural incentive descriptors

Themes	Descriptors	R2:Mdn	R2:IQR	R3:Mdn	R3:IQR
			R		
	Higher salaries or bonuses for rural postings*	6	1	-	-
Financial incentives	Student loan repayment assistance programs	6	2	6	2
	Relocation allowances or housing subsidies	6	2	6	2
	Tax breaks for rural practice	6	2	6	2
	Allowances to purchase vehicle	6	2	6	2
	Access to continuing medical education opportunities*	6	1	-	-
Professional development					

and career advancement	Mentorship and support from experienced rural physicians	6	2	6	2
	Opportunities to specialize or subspecialize in rural medicine*	7	1	-	-
	Participation in rural research or clinical trials	6	2	6	2
	Recognition and awards for rural practice excellence*	6	2	6	1
Work-life balance	Flexible work schedules, shorter commute times and reduced call frequency*	6	1	-	-
	Supportive and collegial work environment	5	1	-	-
	Opportunities for community engagement and leadership*	7	1	-	-
	Access to outdoor activities, recreational facilities, and cultural attractions*	6	1	-	-
	A sense of purpose and fulfilment derived from serving underserved communities*	4	3	7	1
Community and lifestyle	Strong sense of community and belonging among rural residents*	6	2	6	1
	Safe and family-friendly living environment*	6	3	6	1
	Affordable housing and cost of living*	7	1	-	-

*Mdn = median score; IQR= interquartile range; * = Consensus (IQRs ≤1) on important items (Mdn ≥ 6)*

7.5.3 Doctors' Perspective on Barriers of Rural Posting Adoption

In total, experts reached consensus on seven important barriers of rural incentive adoption descriptors (Table 34). There was no consensus on poor drinking water although it was considered important. Poor road networks and little opportunity to do extra work at private health facilities for extra income were considered to be the most important barriers on which consensus were reached.

Table 34: Importance and consensus on doctors' perspective on barriers of rural incentive descriptors

Themes	Descriptors	R2:Mdn	R2:IQR	R3:Mdn	R3:IQR
			R		
	Poor road networks*	6	2	7	1
Poor infrastructure	Poor drinking water	6	3	6	2
	Unavailable electricity*	6	1	-	-
	Substandard educational facilities for wards*	6	1	-	-
Limited source of extra work	Little opportunity to do extra work at private health facilities for extra income*	7	1	-	-
	Inadequate professional support and guidance as a result of few specialists in rural areas*	6	1	-	-
Career development	Few opportunities to specialise since most rural facilities offer primary care compared to the big hospitals in the cities with specialist departments that offer training*	6	1	-	-
Road map	No assurance of release from rural	6	1	-	-

duty post in the future*

*Mdn = median score; IQR= interquartile range; * = Consensus (IQRs ≤1) on important items (Mdn ≥ 6)*

7.5.4 Doctors' Perspective on Drivers of Urban Posting Adoption

Overall, experts reached consensus on eight important drivers of urban incentive adoption descriptors (Table 35). The most important of these were access to quality childcare and educational opportunities, availability of safe drinking water, better transport network and well-resourced health facilities.

Table 35: Importance and consensus on doctors' perspective on drivers of urban incentive descriptors

Themes	Descriptors	R2:Mdn	R2:IQR	R3:Mdn	R3:IQR
Financial incentives	Higher salaries through 'locum'*	6	1	-	-
Professional development and career advancement	Opportunity to attend more conferences and workshops*	6	1	-	-
	Mentorship and support from experienced urban physicians*	6	1	-	-
	Access to a variety of cultural and entertainment options	6	2	6	2
Work-life balance	Opportunities for socialization and networking*	6	2	6	1
	Access to quality childcare and educational opportunities*	7	1	-	-
	Availability of safe drinking water*	7	1	-	-
Better infrastructure	Better transport network*	7	1	-	-
	Well-resourced health facilities*	7	1	-	-

*Mdn = median score; IQR= interquartile range; * = Consensus (IQRs ≤1) on important items (Mdn ≥ 6)*

7.5.5 Implementors' Perspectives on Drivers of Rural Posting Adoption

Overall, experts reached consensus on four important drivers of rural incentive adoption descriptors (Table 36). The most important of these were the opportunity to complete 'housemanship' faster, supportive and collegial work environment and opportunities for community engagement and leadership. Experts reached consensus that low cost of living is not an important descriptor.

Table 36: Importance and consensus on regional directors' perspective on drivers of rural incentive descriptors

Themes	Descriptors	R2:Mdn	R2:IQR	R3:Mdn	R3:IQR
Professional development and career advancement	Opportunity to complete 'housemanship' faster*	7	1	-	-
	Flexible work schedules, shorter commute times and reduced call frequency*	6	1	-	-
Work-life balance	Supportive and collegial work environment*	7	1	-	-
	Opportunities for community engagement and leadership*	7	1	-	-
Community and lifestyle	Low cost of living	5	1	-	-
	Chance to give back to the rural communities	6	3	6	3
	Enjoy serenity and nature	6	2	6	2

*Mdn = median score; IQR= interquartile range; * = Consensus (IQRs ≤1) on important items (Mdn ≥ 6)*

7.5.6 Implementors' Perspectives on Drivers of Urban Posting Adoption

In total, experts reached consensus on seven important drivers of urban incentive adoption descriptors (Table 37). There was no consensus on motivation to learn more from more experienced doctors although it was considered important. Quality educational facilities for wards was considered to be the most important driver on which consensus was reached.

Table 37: Importance and consensus on regional directors' perspective on drivers of urban incentive descriptors

Themes	Descriptors	R2:Mdn	R2:IQR	R3:Mdn	R3:IQR
Financial incentives	Opportunity to do extra work for more income*	7	1	-	-
	Motivation to learn more from more experienced doctors	5	1	-	-
Professional development and career advancement	Ability to specialise in diverse fields due to complexity of services rendered in urban facilities*	6	1	-	-
Work-life balance	Proximity to family and friends support groups*	7	2	7	1
	No late-night calls except those that are already scheduled*	6	1	-	-
Better infrastructure	Availability of safe drinking water	7	2	7	2
	Better transport network*	7	1	-	-
	Well-resourced health	7	1	-	-

facilities*				
Quality educational facilities for wards*	7	0	-	-

*Mdn = median score; IQR= interquartile range; * = Consensus (IQRs ≤1) on important items (Mdn ≥ 6)*

7.6 Discussion of results

We conducted a Delphi study among experts to identify the level of consensus on the most important drivers and barriers influencing doctors' decisions to work in rural and urban settings in Ghana. While the study did not focus exclusively on the Early Study Leave with Pay policy that was assessed in chapters 4-6, this broader framing was intentional, as it enabled experts to situate their views within the wider motivational and systemic factors that shape rural attraction and retention.

Drivers of Rural Posting Adoption

Only doctors mentioned financial incentives as a driver of rural incentive adoption. This pertained to higher salaries or bonuses for rural postings; student loan repayment assistance programs; relocation allowances or housing subsidies; tax breaks for rural practice and allowances to purchase vehicle. However, only one (higher salaries or bonuses for rural postings) of these was considered important. The primary emphasis on higher salaries or bonuses for rural postings as the pivotal financial incentive in the adoption of rural incentives can be attributed to several key factors. Firstly, the direct impact on income is a significant factor; elevated salaries or bonuses contribute directly to an individual's earnings, providing immediate financial benefits and serving as a tangible motivator. This addresses the immediate financial concerns of healthcare professionals, making it a prominent and easily quantifiable incentive (Johnson et al., 2019). Another crucial aspect is the immediacy of gratification. Higher salaries or bonuses offer immediate rewards, unlike other incentives such as student loan repayment assistance programs or tax breaks, which may take time to materialize or may not be as perceptible in day-to-day financial matters. Healthcare professionals often prioritize incentives that yield more immediate financial gains, especially when facing immediate financial needs or obligations.

The consideration of cost-of-living disparities in rural areas also plays a role in the prominence of higher salaries or bonuses. These financial incentives help healthcare professionals offset the challenges associated with living in rural communities, acknowledging and addressing the potential financial sacrifices that individuals might make when choosing to practice in such areas. Flexibility in the use of financial incentives is another contributing factor. Higher salaries and bonuses provide healthcare professionals with the autonomy to allocate funds based on their individual priorities. Whether it is addressing student loans, housing costs, or other personal financial goals, a salary increase offers personal financial flexibility. The competitive nature of the job market, particularly in healthcare, is also influential. Offering higher salaries for rural postings can make positions in rural areas more appealing compared to opportunities in urban or suburban settings. This is particularly important in healthcare, where shortages of professionals in rural settings are common. Moreover, the influence on lifestyle choices is a significant consideration. Financial incentives, such as higher salaries or bonuses, can substantially impact lifestyle decisions. By providing competitive compensation for rural postings, healthcare professionals may be more inclined to consider and commit to long-term rural practice, positively affecting the overall success of rural incentive programs.

Regional directors did not consider financial incentives as an important descriptor. This contradicts the findings of Kumar et al. (2020) where employers observed that offering monetary incentives was an effective means of luring allied health workers to rural locations. Several reasons could be deduced as why implementors did not consider financial incentives as a driver of rural incentive adoption. Firstly, implementors could be directing their attention towards non-monetary elements within incentive programs, such as opportunities for professional growth, mentorship initiatives, or enhancements to working conditions. It is possible that they perceive these non-financial aspects as more influential in attracting and retaining healthcare professionals in rural areas. Another plausible explanation is that financial incentives might be inadvertently overlooked or undervalued by implementors who place a higher priority on other components of incentive programs. They might assume that the financial dimension is adequately addressed or that non-financial incentives hold greater significance for successful implementation. A third factor could be an assumption among implementors that financial incentives are universally acknowledged and considered important. Consequently, they may opt to focus on aspects they believe are less commonly discussed or acknowledged, underestimating the necessity to explicitly mention financial

incentives. This could involve addressing systemic issues, enhancing the overall healthcare infrastructure, or implementing policies that create an environment conducive to healthcare professionals in rural areas. Further exploration through qualitative interviews may yield deeper insights into the reasons behind the limited emphasis on financial incentives.

Doctors and regional directors reached consensus on some professional development and career advancement descriptors as drivers of rural incentive adoption. Regional directors mentioned and reached consensus on one descriptor while doctors mentioned five descriptors and reached consensus on three of them. For doctors, the median score for opportunities to specialize or subspecialize in rural medicine was higher than the other professional development and career advancement theme descriptors indicating higher importance. This higher median score signifies a collective perception among doctors that the prospect of specializing or subspecializing in rural medicine holds greater importance compared to other descriptors in the context of rural incentive adoption. The emphasis placed on this particular descriptor implies that healthcare professionals view specialized training and career growth in rural medicine as a compelling factor influencing their decision to adopt rural incentives. The recognition of the significance of this descriptor by doctors may stem from the belief that specialized skills and expertise in rural healthcare contribute not only to personal career advancement but also to the overall improvement of healthcare services in rural areas (Kumar et al., 2020).

In the assessment of work-life balance descriptors as drivers of rural incentive adoption, a shared consensus emerged between doctors and regional directors, although there were variations in the descriptors highlighted by each group. Regional directors identified and reached consensus on three descriptors, whereas doctors cited five descriptors and achieved consensus on all of them. For regional directors, the descriptors deemed most crucial were a supportive and collegial work environment and opportunities for community engagement and leadership (Onnis, 2019). These aspects signify that regional directors perceive the importance of fostering a positive and collaborative workplace atmosphere, as well as providing opportunities for healthcare professionals to engage with the local community and assume leadership roles within the rural healthcare setting. On the other hand, doctors expressed a broader range of considerations regarding work-life balance. The most prominent descriptors for doctors were opportunities for community engagement and leadership, along with a sense of purpose and fulfilment derived from

serving underserved communities. This position aligns with Cosgrave (2020). This suggests that, from the perspective of doctors, the opportunity to actively engage with the community and take on leadership roles, coupled with a sense of purpose derived from serving underserved populations, significantly influences their perception of work-life balance. Interestingly, while doctors reached consensus on the importance of a supportive and collegial work environment, it was not deemed as crucial as the other descriptors in their evaluation. This could indicate that doctors, while valuing a positive work environment, place higher importance on community engagement, leadership opportunities, and a sense of purpose when considering work-life balance in the context of rural incentive adoption. The divergent perspectives between regional directors and doctors highlight the multi-faceted nature of work-life balance considerations. While regional directors prioritize a positive work environment and community engagement, doctors emphasize a broader spectrum of factors that contribute to a holistic and fulfilling work-life balance, with a strong emphasis on community connection and a sense of purpose in serving underserved communities. Understanding and addressing these varied perspectives is crucial for the effective design and implementation of rural incentive programs that truly resonate with healthcare professionals working in rural settings.

After three rounds of evaluation, doctors involved in the study reached a unanimous consensus on all three descriptors related to community and lifestyle indicators. Notably, the most emphasized aspect was "affordable housing and cost of living," achieving consensus early in the first round with a median score of 7. This indicates a strong collective agreement among doctors regarding the paramount importance of affordable housing and managing the overall cost of living in their decision-making process regarding rural incentive adoption. The second and third descriptors, namely "strong sense of community and belonging" and a "safe and family-friendly living environment," attained consensus in the third round. This delayed consensus might suggest that while these factors are considered crucial by doctors, achieving agreement on their significance required more thorough and extended discussions. Conversely, among regional directors, consensus was reached on the descriptor of "low cost of living"; however, it was not deemed as important, as indicated by a median score less than 6. This divergence in perception suggests that while regional directors acknowledge the impact of a low cost of living, they may not view it as a highly influential factor in the context of rural incentive adoption.

Moreover, consensus was not reached for the other descriptors under consideration, indicating a lack of unanimity in the perspectives of regional directors regarding certain community and lifestyle indicators. The pronounced consensus among doctors on the importance of affordable housing and cost of living, along with the subsequent agreement on a strong sense of community and a safe living environment, contrasts with the regional directors' acknowledgment of a low cost of living without deeming it highly significant. This divergence highlights the complexity of perceptions regarding community and lifestyle indicators and underscores the importance of considering diverse viewpoints in the design and implementation of effective rural incentive strategies.

Barriers of Rural Posting Adoption

In the assessment of barriers to rural incentive adoption, experts identified poor infrastructure as prevalent in rural settings. The most noteworthy barrier, unanimously acknowledged with a median score of 7, was the poor road network. This consensus underscores the pivotal role that well-maintained road play in facilitating healthcare professionals' accessibility to medical facilities and ultimately influences the attractiveness of rural practice. Similarly, there was consensus among experts on the barriers of inadequate electricity and substandard educational facilities for children. The recognition of inadequate electricity as a significant barrier highlights the impact of power shortages on the delivery of healthcare services. Insufficient access to electricity can compromise patient care and serve as a deterrent for healthcare professionals considering rural placements. The consensus on substandard educational facilities emphasizes the interconnected nature of healthcare workforce decisions with broader community infrastructure, particularly the educational resources available for healthcare professionals' children. Darkwa et al. (2015) also found that inadequate infrastructure and social amenities hinders the retention of doctors and nurses in rural Bangladesh. Conversely, the lack of consensus on poor drinking water as a barrier requires further exploration. This disparity may stem from varying perceptions of the severity of the issue among experts, regional, district and locale differences in water quality concerns, or differences in interpretation and prioritization of this specific barrier. Addressing this lack of consensus necessitates in-depth discussions and detailed assessments to understand diverse perspectives and potential solutions related to poor drinking water as a barrier to rural incentive adoption.

The recognition of a limited source of extra work as a barrier to rural incentive adoption sheds light on a critical challenge for healthcare professionals contemplating rural placements. Specifically, the scarcity of opportunities for additional work at private health facilities, resulting in extra income limitations, has been underscored with a notable median score of 7. This unanimous acknowledgment among experts suggests a shared understanding of the profound impact that this barrier can have on the decision-making process of healthcare professionals considering rural practice. Economically, the constraint posed by limited opportunities for extra work, particularly in private health facilities, directly affects the financial considerations of healthcare professionals. In rural areas where such opportunities are scarce, professionals may encounter financial constraints, making rural practice less financially appealing when compared to more urban or private settings. Moreover, the importance of additional income through extra work is not only a financial consideration but also has implications for work-life balance. The scarcity of opportunities for extra work may impact the ability of healthcare professionals to achieve their desired level of financial security, potentially influencing their overall job satisfaction and well-being. Striking a balance between professional commitments and personal financial goals becomes challenging when these opportunities are limited.

In a competitive job market for healthcare professionals, the absence of extra work opportunities could diminish the appeal of rural placements compared to areas where such opportunities are more readily available. This competition for skilled professionals further complicates recruitment and retention efforts in rural healthcare settings. The significance of this barrier is not confined to immediate financial concerns; it also extends to the perception of career development in rural settings. Professionals may prioritize locations that not only offer financial incentives but also provide avenues for professional growth and additional income generation.

The recognition of inadequate professional support and guidance as a barrier to rural incentive adoption sheds light on substantial challenges healthcare professionals face in rural settings. This barrier is intricately linked to the limited availability of specialists in rural areas and the scarcity of opportunities for specialization. Consensus among experts on these issues, as captured under the career development indicator, reflects a shared understanding of the profound impact these challenges can have on healthcare professionals considering rural practice. The limited availability of specialized medical professionals can result in healthcare practitioners in rural settings having

inadequate access to expert guidance and mentorship. This deficiency in professional support can adversely affect the quality of healthcare services, as practitioners may lack the specialized knowledge required to address complex medical cases. Additionally, the absence of specialists can contribute to feelings of professional isolation among healthcare professionals in rural areas. Furthermore, the scarcity of opportunities to specialize in rural settings poses a significant hurdle for career development. Rural healthcare facilities, often focused on primary care, may lack the infrastructure and resources to support specialized training programs. As a result, healthcare professionals in rural areas may find themselves with fewer avenues for professional advancement compared to their counterparts in larger urban hospitals. The consensus on these barriers underscores the critical need to address the disparities in career development opportunities between rural and urban healthcare settings.

To mitigate these barriers, comprehensive strategies are essential. Initiatives that promote telemedicine for remote consultations, collaborative networks that connect rural practitioners with specialists, and targeted training programs for rural healthcare professionals can contribute to overcoming the challenges associated with inadequate professional support and limited opportunities for specialization. By addressing these career development barriers, rural incentive programs can create a more conducive environment for healthcare professionals to thrive in rural settings, fostering a sustainable and fulfilling healthcare workforce.

The barrier identified as the lack of assurance of release from rural duty post in the future, categorized under the broader theme of an unclear roadmap, points to a significant concern for healthcare professionals considering rural placements. The absence of a clear path or guarantee of being released from rural duty raises apprehensions about the long-term commitments and uncertainties associated with practicing in rural areas. Healthcare professionals often seek clarity and assurance regarding their future career trajectories. The lack of a clear roadmap creates uncertainty about the duration of rural assignments, leading to concerns about professional growth, career development, and personal planning. The absence of assurance of release may deter healthcare professionals from committing to rural practice, as it introduces an element of unpredictability that can impact their overall job satisfaction and career decisions. This barrier is not only pertinent to individual healthcare professionals but also has implications for workforce planning and rural healthcare system sustainability. If professionals are unsure about the duration

of their rural commitments, it can hinder effective workforce management and lead to challenges in maintaining a stable and skilled healthcare workforce in rural areas.

Addressing this barrier requires the development and communication of transparent and realistic roadmaps for healthcare professionals practicing in rural areas. Ensuring that healthcare professionals are provided with information about the duration of their rural service, potential career progression opportunities, and mechanisms for release can contribute to alleviating concerns and fostering a more supportive environment for rural practice. Moreover, initiatives that offer flexibility in career paths, such as structured rural rotations with defined endpoints or options for career transitions within the healthcare system, can enhance the appeal of rural practice by providing healthcare professionals with a clearer understanding of their professional journey. A well-defined roadmap can not only attract healthcare professionals to rural areas but also contribute to their long-term commitment and satisfaction, ultimately benefiting the overall healthcare landscape in rural communities.

Drivers of Urban Posting Adoption

In the evaluation of drivers influencing the choice of doctors to practice in urban areas, a unanimous consensus was achieved on all descriptors except for access to a variety of cultural and entertainment options. This outcome suggests a shared perspective among doctors on several key factors that significantly impact their inclination toward urban placements. One of the prominently rated descriptors, with a median score of 7, was the importance attributed to access to quality childcare and educational opportunities. Similarly, the high median score for the availability of safe drinking water indicates the significance doctors place on fundamental infrastructure and services in urban areas. Access to clean and safe drinking water is viewed not only as a basic necessity but also as a crucial contributor to the overall well-being and quality of life for healthcare professionals and their families.

The emphasis on a well-developed transport network, also with a median score of 7, points to the value doctors place on efficient and reliable transportation options in urban areas. Recognizing the demanding nature of medical professions, where timely access to healthcare facilities is imperative, a well-established transport network becomes a key consideration. Furthermore, the high median score for well-resourced health facilities highlights the preference for urban settings equipped with advanced and comprehensive healthcare infrastructure. The availability of cutting-

edge and technologically advanced health facilities is considered crucial for doctors in delivering optimal patient care and advancing their professional development. Contrastingly, the lack of consensus on access to a variety of cultural and entertainment options indicates a nuanced understanding among doctors. While these offerings may be considered factors in choosing urban settings, there is not a universal agreement on their primary importance. This variation underscores the diverse priorities and preferences that healthcare professionals may have when opting for urban placements.

Like doctors, regional directors placed importance on a well-developed transport network, highlighting its significance. The emphasis on well-resourced health facilities aligns with doctors' priorities, indicating a shared recognition among regional directors of the importance of advanced healthcare infrastructure. Additionally, the consensus among regional directors regarding the importance of quality educational facilities for the wards of healthcare professionals mirrors the findings among doctors. This highlights a common understanding among both groups about the significance of education-related amenities for families in the decision-making process for urban placements.

However, the lack of consensus among regional directors on the availability of safe drinking water contrasts with the consensus reached by doctors on this descriptor. This difference may arise from varying perspectives on the perceived importance of water quality as a driver for urban incentive adoption. It could also reflect regional directors' considerations of other factors that may outweigh concerns related to drinking water, or it may suggest a regional variation in the perceived severity of this particular issue. The variation in consensus highlights the complex and nuanced nature of incentive adoption drivers. Understanding these variations is crucial for tailoring incentive programs to address the unique preferences and priorities of doctors in different regions.

In summary, the drivers and barriers of rural incentive adoption often exhibit a contrasting nature when compared to those of urban incentive adoption. This disparity is reflective of the distinct characteristics, preferences, and challenges associated with rural and urban healthcare settings, influencing healthcare professionals' decisions regarding their practice locations.

Situating the Drivers and Barriers in a Global Context

Access to timely and appropriate healthcare is widely recognized as a critical factor in improving life expectancy, reducing preventable deaths, preventing diseases, managing chronic conditions,

and enhancing overall quality of life. A key contributor to the ongoing challenges in rural health is the persistent lack of access to healthcare services, largely stemming from a shortage of physicians in rural areas (Hu et al., 2021). Financial incentives play a pivotal role in influencing healthcare professionals' choice of practice location. A systematic review by Goodfellow et al. (2016) identified financial incentives as one of the most critical determinants guiding primary care physicians toward underserved and rural areas. Many policy initiatives have built upon this understanding by offering loan forgiveness, coverage of training costs, or scholarships in exchange for service in these areas. The findings of this study align with such evidence, highlighting a strong consensus on the importance of financial incentives as a key driver of rural incentive adoption. Additionally, this study underscores the role of a sense of purpose and fulfilment derived from serving underserved populations, which was also identified as a consensus factor. This perspective resonates with Hu et al. (2021), who found that physicians practicing in rural areas were significantly motivated by "greater patient needs," reflecting a mission-driven approach to their career decisions.

The findings revealed that key factors influencing doctors' preference for urban areas included access to additional employment opportunities, such as locum work, and the availability of quality schools for their children. These insights suggest that strengthening the rural education system could be a powerful strategy to reduce the disparity in physician workforce distribution between rural and urban regions. This recommendation may also be applicable to attracting other highly skilled professionals to underserved areas. Notably, this finding aligns with Hu et al. (2021) who identified the quality of schools as a significant determinant in physicians' decisions to practice in urban settings. Moreover, our observation that physicians prioritize career advancement opportunities underscores the critical importance of offering robust professional development programs in rural areas. Such initiatives could help attract, nurture, and retain experienced healthcare providers in underserved regions. This conclusion is further supported by Hu et al. (2021) who similarly emphasized the role of career development in shaping physicians' practice location decisions.

7.7 Strengths and Limitations

This study represents the inaugural exploration into the perspectives of experts on crucial interventions aimed at addressing specific determinants influencing healthcare incentive adoption

in the country. This research introduces fresh insights into strategies for managing incentive adoption, potentially guiding policy formulation and steering discussions on the trajectory of incentive adoption within the Ghanaian context. Additionally, the utilization of the Delphi approach in this study ensures consensus on a broad array of interventions, drawing from diverse perspectives. This methodological advantage equips policymakers with a comprehensive selection of incentive policy options to address the challenges comprehensively.

To bolster the methodological robustness of the investigation, scholars have advocated for a target response rate of around 70% for each round (Walker & Selfe, 1996; Sumsion, 1998). In this Delphi study, the response rates across all rounds exceeded the recommended thresholds outlined in the literature. The response rate was 85.5%, 89.4% and 100% respectively for the first, second and third rounds. This pattern suggests a noteworthy level of participant interest and engagement in the study, reinforcing the strength of the research process.

This study, while contributing valuable insights into the barriers and facilitators to working in rural or urban settings in the Ghanaian healthcare system, is not without limitations. One limitation arises from the participant selection, which included doctors and regional directors but excluded other important stakeholders such as policymakers (e.g., Parliamentary Select Committee on Health and Ministry of Health personnel) and community members. Including these groups could have provided a more comprehensive perspective on the program. Policymakers may have offered insights into the strategic intentions and decision-making processes behind the intervention, while community members could have shared their experiences and perceptions of its impact on healthcare access and outcomes. Future studies should incorporate a more diverse set of participants to capture these additional dimensions and provide a holistic evaluation of facilitators and barriers to working in rural / urban setting. Although the findings of this study provide valuable insights into the drivers and barriers, it is important to note that the study does not establish causality. The Delphi method, while effective in identifying key factors through expert consensus, is inherently cross-sectional and does not account for temporal changes or causal relationships. As a result, future research incorporating longitudinal designs or advanced statistical techniques, such as randomized control trials or regression analysis, would be necessary to explore the causal relationships between these factors and the adoption of healthcare incentives.

In addition to the previously discussed factors, this study acknowledges the potential influence of cultural, social, and gender dynamics on the facilitators and barriers to working in rural / urban setting. Cultural factors, such as regional attitudes toward rural healthcare work, community ties, and local practices, could influence the willingness of healthcare workers to accept postings in rural areas. In some regions, traditional norms or community expectations may discourage healthcare workers from relocating, which could impact the uptake of incentive policies. Understanding these regional differences is vital for designing an incentive program that is not only effective but also culturally sensitive.

Furthermore, gender disparities in the healthcare workforce in Ghana warrant further attention. Women in healthcare often face additional challenges related to work-life balance, family responsibilities, and access to professional development opportunities, particularly in rural settings. In regions where gender roles are more traditional, women may face additional barriers when it comes to relocating to rural areas or accepting study leave opportunities that require long-term absences. These gendered barriers can significantly impact women's decisions. Future research should investigate the specific cultural, social, and gender-based barriers as well as their impact on healthcare delivery.

7.8 Policy Implication

The findings of this study have significant implications for long-term policy planning in Ghana. The results emphasize the need for tailored incentive structures to address regional disparities, as the factors influencing rural or urban placement incentives differ between the areas. A more regionalized approach to incentive structures is recommended, where policies are designed to respond to the unique challenges of healthcare workers in different regions. For instance, regions with fewer healthcare professionals may require larger financial incentives or additional support for healthcare workers to make rural postings more attractive, while urban centres may benefit from policies focused on professional development and career progression.

Moreover, the study highlights the importance of adapting policies to the evolving needs of the healthcare workforce. Factors such as career advancement and work-life balance play crucial roles in healthcare workers' decisions to accept or reject rural or urban areas. As the workforce continues to change, policies must be flexible and responsive to shifting expectations. Regular assessments of

the workforce's needs, particularly regarding professional development and the balance between personal and professional lives, will ensure that the policies remain attractive and relevant. Additionally, the study underscores the importance of incorporating feedback from stakeholders, particularly doctors and regional directors, in shaping and refining work placement decisions. Given the dynamic nature of healthcare systems, regular consultations with healthcare workers and other relevant stakeholders should be institutionalized. These consultations would help policymakers address emerging challenges and ensure that incentive programs remain aligned with the evolving needs of healthcare delivery.

Continuous evaluation is also crucial. The study recommends establishing a framework for ongoing impact assessments to track both short-term and long-term impact of work-placement decisions. Regular evaluations would provide valuable data to policymakers, enabling them to make informed, data-driven decisions regarding program refinement and resource allocation. Furthermore, financial incentives, particularly the allocation of resources, must be carefully planned to ensure long-term sustainability. Financial incentives have been identified as one of the most significant drivers of rural practice. To ensure continued effectiveness, policymakers should consider how to balance resource allocation across regions while maintaining financial sustainability. Work-placement decisions must be adaptable to the changing healthcare landscape. The study suggests that the placement decisions will likely evolve over time. It is therefore imperative to periodically review and adjust. These adjustments will help accommodate shifts in workforce demographics, healthcare needs, and regional disparities, ensuring continuous relevance and effectiveness.

The findings of this study underscore the importance of targeted strategies to address the maldistribution of healthcare workers, particularly in rural and underserved areas. These insights resonate with the WHO's Health Workforce Plan, which emphasizes equitable distribution, capacity-building, and sustainability in health workforce development. To align with WHO guidelines, this study recommends periodic workforce assessments to ensure that resource allocation reflects evolving healthcare demands. Furthermore, integrating continuous professional development and career growth opportunities into incentive programs aligns with WHO's principles of retention and motivation. Additionally, the WHO highlights the need for policies that foster sustainable workforce solutions, including localized training programs, community

engagement, and gender-sensitive approaches. In this context, the findings advocate for tailored policy interventions that address regional disparities while fostering a resilient and adaptive workforce. Embedding these strategies will not only enhance its efficacy but also ensure its sustainability and alignment with global standards for health workforce development.

Finally, this study underscores financial incentives, such as increased salaries and bonuses for rural postings, as critical drivers. These incentives are particularly important in addressing the persistent maldistribution of healthcare workers in Ghana, where rural areas are often underserved due to the reluctance of healthcare professionals to accept postings in these regions. The challenges associated with rural service, including limited professional opportunities, social isolation, and inadequate infrastructure, necessitate financial interventions to attract and retain healthcare workers. To achieve sustainable workforce distribution, it is essential to contextualize these financial incentives within the broader framework of equitable pay. Equitable pay reflects the principle that compensation should correspond to the demands, complexities, and challenges of specific work environments. Rural healthcare workers often face higher workloads, professional isolation, and significant personal sacrifices, yet urban healthcare workers receive comparable compensation. Addressing such discrepancies is vital for fostering a sense of fairness and ensuring that rural postings are not perceived as punitive or less rewarding. Integrating equitable pay principles into policy frameworks goes beyond the provision of basic financial incentives. For example, targeted salary adjustments that reflect the unique challenges of rural healthcare delivery, coupled with additional supports such as housing allowances, transportation subsidies, and tuition loan forgiveness, can make rural postings more viable and appealing. These measures can also enhance job satisfaction, reduce turnover rates, and create a more sustainable rural healthcare workforce. The alignment of financial incentives with equitable pay principles also has broader implications for healthcare policy. By prioritizing fairness and equity in remuneration, healthcare systems can mitigate workforce disparities and improve service delivery in underserved areas. Furthermore, ensuring that rural healthcare workers feel valued and adequately compensated contributes to improved morale and productivity, which are essential for achieving long-term goals of equitable healthcare access and quality service provision.

7.9 Reflections on Methodological Choice and Policy Relevance

The Delphi study presented in this chapter was not designed as a narrow evaluation of the Early Study Leave with Pay policy, but rather as an exploration of the broader drivers and barriers shaping doctors' willingness to work in rural and urban areas. This distinction is important to clarify in light of the observation that participants did not explicitly identify the Early Study Leave with Pay policy as a facilitator of rural service. Far from diminishing the relevance of Policy, this outcome sheds light on the complex realities of workforce motivation, redistribution, and retention in Ghana and similar contexts.

The decision to frame the Delphi around general drivers and barriers of rural and urban service was a deliberate methodological and conceptual choice. While chapters 4–6 had already provided quantitative evidence of the effects of the Policy on service delivery using interrupted time series analysis of Caesarean section volumes at national, regional, district, and facility levels, the Delphi sought to complement these findings by investigating the underlying motivational dynamics that influence doctors' choices. Incentive schemes, including the Early Study Leave with Pay, are only one part of this broader motivational ecosystem. By structuring the Delphi around open-ended questions about what encourages or deters rural and urban postings, the study allowed participants to foreground the factors that they themselves considered most salient, without being constrained to a single policy frame.

From this perspective, the absence of the Early Study Leave with Pay in doctors' and regional directors' spontaneous responses do not negate its importance as a policy. Instead, it suggests that doctors perceive other, more immediate factors such as working conditions, career development opportunities, family considerations, and professional recognition as more powerful influences in their decision-making. This finding is consistent with the broader literature on health worker motivation, which highlights that financial or career-linked incentives, while important, often prove insufficient on their own to drive long-term commitment to rural service. The ERG theory framework reinforces this interpretation: the Early Study Leave with Pay scheme may address growth needs (by providing career progression opportunities through study leave), but if existence needs (such as adequate salary, infrastructure, or housing) or relatedness needs (such as professional recognition and collegial support) are not adequately met, its motivational impact may be constrained.

Seen in this light, the Delphi results complement rather than contradict the earlier quantitative findings. The ITS analysis demonstrated that the Early Study Leave with Pay produced a measurable impact on CS volumes, indicating that the scheme had short-term effects on service delivery. However, the Delphi reveals that from doctors' and regional directors' perspectives, the Early Study Leave with Pay does not feature prominently in their narratives of motivation and career decision-making. The two findings, taken together, point to the limitations of relying solely on a single incentive mechanism to achieve sustained workforce redistribution. The Early Study Leave with Pay may have created an initial surge in service delivery, as shown in chapter 4, but its salience to doctors' personal and professional choices appears weaker when set against a backdrop of systemic and contextual factors.

This interpretation has important implications for policy. First, it underscores the need to situate the Early Study Leave with Pay within a broader package of measures that addresses the full spectrum of doctors' needs and motivations. For example, combining study leave opportunities with improved rural infrastructure, reliable supplies, and clear pathways for professional recognition may increase the likelihood that doctors will view rural service as an attractive and viable career stage. Second, it suggests that policy-makers should adopt a more holistic approach when assessing the effectiveness of interventions: quantitative outcomes, such as procedure volumes, must be read alongside qualitative insights into worker motivations and perceptions. Finally, it highlights the value of giving voice to doctors themselves in shaping workforce policies. By prioritising their lived experiences, as captured in the Delphi, policies can be designed to better align with the realities of practice.

7.10 Positionality in Conducting and Interpreting the Study

It is also important to reflect on my own positionality in conducting and interpreting this research. In the case of this chapter, my positionality is shaped by several interrelated dimensions: my professional background, my insider–outsider status, and my interpretive stance.

As a researcher trained in public health and familiar with Ghana's health system, I approached this study with pre-existing knowledge of the challenges of rural service delivery and the role of policies such as the Early Study Leave with Pay. This knowledge provided me with insights into the structural constraints facing the Ghana Health Service and the Ministry of Health, as well as into

the everyday realities of healthcare delivery in rural facilities. At the same time, it created expectations that doctors would view the Early Study Leave with Pay as a significant motivator, given its prominence in policy discourse. The fact that participants did not highlight Early Study Leave with Pay directly challenged these assumptions, reminding me of the importance of privileging participant perspectives over researcher expectations.

My positionality can also be understood in terms of insider–outsider dynamics. On one hand, as someone familiar with the Ghanaian context, I occupied the position of an insider, with the ability to understand cultural nuances, institutional practices, and the language of health workforce debates. This facilitated rapport with participants and enabled me to interpret their responses with contextual sensitivity. On the other hand, as a researcher conducting a structured academic inquiry, I was also an outsider, analysing responses through the lens of ERG theory and situating them within international literature on workforce motivation. This dual positioning is both a strength and a limitation: it allows for nuanced interpretation, but also risks overlaying local perspectives with external theoretical frames.

My interpretive stance further shaped the analysis. By adopting ERG theory as an interpretive framework, I foregrounded the role of existence, relatedness, and growth needs in shaping doctors' motivations. This lens helped to organise and make sense of the diverse drivers and barriers identified by participants, but it also reflected a particular theoretical commitment. Alternative frameworks, such as self-determination theory or social capital theory, might have emphasised different aspects of motivation. Recognising this interpretive choice is essential for transparency: the knowledge produced here is not a neutral reflection of reality, but a situated interpretation shaped by my theoretical choice.

These positionalities have substantive implications for how the findings should be read. First, it highlights the need for caution in generalising the results. The factors identified by participants reflect their perspectives within a particular socio-economic and institutional context, and my interpretation reflects my position as a researcher embedded in, but also analytically distanced from, that context. Second, it underscores the importance of methodological pluralism. By combining quantitative ITS analysis with qualitative Delphi insights, the study offsets some of the limitations of each method and provides a more comprehensive understanding of the Early Study Leave with Pay and rural workforce dynamics. Finally, it calls attention to the relational nature of

knowledge production: the findings are co-constructed through the interaction between participants' accounts and my interpretive lens.

7.11 Conclusion

This chapter has explored the perspectives of doctors on the drivers and barriers that shape their willingness to work in rural and urban settings, using a Delphi methodology to systematically capture and refine expert opinion. The findings revealed that doctors' decisions are influenced by a combination of existence needs (such as adequate infrastructure, fair remuneration, and living conditions), relatedness needs (such as collegial support, recognition, and family considerations), and growth needs (such as opportunities for career advancement and professional development). Importantly, while incentive schemes such as the Early Study Leave with Pay policy have demonstrated measurable short-term effects on service delivery, participants did not spontaneously identify the policy as a primary motivator of rural practice. This absence underscores the reality that financial or career-linked incentives alone are insufficient to sustain long-term redistribution and retention of the workforce unless complemented by improvements in working conditions, systemic supports, and broader socio-economic opportunities.

The chapter also highlighted that doctors perceive urban postings as attractive not only because of better infrastructure and professional networks, but also because urban environments afford greater opportunities for personal and family wellbeing. Conversely, rural postings are shaped by a mix of professional altruism, desire for recognition, and availability of supportive systems, but are constrained by persistent challenges such as limited infrastructure, professional isolation, and inadequate social amenities. These findings point to the need for a more holistic policy package that addresses the full spectrum of motivational factors rather than relying on single interventions.

Finally, the chapter has reflected on the positionality of the researcher in shaping the study and its interpretation. The dual insider–outsider position, coupled with the choice of ERG theory as the analytical framework, provided both strengths and limitations. Acknowledging these dynamics underscores that the findings are situated interpretations, co-constructed between participants' lived experiences and the researcher's analytic lens.

In sum, the Delphi study enriches the overall thesis by complementing the quantitative analyses with qualitative insights into workforce motivation. It demonstrates that sustaining rural healthcare

delivery requires multi-pronged strategies that integrate financial and non-financial incentives, strengthen infrastructural supports, and account for the lived realities of doctors. These insights provide a foundation for more responsive, context-sensitive workforce policies that can contribute to reducing geographical inequities in access to healthcare in Ghana and comparable settings

The next chapter draws together the insights from all preceding analyses to present the overall conclusions of the thesis. It synthesises the empirical evidence and policy implications to articulate a coherent account of how incentive schemes and broader systemic factors interact to shape the distribution and motivation of Ghana's healthcare workforce.

CHAPTER EIGHT

DISCUSSIONS AND CONCLUSION

8.1 Introduction

This concluding chapter provides a concise overview of the thesis's results, examines their alignment with existing literature, and evaluates their contribution to the current body of scholarship on incentive adoption. Furthermore, it examines the thesis's impact on Ghana, compares the results to those obtained in other nations, and establishes the connection between the findings and the ERG model. Ultimately, the chapter delves into the practical consequences of the results, as well as the constraints and prospective avenues for further research.

8.2 Findings in Relation to the Research Objectives

This research directly addressed the study objectives:

8.2.1 Effectiveness in Retaining Rural Health Workforce

The findings suggest that the intervention exhibited partial effectiveness in attracting healthcare workers to rural areas, with variations in effectiveness observed across different regions, districts and facilities. Regions and districts which can be predominantly described as rural such as Upper West and Brong Ahafo, Nadowli, Sissala East and Sagnarigu recorded significant increases in CS

cases which could be attributed to the successful placement of healthcare workers in these areas. These results indicate that the incentive scheme effectively encouraged health professionals to serve in underserved regions, particularly in rural and remote settings where healthcare access has historically been limited.

However, the effectiveness in retaining healthcare workers in rural areas was not uniform. Some predominantly rural regions and districts such as Northern, Upper East and Volta regions, Wa West, Kasena-Nankana and Jirapa districts saw significant positive changes in CS cases. These suggests that the intervention alone may not be sufficient to sustain healthcare worker retention. This variation points to the complex nature of workforce retention, where factors beyond financial incentives, such as local infrastructure, living conditions, and professional development opportunities, also play a crucial role.

8.2.2 Barriers and Drivers to Working in Rural / Urban Setting

The study identified critical barriers and facilitators influencing the decision of doctors to work in rural or urban areas.. Financial incentives were universally recognized as essential, aligning with global literature on workforce retention. However, barriers such as professional isolation and inadequate rural infrastructure suggest the need for comprehensive policy interventions that go beyond financial measures.

8.2.3 Policy Development

Human resources for health (HRH) remain one of the most critical determinants of health system performance in low- and middle-income countries. In Ghana, persistent challenges of health worker maldistribution, high attrition, and rural–urban disparities in access to skilled providers have constrained progress toward equitable health outcomes. Addressing these challenges requires policies that are not only well-designed but also evidence-based, context-sensitive, and sustainable. The study presented in this thesis offers important empirical insights into these policy questions by examining the effects of the Early Study Leave with Pay scheme and by exploring broader drivers and barriers to health worker motivation and distribution. This subsection presents actionable policy lessons from the findings. It outlines the policy implications emerging from the national, regional, hospital-level, and Delphi components of the study. It also highlights cross-cutting themes.

8.2.3.1 Lessons from National-Level Trends

At the national level, the study revealed that the Early Study Leave with Pay policy had an immediate and measurable impact on service delivery, with CS volumes rising significantly in the period immediately after the intervention. This outcome demonstrates that financial and career-related incentives can influence doctor behaviour in ways that directly improve access to essential health services. Policymakers can draw three important lessons from this finding.

First, incentive schemes can have a rapid effect when they directly align with health workers' immediate needs for financial security and professional advancement. The short-term surge in CS volumes following policy implementation suggests that doctors responded positively to the promise of study leave and remuneration, prioritising their service commitments in the interim. This aligns with ERG theory's emphasis on existence needs (financial/material security) as a primary motivator.

Second, the sustainability of such impacts is less straightforward. The analysis showed a slowing in the growth rate of CS procedures over time, raising questions about the durability of incentive-driven behaviour. This pattern highlights the risk of relying exclusively on financial or contractual incentives without simultaneously addressing structural enablers such as facility readiness, supply chains, and adequate support staff. Policy therefore needs to consider not only the "pull" created by incentives but also the "push" factors that constrain service delivery, such as surgical theatre availability, anaesthetic support, and blood supply.

Third, national-level findings highlight the importance of monitoring and evaluation. Without robust monitoring and evaluation, it will be difficult to distinguish between a stabilisation of service delivery at higher levels (a success) and a loss of momentum due to waning motivation (a risk). Embedding real-time monitoring into policy implementation would allow course corrections, such as supplementing financial incentives with targeted infrastructure investments or refresher training to sustain performance.

8.2.3.2 Lessons from Regional-Level Variation

The regional analysis revealed significant heterogeneity in the impact of the policy, with rural and northern regions (e.g., Upper East, Northern) showing marked increases in CS volumes, while urbanised regions such as Greater Accra and Ashanti saw plateauing or even declines.

First, this variation underscores the importance of context-specific policy design. In underserved regions with historically low HRH density and poor infrastructure, incentives had a transformative effect. Doctors were more likely to accept postings, and the marginal benefit of their presence translated directly into improved service delivery. In contrast, in urbanised regions where baseline HRH levels were higher and infrastructure more developed, the intervention's added value was limited.

Second, the findings demonstrate the policy's success in redistributing health workers toward areas of greatest need. From a policy perspective, this outcome aligns with equity goals, but it also raises concerns about unintended consequences in urban centres. While rural areas benefitted from increased service coverage, urban regions risked staff shortages that could undermine specialised care or teaching hospital functions. Policymakers must therefore view redistribution policies as a balancing act, requiring careful calibration to avoid weakening urban care while addressing rural deficits.

Third, regional findings point to the need for differentiated incentive packages. A one-size-fits-all incentive such as study leave may resonate strongly in rural regions but less so in urban ones, where doctors' priorities may centre on opportunities for sub-specialisation, academic work, or private practice. Tailoring incentives to regional contexts, combining rural allowances, housing support, and recognition schemes in underserved areas with career development and research opportunities in urban settings could enhance overall effectiveness.

8.2.3.3 Lessons from Hospital-Level Findings

Hospital-level analysis offered granular insights into how policy translated into service delivery outcomes at the institutional level. Rural hospitals such as Presbyterian Hospital-Bawku, War Memorial Hospital, and Tamale West Hospital experienced significant improvements in CS volumes, reinforcing the notion that redistribution policies can deliver tangible benefits in underserved settings.

First, these findings emphasise the importance of hospitals as the frontline of HRH policy implementation. Regardless of national or regional trends, it is at the hospital level where workforce presence interacts with infrastructure, supply chains, and patient demand to produce measurable outcomes. Policies must therefore ensure that incentive-driven workforce

redistribution is matched by commensurate investments in hospital capacity such as theatre upgrades, staffing for anaesthesia, and reliable supply of consumables.

Second, the contrast between rural and urban hospitals highlighted persistent challenges of urban bias. Facilities such as Manhya Government Hospital continued to experience high demand despite the redistribution policy, underscoring the enduring attractiveness of urban postings. This suggests that policy alone cannot fully counteract the structural pull of urban areas. Instead, targeted interventions to make rural hospitals more “livable” and professionally rewarding through for instance, housing, continuing education, and technology-enabled support are required.

8.2.3.4 Lessons from Stakeholder Perspectives (Delphi Study)

The Delphi study captured doctors’ and regional directors’ perspectives on the drivers and barriers to rural and urban service, providing an interpretive lens for the quantitative findings.

First, doctors identified a range of incentives influencing their willingness to work in rural areas, including financial allowances, housing, professional recognition, and career development opportunities. Importantly, many of these factors align with ERG theory: existence needs (allowances, job security), relatedness needs (recognition, collegiality), and growth needs (career advancement, further study). This suggests that effective policy must address multiple motivational domains simultaneously rather than relying solely on financial levers.

Second, regional directors highlighted the systemic barriers that limit the impact of incentive schemes, such as inadequate infrastructure, poor working conditions, and limited supervisory capacity. Their perspectives reinforce the point that policy effectiveness depends not only on motivating individuals but also on creating enabling environments.

Third, the Delphi revealed a gap between policy design and frontline realities. The Early Study Leave with Pay scheme, while impactful, was not explicitly identified by respondents as a major facilitator of rural service. This suggests that while financial and contractual incentives matter, they may be overshadowed in practice by broader systemic challenges. From a policy perspective, this highlights the importance of aligning incentive schemes with health workers’ lived experiences, ensuring that policies resonate with the factors that doctors and managers perceive as most relevant to their professional lives.

8.2.3.5 Cross-Cutting Policy Themes

Synthesising the findings across national, regional, hospital, and stakeholder perspectives reveals several cross-cutting policy themes that are crucial for the future of human resources for health in Ghana. A key insight is that sustainability matters as much as initial impact. While the Early Study Leave with Pay scheme produced an immediate surge in service delivery, particularly in CS volumes, this effect gradually slowed over time. The pattern illustrates that short-term gains are possible when financial and contractual incentives are introduced, but sustaining these outcomes requires embedding the intervention within broader systemic reforms.

Equally important is the recognition that context matters. The impact of the scheme varied significantly across regions and hospitals, reflecting differences in infrastructure, demand, and socioeconomic conditions. This heterogeneity demonstrates that national policies must be sufficiently flexible to adapt to local contexts rather than relying on a one-size-fits-all approach. For example, rural and underserved regions benefitted more visibly from the intervention, while urban centres with already high HRH density saw little change. Effective policy design, therefore, requires acknowledging such variation and tailoring incentive packages to suit different regional realities.

Another theme that emerges is the insufficiency of incentives alone. Financial and contractual mechanisms can influence workforce distribution, but they cannot compensate for systemic deficits such as inadequate hospital infrastructure, shortages of essential supplies, or limited career development opportunities. The perspectives of doctors and regional directors in the Delphi study reinforced this point by emphasising professional recognition, opportunities for advancement, and supportive working conditions as equally important motivators. Policies that focus narrowly on financial incentives risk overlooking these intrinsic and systemic factors, thereby limiting long-term effectiveness.

The study also highlights the critical role of monitoring and evaluation in workforce policy. Without robust monitoring systems, policymakers may misinterpret stabilisation at higher levels of service as decline or conversely fail to detect inequities in redistribution. Real-time data collection and analysis would enable continuous assessment of whether interventions are meeting their intended objectives and provide opportunities for mid-course adjustments.

Finally, the findings underscore the importance of stakeholder engagement in policy development. The Delphi study showed that doctors and regional managers did not always perceive existing incentives as key facilitators of rural service. This divergence between policy intent and frontline perception illustrates how policy relevance depends on alignment with health workers lived experiences and professional aspirations. Meaningful engagement of stakeholders during policy formulation and implementation can enhance both acceptability and effectiveness, ensuring that interventions respond to the real drivers and barriers of health worker motivation.

Taken together, these cross-cutting themes point to the need for a holistic, adaptive, and participatory approach to HRH policy. Sustainability, contextual sensitivity, systemic support, rigorous monitoring, and stakeholder engagement must all be woven into the fabric of policy design if Ghana is to address long-standing challenges in health workforce distribution and performance.

8.3 Findings in Relation to the Research Gaps

This thesis aimed to assess the effectiveness of an incentive scheme and to identify the drivers and barriers to working in rural / urban setting. Consequently, a systematic review was undertaken to examine and consolidate the available evidence regarding the impact of incentives on the behaviour of healthcare workers. The review showed that there were paucity of studies evaluating health workers incentive packages in Ghana, inadequate studies exploring facilitators and barriers of health workers incentive schemes adoption, lack of studies exploring the cost-effectiveness of health workers incentive schemes in Ghana and inadequate theoretical models and model diagnosis in incentive schemes.

To fill a notable gap identified in the systematic review, this study undertook an examination of the Early Study Leave with Pay incentive program. The specific focus was on assessing the program's effectiveness in addressing the shortage of caesarean doctors in rural areas of Ghana. The evaluation aimed to provide insights into the impact of this incentive initiative, shedding light on its contributions to mitigating the shortage of healthcare professionals in critical areas. The evaluation, conducted across national, regional, district, and hospital levels, revealed a nuanced effectiveness of the incentive program. Strikingly, the study demonstrated considerable variation in effectiveness even within the same region and district. This divergence in outcomes emphasized

the complex and context-specific nature of the incentive's impact. Factors such as local healthcare infrastructure, community dynamics, and specific facility conditions might have contributed to the observed variations. This finding underscored the importance of considering micro-level factors when assessing the overall effectiveness of incentive programs, suggesting that a one-size-fits-all approach may not be optimal for achieving uniform success across diverse geographical and administrative units. Given the observed variations in effectiveness across different levels, a Delphi study was initiated to systematically identify and explore the barriers and drivers to working in rural / urban settings. Recognizing the complexity revealed in the evaluation, the Delphi study aimed to gather expert opinions and insights from diverse stakeholders across national, regional, district, and facility levels. This approach allowed for a comprehensive understanding of the multifaceted factors contributing to the diverse effectiveness of attracting and retaining rural healthcare workers. The Delphi study methodology facilitated the generation of consensus among experts, offering a refined perspective on the specific challenges and facilitators influencing the choice to work in rural or urban areas.

This thesis did not evaluate the cost-effectiveness of the incentive scheme although it was a gap identified in the review. Future studies could conduct detailed economic analyses of health worker incentive schemes particularly the Early Study Leave with Pay. On the gap about the inadequate use of theoretical frameworks, this study used the Existence Relatedness Growth theory enhancing its contribution to the field. By grounding the findings in the established theory, the research offers a robust foundation for future work on healthcare workforce policies.

Figure 20 illustrates the novel insights generated from this thesis regarding the adoption of incentive schemes in Ghana. The visual representation encapsulates the key findings uncovered throughout the research process. This figure serves as a visual synthesis, providing a comprehensive overview of the unique contributions and advancements made in the understanding of incentive scheme adoption within the Ghanaian context as presented in the thesis.

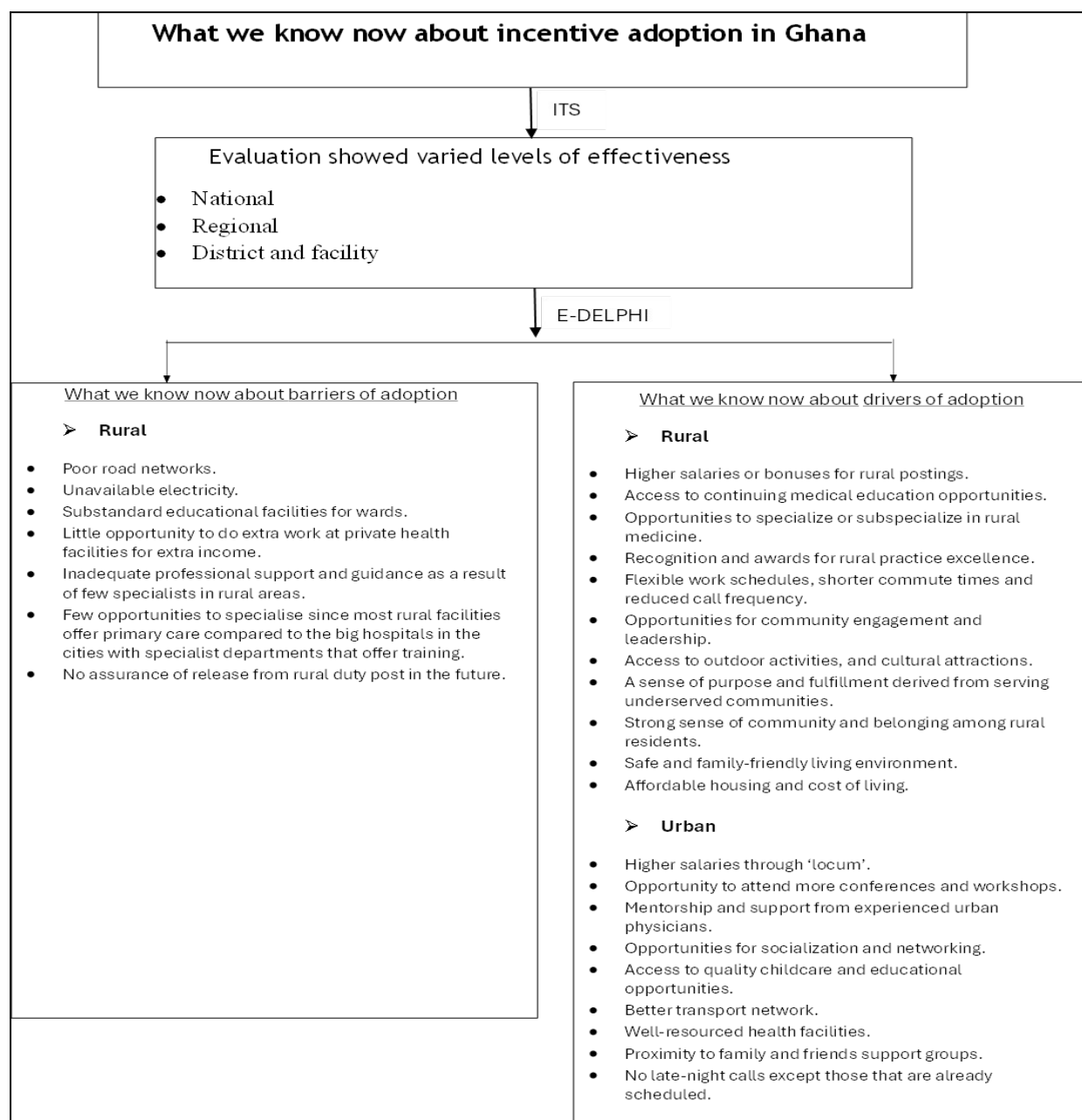


Figure 20: What we now know about the incentive adoption in Ghana

8.4 Findings in Relation with the Literature

The study's findings establish a significant alignment with existing literature on incentive scheme adoption, particularly in confirming and extending prior knowledge. Consistent with previous research, our investigation underscores the critical role of financial considerations, career development opportunities, and community engagement as key drivers and barriers in the adoption

of incentive schemes within the healthcare sector (Kwansah et al., 2012; Ramadhan, 2015; Ankomah & Karikari, 2016; Goodfellow et al., 2016; Wurie et al., 2016; Johnson et al., 2019; Kumar et al., 2020; Cosgrave, 2020; Hu et al., 2021). These commonalities reinforce the robustness of certain patterns identified in the literature.

However, the study contributes novel insights by venturing beyond the broad strokes of national-level analyses, delving into regional, district, and facility-level dynamics. A primary contribution lies in the in-depth regional analysis, unravelling variations in incentive scheme effectiveness within the same administrative regions. This level of granularity offers a localized perspective rarely explored in existing literature, providing a nuanced understanding of regional dynamics in Ghana. The study also delves into hospital-level nuances, acknowledging that the effectiveness of incentive schemes can vary even within the same hospital levels. By recognizing and highlighting these variations, the study contributes to a more detailed comprehension of factors impacting healthcare facilities, offering insights for targeted interventions.

The utilization of the Delphi study methodology further augments the study's contributions. By synthesizing expert opinions and establishing consensus, the Delphi study offers a refined and expert-driven perspective on the complexities of incentive adoption. This methodological approach enhances the reliability of our findings and adds depth to the existing literature by capturing the insights of key stakeholders at various levels of the healthcare system.

Despite these confirmations and extensions, the study reveals certain contrasts and divergences that challenge conventional understandings. Unique contextual factors contributing to the varied effectiveness of incentive schemes emphasize the importance of context-specific tailoring, challenging the feasibility of a uniform approach across diverse regions in Ghana. This inconsistency highlights the significance of considering local nuances and tailoring incentive programs to specific contexts. The identification of nuanced contextual factors enhances our understanding of incentive adoption dynamics, opening avenues for future research to delve deeper into specific regions, and facility levels. Overall, the synthesis of our findings within the broader literature underscores the pivotal role of contextual factors and local dynamics in shaping the success and challenges of incentive adoption initiatives in Ghana's healthcare sector.

8.5 Findings in Relation with the Ghanaian Context

The study's findings are closely tied to the unique dynamics of Ghana's healthcare landscape while also offering insights that extend to broader regional contexts. Beyond simply using Ghanaian data, this research highlights critical contextual factors and mechanisms that influence the effectiveness of incentive schemes, making its contributions both locally grounded and regionally relevant.

The study confirms that financial incentives, career development opportunities, work-life balance, infrastructural development, and community engagement are pivotal factors driving the adoption and success of incentive schemes, aligning with global literature. However, what distinguishes this study is its fine-grained exploration of how these factors play out in the specific regional, district, and hospital-level contexts of Ghana. For example, the observed regional, district and hospital levels variations in the scheme's effectiveness reveal how differences in healthcare infrastructure, socio-economic conditions, and community dynamics influence outcomes. These findings emphasize that while financial and career development incentives are critical, their effectiveness could be influenced by contextual factors, such as local resource availability, socio-economic disparities, and cultural norms.

Notably, the study demonstrates that incentive schemes targeting underserved and rural areas, such as the Early Study Leave with Pay programme, can achieve substantial success in addressing inequities in healthcare delivery. For example, the significant increase in Caesarean section cases in predominantly rural regions and districts underscores the potential for targeted interventions to improve healthcare access in marginalized areas. At the same time, the observed declines in urban facilities, regions and districts reflect the trade-offs inherent in redistributing healthcare workers. This nuanced understanding of rural-urban dynamics has broader implications for healthcare systems in other low- and middle-income countries (LMICs) that face similar challenges of healthcare workforce redistribution.

By adopting the Delphi methodology, the study also incorporates local expertise and stakeholder perspectives, ensuring that its findings are both contextually informed and grounded in practical realities. This participatory approach aligns with the decentralised nature of decision-making in Ghana's healthcare system and highlights the value of involving stakeholders at multiple levels. Such an approach is not only applicable to Ghana but also offers a transferable framework for understanding and implementing incentive schemes in other LMICs.

This study stands out for its detailed exploration of how national-level interventions manifest at regional and hospital levels, providing insights into both the successes and limitations of incentive programmes in the Ghanaian context. While the findings are deeply rooted in Ghana's unique healthcare landscape, the lessons drawn, particularly, regarding the importance of tailoring interventions to local contexts and leveraging participatory approaches are generalisable to wider regional contexts across Sub-Saharan Africa and beyond. By bridging the gap between local specificity and broader applicability, the study contributes to advancing both the theory and practice of health workforce incentive strategies in resource constrained settings.

8.6 Situating the Findings in Relation with the ERG Theory

Alderfer's Existence, Relatedness, and Growth theory of motivation provides a powerful interpretive framework for understanding the motivations of healthcare workers and the outcomes of incentive policies such as Ghana's Early Study Leave with Pay scheme. The three dimensions of the theory: existence, relatedness, and growth, map onto distinct but interconnected aspects of human motivation. By applying this framework, the findings presented in chapters four through seven can be situated within a broader conceptual understanding of what drives health worker behaviour in the Ghanaian context. The quantitative analyses in chapters four to six examined the impact of the Early Study Leave with Pay scheme at the national, regional, and hospital levels, using caesarean section rates as a proxy for physician presence and service delivery. Chapter seven complemented these analyses through a Delphi study that captured the perspectives of doctors and regional directors on the broader drivers and barriers to rural service adoption. Together, these chapters provide an integrated view of how incentive schemes interact with financial security, social relationships, and professional development opportunities corresponding to the existence, relatedness, and growth needs articulated by Alderfer.

8.6.1 Existence Needs: Financial Security, Material Wellbeing, and Basic Work Conditions

Existence needs, according to Alderfer, refer to the most fundamental drivers of behaviour, those concerned with material and physiological security. Within the Ghanaian healthcare context, this dimension encompasses financial remuneration, job security, infrastructure adequacy, and the material conditions necessary to provide safe and effective care.

At the national level (chapter four), the findings demonstrated a significant immediate increase in CS volumes following the introduction of the Early Study Leave with Pay scheme. This sharp rise

indicates that the policy was initially effective in addressing existence needs, particularly by offering financial incentives that encouraged doctors to remain at their posts. The provision of salary support during postgraduate training directly reduced the financial burden on doctors, many of whom may otherwise have sought alternative employment in urban centres or abroad. The responsiveness of CS volumes to this intervention underscores the centrality of financial security as a motivating factor. However, the tapering effect observed in subsequent years reflects the limitations of focusing narrowly on existence needs without simultaneously addressing other motivational dimensions.

The regional-level analysis (chapter five) further illustrated the salience of existence-related factors. Rural and deprived regions, such as the Northern and Upper East regions, experienced noticeable increases in CS cases following the scheme's introduction, suggesting that the financial incentive carried greater weight where baseline salaries were less supplemented by external income opportunities. By contrast, in urban regions such as Greater Accra and Ashanti, where doctors often engage in locum work or private practice, the relative value of the incentive was diminished. This finding aligns with ERG theory's assertion that the satisfaction of existence needs varies depending on baseline conditions—those already able to meet their material needs through alternative avenues are less motivated by financial supplements alone.

At the hospital level (chapter six), the differential performance of facilities further highlighted the importance of existence-related drivers. Hospitals such as Tamale West and War Memorial located in predominantly rural regions experienced substantial increases in CS volumes, suggesting that financial and material incentives were effective in attracting and retaining doctors. However, in some urban hospitals, such as Manhyia Government Hospital located in a predominantly urban region, the effect was less pronounced. More importantly, even in rural hospitals, the sustainability of gains depended heavily on material conditions: the availability of theatre space, anaesthetic staff, and essential supplies determined whether doctors could translate their presence into higher service volumes. In this way, existence needs were not limited to individual financial security but extended to institutional resourcing, without which incentives could not be fully effective.

The Delphi findings in chapter seven reinforced the primacy of existence needs. Doctors consistently identified financial allowances, housing, and the ability to supplement income as critical factors influencing their willingness to accept rural postings. Regional directors echoed this

perspective, noting that financial disparities between rural and urban postings were a persistent source of dissatisfaction. Moreover, barriers such as poor road infrastructure, unreliable electricity, and unsafe water supplies were identified as key deterrents, underscoring that existence needs in rural postings extend beyond direct remuneration to encompass the material environment in which healthcare is delivered.

Together, the findings across all chapters confirm that existence needs are foundational in shaping healthcare worker motivation. The Early Study Leave with Pay scheme achieved short-term improvements by directly addressing financial concerns, but its limited long-term impact highlights the insufficiency of existence-focused interventions when relatedness and growth needs remain unmet.

8.6.2 Relatedness Needs: Belonging, Recognition, and Professional Support

Relatedness needs refer to the human desire for meaningful social relationships, recognition, and a sense of belonging. For healthcare workers, these needs encompass collegial support, mentorship, community integration, and recognition from both peers and society.

At the national level, the stabilisation of CS volumes after the initial surge suggests that once financial security was temporarily improved, doctors' motivation became increasingly contingent on relational factors. Without sufficient recognition, collegial networks, or integration into supportive professional communities, the initial enthusiasm waned. This interpretation aligns with ERG theory's principle that unmet relatedness needs can limit the sustainability of existence-based gains. The regional analysis revealed further insights. In rural regions, where smaller professional communities often meant that individual contributions were more visible and valued, the incentive policy appeared to have greater impact. Doctors working in such contexts may have experienced a heightened sense of belonging and professional recognition, which amplified the motivational effect of financial incentives. By contrast, in urban centres, where professional hierarchies are steeper and doctors may feel more anonymous within larger institutions, relatedness needs may have been less satisfied, contributing to weaker intervention effects.

At the hospital level, differences between facilities also reflected relational dynamics. Hospitals such as Presbyterian Hospital in Bawku and War Memorial in Navrongo might have benefited not only from financial incentives but also from strong community ties and a sense of local appreciation for healthcare workers. These relational reinforcements may explain why rural

hospitals sustained gains more effectively than their urban counterparts, even when material conditions remained challenging. Conversely, in urban facilities like Manhyia Hospital, where professional hierarchies and competition were more pronounced, relatedness needs may have been insufficiently met, limiting the motivational impact of the intervention.

The Delphi study provided explicit evidence of the importance of relatedness. Doctors repeatedly emphasised the value of supportive working environments, mentorship, and recognition as critical determinants of rural service adoption. Regional directors similarly highlighted the role of community engagement, noting that doctors who felt integrated into their host communities were more likely to remain. Barriers such as professional isolation, lack of mentorship, and inadequate support from senior colleagues were identified as significant deterrents. These findings reinforce the ERG perspective that relatedness needs, when unmet, can undermine the sustainability of incentive policies.

These findings underscore that relatedness is a critical but often overlooked dimension of healthcare workforce motivation. Policies that focus solely on financial incentives risk neglecting the relational aspects of work that sustain long-term engagement. Structured mentorship programs, recognition schemes, and community integration initiatives could play an important role in complementing financial incentives and addressing relational needs.

8.6.3 Growth Needs: Career Development, Specialisation, and Long-Term Prospects

Growth needs pertain to the desire for personal development, advancement, and self-actualisation. For healthcare professionals, these needs include opportunities for training, specialisation, professional recognition, and the pursuit of meaningful long-term career goals.

At the national level, the limited sustainability of the Early Study Leave with Pay scheme can be partly attributed to its failure to adequately address growth needs. While the scheme temporarily improved physician presence, it did not create clear pathways for professional development in rural service. Once the immediate financial benefits were secured, many doctors may have continued to view urban centres or international opportunities as more attractive for long-term career growth. The decline in CS growth rates over time reflects this underlying gap.

The regional analysis further highlighted the salience of growth needs. In urban centres with teaching hospitals, such as Accra and Kumasi, doctors had access to specialisation and

subspecialisation opportunities that rural postings could not provide. Consequently, the marginal benefit of financial incentives was outweighed by the lack of growth-related opportunities in rural areas. This finding underscores the ERG principle that unmet growth needs can limit the effectiveness of policies, even when existence and relatedness needs are partially addressed.

At the hospital level, growth-related challenges were especially acute. Smaller rural hospitals, while benefiting from increased doctor presence, were unable to provide the training opportunities or specialised practice environments that many doctors sought. This limitation might have constrained the long-term attractiveness of rural postings, even when financial and relational needs were met. The Delphi study reinforced these findings. Doctors consistently emphasised career development, opportunities for specialisation, and access to continuing education as critical drivers of rural service adoption. The absence of such opportunities was cited as a major barrier, with many noting that rural postings were often perceived as career stagnation rather than advancement. Regional directors acknowledged this limitation, highlighting the need for policies that explicitly link rural service to long-term career progression, such as priority access to postgraduate training or structured career advancement pathways.

The application of ERG theory to the findings of chapters four through seven reveals a consistent pattern: the Early Study Leave with Pay scheme primarily addressed existence needs but was less successful in satisfying relatedness and growth needs. This imbalance explains the initial effectiveness of the policy, reflected in the immediate surge of CS volumes, as well as its limited sustainability, reflected in the subsequent decline in growth rates and uneven regional and hospital-level outcomes. The Delphi study provided further validation by explicitly identifying financial security (existence), supportive environments and community belonging (relatedness), and career development opportunities (growth) as central drivers of rural service adoption. The barriers identified such as poor infrastructure, professional isolation, and lack of career pathways mirror the unmet needs across all three ERG dimensions.

8.7 Why Participatory Approach in this Thesis

The stakeholder approach in the study is employed to ensure a comprehensive and inclusive understanding of incentive scheme adoption in the Ghanaian healthcare sector. Firstly, stakeholders are directly involved in, or affected by, decisions related to incentive schemes. Involving stakeholders in the research process ensures that the findings are informed by their practical experiences, insights, and knowledge. This firsthand knowledge is crucial for understanding the on-the-ground realities and challenges. This approach enhances the relevance and applicability of the study's outcomes to real-world decision-making. By tapping into this knowledge, the study ensures that the findings are not only theoretically sound but also grounded in practical considerations. Secondly, healthcare systems are deeply embedded within specific socio-cultural and economic contexts. Stakeholders, who operate within these contexts, can provide valuable insights into how local dynamics and cultural nuances may influence the success or challenges of incentive programs. This ensures the contextual relevance of the study's findings. Stakeholders contribute to a deeper understanding of the local context. In the context of healthcare in Ghana, where cultural, economic, and social factors play a significant role, stakeholders can provide contextual nuances that may not be apparent solely through academic literature. This understanding is essential for tailoring incentive programs to the specific needs of the Ghanaian healthcare system. Finally, the use of the stakeholder approach aligns with the principles of participatory research. This approach recognizes the value of involving those directly impacted by the research in the decision-making process. In the context of healthcare, where decisions on incentive programs have practical implications for stakeholders, their active participation ensures that the research is attuned to their needs and concerns. This enhances the validity and reliability of the study. Different stakeholders may provide converging or diverging views, contributing to a more comprehensive and well-rounded understanding of incentive adoption. This multi-stakeholder approach strengthens the robustness of the research. In essence, the stakeholder approach acts as a conduit for effective knowledge transfer, creating a symbiotic relationship between the researcher and those directly impacted by the research outcomes. Through this approach, the study aims to not only generate knowledge but also ensure its meaningful application within the Ghanaian healthcare context.

8.8 Thesis Contribution to the Literature

This thesis offers novel and significant contributions to the body of literature on healthcare workforce interventions in Ghana, specifically focusing on incentive schemes aimed at improving rural healthcare delivery.

Chapter 2 of the thesis focused on identifying significant gaps in the existing literature, particularly regarding the evaluation of health workers' incentive packages in Ghana. The chapter highlighted the paucity of studies examining the impact of these schemes within the Ghanaian context, a gap that this study sought to address. By analysing the effectiveness of incentive programs, this research provides empirical evidence that fills a critical void in the literature. Additionally, the chapter pointed out the lack of studies exploring the facilitators of health worker incentive schemes. This gap was significant, as understanding the factors that enable successful implementation is just as important as evaluating outcomes. The chapter also identified a dearth of robust theoretical models for assessing the effectiveness of incentive schemes, which often led to overly simplistic evaluations. This thesis used the ERG model to evaluate the success of health worker incentive scheme.

Chapters 4, 5, and 6 of the thesis provided a detailed evaluation of the effectiveness of the incentive scheme at the national, regional, district, and hospital levels. By adopting a multi-layered approach, the research deepened the understanding of how incentive schemes influence healthcare delivery in Ghana. At the national level, the thesis provided a broad analysis of the scheme's impact on key health indicators, such as Caesarean section rates, highlighting both the successes and limitations of the intervention. Previous research has primarily focused on national-level impacts or broader narratives without delving into the granular dynamics within specific districts and regions. Moving to regional and district levels, the research revealed important variations in the effectiveness of the incentive scheme in districts and facilities even in the same region. This finding emphasized the necessity of tailoring incentive schemes to the specific challenges and needs of different settings, rather than adopting a one-size-fits-all approach. At the facility level, the study found that rural facilities benefitted the most from the redistribution of healthcare workers, as intended by the scheme. However, the unintended reduction in capacity at urban facilities raised

concerns about the balance between urban and rural needs, prompting a discussion about the complexities of healthcare workforce redistribution.

One of the most significant contributions of this thesis is the exploration of the drivers and barriers influencing the adoption of health worker incentive schemes in Ghana, discussed in Chapter 7. Through a detailed analysis of the factors that shape the success of these programs, the study identified key drivers, such as career development opportunities, community engagement, and the availability of well-resourced health facilities. These drivers were found to be crucial in motivating healthcare workers to embrace and actively participate in incentive schemes. Conversely, the research also uncovered several barriers to the successful adoption of these programs, including infrastructure challenges, financial constraints, and issues related to work-life balance. These barriers highlighted the complex nature of implementing incentive schemes in resource-limited settings and underscored the need for targeted strategies to overcome these challenges. By conducting a Delphi study and reaching a consensus on 40 descriptors of drivers and barriers, this research provided validated insights that can inform the design of more effective and context-sensitive incentive schemes in the future.

The thesis also provides methodological advancements by adopting a mixed-methods approach to evaluating healthcare workforce interventions. Unlike previous studies that relied solely on qualitative or single-method quantitative analyses, this research integrates statistical modelling, and stakeholder perspectives through the Delphi technique. This comprehensive approach strengthens the robustness and reliability of the findings and ensures that the voices of key stakeholders are incorporated into the evidence base. The participatory nature of the Delphi methodology aligns with the principles of decentralized decision-making, enhancing the relevance and applicability of the study's outcomes.

Lastly, the thesis offers generalisable insights that extend beyond the Ghanaian context. The findings on the effectiveness of combining financial and non-financial incentives, the role of regional disparities, and the challenges of sustaining health workforce interventions provide valuable lessons for low- and middle-income countries (LMICs) facing similar healthcare challenges. By emphasizing the importance of evidence-based, context-specific, and multi-faceted approaches, the thesis contributes to global discourses on health workforce management and redistribution.

8.9 Policy Implication of the Findings

The study's findings hold substantial implications for the Ghanaian health system, necessitating nuanced and targeted interventions. A key takeaway is the imperative to tailor incentive programs according to the diverse dynamics observed, especially in regions where effectiveness varies significantly. This underscores the need for flexibility in program design, acknowledging that a uniform approach may not optimize results and regional disparities should be considered for tailored strategies.

Financial barriers, notably inadequate salaries and bonuses, emerge as pivotal hurdles in the adoption of incentive schemes. Addressing these financial constraints is paramount to enhance the attractiveness of such programs. Policymakers should consider revising compensation structures and exploring supplementary financial incentives, particularly in recognition of regional variations in the cost of living.

The study's identification of inadequate professional support and guidance as barriers highlights the significance of cultivating a supportive work environment. Efforts to invest in mentorship programs, training opportunities, and avenues for professional development could contribute to a more supportive atmosphere for healthcare professionals, ultimately positively impacting incentive adoption.

Infrastructure-related barriers, such as poor roads, inadequate electricity, safe and portable drinking water, and poorly resourced health facilities indicate a need for substantial investments to improve the physical environment in rural areas. Ensuring that rural facilities are well-equipped for both healthcare delivery and professional development can be pivotal in the success of incentive programs. Such improvements are crucial in enhancing the appeal of these locations for healthcare professionals and can significantly contribute to the success of incentive programs aimed at rural service.

The study underscores the importance of community engagement, particularly for doctors. Policymakers should explore initiatives that actively involve healthcare professionals in community activities, as programs fostering community engagement and leadership opportunities can enhance a sense of purpose and fulfilment, especially for those serving underserved communities.

The uncertainty surrounding release from rural duty points to the necessity of providing clear roadmaps within incentive programs. Policymakers should establish transparent guidelines, offering healthcare professionals a clear understanding of their service commitments. This can substantially enhance the acceptability and effectiveness of incentive programs.

Continued monitoring and evaluation mechanisms are recommended to adapt to the dynamic nature of incentive adoption. Regular assessments will enable policymakers and healthcare administrators to identify changing trends, assess the impact of interventions, and guide ongoing improvements in incentive programs, ensuring their sustained effectiveness.

Lastly, the collaborative decision-making approach suggested by the stakeholder involvement underscores the importance of inclusivity. Involving healthcare professionals, administrators, policymakers, and community representatives in decision-making processes fosters a sense of ownership and commitment, contributing to the successful implementation of incentive programs within the Ghanaian healthcare system.

8.10 Limitation of Study

While this thesis has generated valuable evidence on the impact of incentive schemes on healthcare workforce distribution and service delivery in Ghana, it is important to acknowledge its limitations. These limitations span across methodological, data-related, contextual, theoretical, and interpretive domains, and they should be borne in mind when interpreting the findings.

8.10.1 Limitations from the Systematic Review

The first substantive limitation emerged from the systematic review presented in chapter two. The studies included in the review were highly heterogeneous in terms of design, methodology, and quality. Interventions varied widely, from direct salary incentives to housing schemes, from compulsory service requirements to professional development opportunities. Contextual differences such as health system governance, financing, and cultural attitudes towards rural service further compounded this variability. As a result, synthesising and comparing findings across studies was inherently challenging. While the review was able to identify consistent themes, such as the importance of both financial and non-financial motivators, the heterogeneity limited the strength of generalisable conclusions.

A second limitation linked to the review was the absence of an economic evaluation. The review identified a clear gap in the global literature concerning the cost-effectiveness of incentive schemes. Despite recognising the significance of this gap, the current study was unable to incorporate an economic analysis due to practical constraints, including resource limitations and the unavailability of cost data. Consequently, while this thesis advances understanding of the drivers, barriers, and outcomes of incentive schemes, it does not address their economic sustainability or efficiency both of which are crucial for long-term policy adoption and scaling.

8.10.2 Methodological Limitations

A central methodological approach in this thesis was interrupted time series analysis, applied to assess the impact of the Early Study Leave with Pay scheme on Caesarean section volumes. While ITS is a robust quasi-experimental design for evaluating interventions implemented at population level, it carries inherent assumptions and limitations.

First, ITS assumes that observed post-intervention changes are attributable primarily to the intervention itself, provided that no concurrent events confound the trend. In practice, health systems are influenced by multiple overlapping dynamics, including other workforce policies, resource fluctuations, and external shocks. While this study explicitly acknowledged the COVID-19 pandemic as a confounder, other contemporaneous developments such as changes in training capacity, district-level resource allocation, or local leadership may also have influenced outcomes in ways that cannot be fully disentangled.

Second, ITS is sensitive to the quality and completeness of data. In this study, hospital-level secondary data were used. Reporting delays, underreporting, or inconsistencies in data capture particularly in rural hospitals with weaker health information systems may have affected the accuracy of trend estimates. Although data cleaning procedures were applied, residual inaccuracies remain possible.

Third, ITS models aggregate-level changes rather than individual-level dynamics. The method cannot reveal whether increased CS volumes were driven by a greater number of doctors, improved efficiency among existing doctors, or external teams providing periodic surgical services. Nor can it confirm whether the same individual doctors remained in service or whether new entrants offset attrition. Thus, causal attribution should be viewed as indicative rather than definitive.

8.10.3 Data Limitations

The study relied on CS cases as the principal outcome indicator. While CS is a relevant and sensitive measure of surgical service delivery, it has limitations as a proxy for physician activity. CS reflects maternity and surgical capacity but excludes other domains such as paediatrics, internal medicine, or preventive care. As such, the indicator provides a partial picture of physician workload and contribution.

CS volumes are also influenced by factors beyond workforce numbers. Variations in obstetric demand, fertility rates, and referral patterns can drive changes in CS independent of staffing. Similarly, CS depends on infrastructure and supporting resources such as anaesthesia, theatre capacity, blood supplies, and post-operative care. Constraints in any of these areas may suppress CS numbers even where doctors are available. Moreover, special surgical outreach programmes common in Ghana, where external medical teams periodically perform CS in underserved areas may inflate CS volumes without reflecting sustained physician presence. These factors complicate the attribution of observed CS trends to the Early Study Leave with Pay scheme.

Another limitation relates to the absence of population-standardised data at the regional, district and hospital levels. The analysis in chapters 5 and 6 relied on absolute counts of Caesarean section cases as a proxy for doctor presence. While this approach allowed for meaningful pre- and post-intervention comparisons, it does not account for variations in population size across regions, districts or hospital catchment areas. As such, the findings should be interpreted with caution, recognising that per-capita service delivery rates may have provided additional nuance to the observed effects.

8.10.4 Representativeness and Scope

Another limitation relates to representativeness. The hospitals included in the ITS analysis and case study chapters were unevenly distributed across regions. Facilities in rural and peri-urban areas were fewer in number and often smaller, limiting comparability with better-resourced urban hospitals. While the sample aimed to capture diversity, differences in infrastructure and service mix may still bias the findings.

At the hospital level, a notable limitation is that only seven hospitals were included in the analysis, which is substantially fewer than the total number of districts and regions in Ghana. This restricted scope was not intentional but stemmed from feasibility constraints and data availability challenges.

Unlike the national, regional, and district-level analyses, which benefitted from comprehensive coverage through the Ghana Health Service's DHIMS2 system, the hospital-level analysis relied on facility records. In many cases, these records were incomplete, inconsistent, or inaccessible for the full study period. As a result, only hospitals with sufficiently reliable and continuous caesarean section data were included. These hospitals were used as illustrative case studies rather than as a representative sample of all hospitals nationwide. Consequently, the findings at this level should be interpreted as exploratory insights that highlight facility-level dynamics and variations, complementing the broader trends identified at the national and district levels.

Similarly, in the Delphi study, participants were drawn primarily from doctors and regional directors. While this selection provided professional and managerial perspectives, it excluded other critical stakeholders, such as Ministry of Health officials, parliamentary health committee members, nurses, midwives, and community representatives. Their absence may have resulted in the underrepresentation of political, nursing, and patient-centred viewpoints. Moreover, the relatively small size of the Delphi panel limits the breadth of perspectives captured, even if consensus methods partially mitigated this.

8.10.5 Theoretical Limitations

The use of Alderfer's ERG theory as the guiding theoretical framework was another limitation. ERG theory provided a useful structure for exploring existence, relatedness, and growth needs in relation to incentive adoption. However, its application may have been overly restrictive. The theory does not fully account for broader systemic factors, such as resource constraints, policy shifts, or socio-cultural attitudes towards rural service. By relying primarily on ERG, the study may have underemphasised interdisciplinary perspectives such as health systems theory or political economy approaches that could capture a wider range of influences.

8.10.6 Contextual Limitations

The study was conducted during a period heavily influenced by the COVID-19 pandemic. The pandemic disrupted healthcare delivery, referral patterns, and elective surgery scheduling. While some adjustments were made in interpretation, its precise impact on the observed outcomes cannot be fully quantified. In some facilities, CS numbers may have declined due to restrictions on elective procedures or reduced facility-based deliveries. In others, cases may have increased due to re-routing of referrals. These dynamics complicate causal attribution to the policy intervention.

More broadly, the findings are situated within Ghana's specific health system, labour market, and policy context. Factors influencing doctor distribution and service delivery in Ghana may not apply in the same way to other low- and middle-income countries. While the study highlights themes that resonate globally such as the importance of financial and non-financial incentives, direct generalisation to other settings must be undertaken cautiously.

8.10.7 Interpretive Limitations

Finally, the study has interpretive limitations. It examined outputs (CS volumes) rather than outcomes (e.g., maternal or neonatal survival). Thus, while increased CS provision suggests enhanced service availability, it does not necessarily translate into improved health outcomes. Similarly, the study focused predominantly on doctors, whereas CS delivery is enabled by teams that include anaesthetists, nurses, and midwives. By not including these cadres, the analysis provides only a partial account of workforce redistribution and performance.

Positionality also shapes interpretation. As discussed in chapters three and seven, the researcher's professional background and embeddedness in the Ghanaian context provided valuable access and insight but may also have introduced bias in framing questions, analysing data, and interpreting findings. While reflexivity was employed, neutrality in qualitative and mixed-methods research cannot be assumed. These limitations do not undermine the contributions of the thesis but rather define the boundaries within which its conclusions should be understood.

8.11 Direction of Future Research

The study on incentive adoption within the Ghanaian healthcare sector opens several avenues for future research. One key area for future studies is the investigation of the effect of prior rural-lived experience in incentive adoption. Such an approach could uncover additional insights into the unique challenges and motivators for healthcare professionals in rural areas.

Research could also consider qualitative methods, such as in-depth interviews and focus group discussions to gain a more nuanced understanding of the lived experiences and perceptions of healthcare professionals regarding incentive adoption. This approach would provide rich insights into the contextual factors influencing decisions.

Finally, cost effectiveness studies can be conducted to assess the efficiency of incentive interventions by comparing the costs incurred with the outcomes achieved. Such an approach can help analyse the efficiency of incentive programs in different geographic locations, taking into account the unique challenges and opportunities presented by rural and urban environments.

8.12 Conclusion

Overall, this research has thoroughly examined the effectiveness of an incentive scheme and highlighted the factors that drive and hinder the choice of doctors to practice in rural or urban settings within Ghana's healthcare delivery system. The study used the ERG model as a guiding framework. The ERG model, based on the essential human requirements of survival, social connection, and personal development, provided a detailed perspective to comprehend the results of the study. The study assessed the efficacy of the incentive scheme across the national, regional, district and hospital levels revealing varying degrees of success. Further, the thesis conducted a Delphi study to investigate the many human and environmental elements that influence healthcare professionals' judgments on the adoption of incentives. The study's results highlighted the significance of financial incentives, possibilities for professional growth, and concerns for achieving a balance between work and personal life as crucial factors in the decision to embrace incentives. The ERG model enabled an analysis of how these incentives cater to essential human

needs, such as the desire for economic security (existence), social relationships and work-life equilibrium (relatedness), and prospects for personal improvement and career progression (growth). The ERG model facilitated a more profound comprehension of how these aspects correspond to the basic requirements recognized in the model, unveiling the interdependence of human needs in the decision-making process within the healthcare workforce. The ERG model, which focuses on the concepts of existence, relatedness, and development, has shown to be a good framework for analysing the complex interaction of human requirements in the decision-making process. This research, being the pioneering study in the Ghanaian healthcare sector, establishes the foundation for future studies on incentive dynamics. It highlights the need to consider basic human needs when formulating laws and practices connected to the adoption of incentives. This work is a groundbreaking attempt to use the ERG model to understand the dynamics of incentive adoption in the healthcare system of Ghana. The study incorporates the essential human needs identified in the ERG model into the analysis. This not only provides new information on the factors that influence the adoption of incentives but also offers valuable insights that may guide future organizational strategies and policies.

REFERENCES

- Aberese-Ako, M., Agyepong, I. A., & van Dijk, H. (2018). Leadership styles in two Ghanaian hospitals in a challenging environment. *Health Policy and Planning*, 33(suppl_2), ii16-ii26.
- Acquah, A., Nsiah, T. K., Antie, E. N. A., & Otoo, B. (2021). Literature review on theories of motivation. *EPRA International Journal of Economic and Business Review*, 9(5), 25-29.

- Adzei, F. A., & Atinga, R. A. (2012). Motivation and retention of health workers in Ghana's district hospitals: addressing the critical issues. *Journal of health organization and management*, 26(4), 467-485. <https://doi.org/10.1108/14777261211251535>
- Afriyie, D. O., Nyoni, J., & Ahmat, A. (2019). The state of strategic plans for the health workforce in Africa. *BMJ Global Health*, 4(Suppl 9), e001115.
- Agyei-Baffour, P., Kudolo, A., Quansah, D. Y., & Boateng, D. (2017). Integrating herbal medicine into mainstream healthcare in Ghana: clients' acceptability, perceptions and disclosure of use. *BMC complementary and alternative medicine*, 17(1), 513.
- Akinfaderin-Agarau, F., Chirtau, M., Ekponimo, S., & Power, S. (2012). Opportunities and limitations for using new media and mobile phones to expand access to sexual and reproductive health information and services for adolescent girls and young women in six Nigerian states. *African journal of reproductive health*, 16(2), 219-230.
- Alhassan, R. K., Nketiah-Amponsah, E., Spieker, N., Arhinful, D. K., & Rinke de Wit, T. F. (2016). Perspectives of frontline health workers on Ghana's National Health Insurance Scheme before and after community engagement interventions. *BMC health services research*, 16, 1-11 <https://doi.org/10.1186/s12913-016-1438-y>
- Alkema, L., Chou, D., Hogan, D., Zhang, S., Moller, A. B., Gemmill, A., ... & Say, L. (2016). Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *The lancet*, 387(10017), 462-474.
- Amoah, P. A., Nyamekye, K. A., & Owusu-Addo, E. (2021). A multidimensional study of public satisfaction with the healthcare system: a mixed-method inquiry in Ghana. *BMC Health Services Research*, 21(1), 1320.
- Anderson, D. R., Sweeney, D. J., Williams, T. A., Camm, J. D., & Cochran, J. J. (2016). *Statistics for business & economics*. Cengage Learning.

- Aninanya, G. A., Howard, N., Williams, J. E., Apam, B., Prytherch, H., Loukanova, S., ... & Otupiri, E. (2016). Can performance-based incentives improve motivation of nurses and midwives in primary facilities in northern Ghana? A quasi-experimental study. *Global health action*, 9(1), 32404.
- Ankomah, S. E., Kumah, E., & Karikari, A. K. (2016). Health Worker Motivation in Ghana: the role of non-financial incentives. A case study of Accident and Emergency Department of Komfo Anokye Teaching Hospital. *International Journal of Biosciences, Healthcare Technology and Management*, 6(4), 34.
<https://www.researchgate.net/publication/311577241>
- Appiagyei, A. A., Kiriinya, R. N., Gross, J. M., Wambua, D. N., Oywer, E. O., Kamenju, A. K., ... & Rogers, M. F. (2014). Informing the scale-up of Kenya's nursing workforce: a mixed methods study of factors affecting pre-service training capacity and production. *Human Resources for Health*, 12(1), 1-10.
- Arakawa, N., & Bader, L. R. (2022). Consensus development methods: considerations for national and global frameworks and policy development. *Research in Social and Administrative Pharmacy*, 18(1), 2222-2229.
- Asamani, J. A., Amertil, N. P., Ismaila, H., Akugri, F. A., & Nabyonga-Orem, J. (2020). The imperative of evidence-based health workforce planning and implementation: lessons from nurses and midwives unemployment crisis in Ghana. *Human Resources for Health*, 18(1), 16.
- Asamani, J. A., Chebere, M. M., Barton, P. M., D'Almeida, S. A., Odame, E. A., & Oppong, R. (2018). Forecast of healthcare facilities and health workforce requirements for the public sector in Ghana, 2016–2026. *International journal of health policy and management*, 7(11), 1040.
- Asamani, J. A., Ismaila, H., Plange, A., Ekey, V. F., Ahmed, A. M., Chebere, M., ... & Nabyonga-Orem, J. (2021). The cost of health workforce gaps and inequitable distribution in the

- Ghana health service: an analysis towards evidence-based health workforce planning and management. *Human Resources for Health*, 19(1), 1-15.
- Asori, M., Emmanuel, D., & Dumedah, G. (2020). Wildfire hazard and Risk modelling in the Northern regions of Ghana using GIS-based Multi-Criteria Decision Making Analysis. *J. Environ. Earth Sci*, 10(11). <https://doi.org/10.7176/jees/10-11-02>
- Barwood, M. J., Gibson, O. R., Gillis, D. J., Jeffries, O., Morris, N. B., Pearce, J., Ross, M. L., Stevens, C., Rinaldi, K., Kounalakis, S. N., Riera, F., Mündel, T., Waldron, M., & Best, R. (2020). Menthol as an Ergogenic Aid for the Tokyo 2021 Olympic Games: An Expert-Led Consensus Statement Using the Modified Delphi Method [Article]. *Sports Medicine*, 50(10), 1709-1727. <https://doi.org/10.1007/s40279-020-01313-9>
- Bawah, A. A., Awoonor-Williams, J. K., Asuming, P. O., Jackson, E. F., Boyer, C. B., Kanmiki, E. W., ... & Phillips, J. F. (2019). The child survival impact of the Ghana Essential Health Interventions Program: A health systems strengthening plausibility trial in Northern Ghana. *PLoS One*, 14(6), e0218025. <https://doi.org/10.1371/journal.pone.0218025>
- Bernal, J. L., Cummins, S., & Gasparrini, A. (2017). Interrupted time series regression for the evaluation of public health interventions: a tutorial. *International journal of epidemiology*, 46(1), 348-355.
- Bernal, J. L., Soumerai, S., & Gasparrini, A. (2018). A methodological framework for model selection in interrupted time series studies. *Journal of clinical epidemiology*, 103, 82-91.
- Bernal, P., & Martinez, S. (2020). In-kind incentives and health worker performance: experimental evidence from El Salvador. *Journal of Health Economics*, 70, 102267. <https://doi.org/10.1016/j.jhealeco.2019.102267>
- Bertone, M. P., & Witter, S. (2015). The complex remuneration of human resources for health in low-income settings: policy implications and a research agenda for designing effective

- financial incentives. *Human resources for health*, 13, 1-9. <https://doi.org/10.1186/s12960-015-0058-7>
- Blanco-Mavillard, I., Personat-Labrador, C., Castro-Sánchez, E., Rodríguez-Calero, M. Á., Fernández-Fernández, I., Carr, P. J., Armenteros-Yeguas, V., Parra-García, G., & de Pedro-Gómez, J. (2023). Interventions to reduce peripheral intravenous catheter failure: An international e-Delphi consensus on relevance and feasibility of implementation [Article]. *Journal of Infection and Public Health*, 16(12), 1994-2000. <https://doi.org/10.1016/j.jiph.2023.10.004>
- Bonenberger, M., Aikins, M., Akweongo, P., & Wyss, K. (2014). The effects of health worker motivation and job satisfaction on turnover intention in Ghana: a cross-sectional study. *Human resources for health*, 12, 1-12. <https://doi.org/10.1186/1478-4491-12-43>
- Bowser, D. M., Shepard, D. S., Nandakumar, A., Okunogbe, A., Morrill, T., Halasa-Rappel, Y., ... & Oluwayemisi, E. (2018). Cost effectiveness of mobile health for antenatal care and facility births in Nigeria. *Annals of Global Health*, 84(4), 592.
- Box, G. E., & Tiao, G. C. (1975). Intervention analysis with applications to economic and environmental problems. *Journal of the American Statistical association*, 70(349), 70-79.
- Bradfield, Z., O'Connor, G., Sharp, T., Reynolds, K., Moore, S., Watts, J., ... & Hauck, Y. (2022). Maternity research priorities in country Western Australia: a Delphi study. *Australian Health Review*, 46(5), 577-585.
- Brault, M. A., Linnander, E. L., Ginindza, T. M., Mabuza, K., Christie, S., Canavan, M. E., ... & Desai, M. M. (2023). Assessing changes in adolescent girls' and young women's sexual and reproductive health service utilisation following a COVID-19 lockdown in eSwatini. *Global Health Action*, 16(1), 2243760.
- Brookfield, S. (1984). Characterizing and Circumventing Simpson's Paradox for ordered Bivariate Data. *Hispanic Journal of Behavioral Sciences*, 9(2), 183–205.

- Buchan, J., Couper, I. D., Tangcharoensathien, V., Thepannya, K., Jaskiewicz, W., Perfilieva, G., & Dolea, C. (2013b). Early implementation of WHO recommendations for the retention of health workers in remote and rural areas. *Bulletin of the World Health Organization*, 91(11), 834–840. <https://doi.org/10.2471/BLT.13.119008>
- Buchan, J., Thompson, M., & O'May, F. (2000). Health workforce incentive and remuneration strategies: a research review. *Health Workforce Incentive and Remuneration Strategies: A Research Review*, 37.
- Campbell, S. M., Shield, T., Rogers, A., & Gask, L. (2004). How do stakeholder groups vary in a Delphi technique about primary mental health care and what factors influence their ratings?. *BMJ Quality & Safety*, 13(6), 428-434.
- Carmichael, S. L., Mehta, K., Raheel, H., Srikantiah, S., Chaudhuri, I., Trehan, S., ... & Darmstadt, G. L. (2019). Effects of team-based goals and non-monetary incentives on front-line health worker performance and maternal health behaviours: a cluster randomised controlled trial in Bihar, India. *BMJ global health*, 4(4), e001146.
- Carter, S.A., Tong, A., Craig, J.C., Teixeira-Pinto, A., Manera, K.E. (2023). Consensus Methods for Health Research in a Global Setting. In: Liamputtong, P. (eds). *Handbook of Social Sciences and Global Public Health*. Springer, Cham. https://doi.org/10.1007/978-3-030-96778-9_65-2
- Cerf, M. E. (2021). Health worker resourcing to meet universal health coverage in Africa. *International Journal of Healthcare Management*, 14(3), 789-796.
- Chaix-Couturier, C., Durand-Zaleski, I., Jolly, D., & Durieux, P. (2000). Effects of financial incentives on medical practice: results from a systematic review of the literature and methodological issues. *International Journal for Quality in Health Care*, 12(2), 133-142.
- Chatio, S., & Akweongo, P. (2017). Retention and sustainability of community-based health volunteers' activities: A qualitative study in rural Northern Ghana. *PloS one*, 12(3), e0174002.

- Chandler, C. I., Chonya, S., Mtei, F., Reyburn, H., & Whitty, C. J. (2009). Motivation, money and respect: a mixed-method study of Tanzanian non-physician clinicians. *Social science & medicine*, 68(11), 2078-2088.
- Chen, Y. F., Hemming, K., Stevens, A. J., & Lilford, R. J. (2016). Secular trends and evaluation of complex interventions: the rising tide phenomenon. *BMJ quality & safety*, 25(5), 303-310.
- Cheng, M. T., & Agyeiwaah, E. (2021). Exploring Chinese students' issues and concerns of studying abroad amid COVID-19 pandemic: an actor-network perspective. *Journal of Hospitality, Leisure, Sport and Tourism Education*, 30, 100349.
<https://doi.org/10.1016/j.jhlste.2021.100349>
- Cheung, K. L., de Ruijter, D., Hilgsmann, M., Elfeddali, I., Hoving, C., Evers, S. M., & de Vries, H. (2017). Exploring consensus on how to measure smoking cessation. A Delphi study. *BMC Public Health*, 17, 1-10.
- Chikanda, A. (2005). Nurse migration from Zimbabwe: analysis of recent trends and impacts. *Nursing Inquiry*, 12(3), 162-174.
- Chimbari, M. J., Madhina, D., Nyamangara, F., Mtandwa, H., & Damba, V. (2008). An assessment of the Zimbabwe government strategy for retention of health professionals. *Zimbabwe: Equity in Health in East and Southern Africa Discussion Paper*.
- Chipeta, E., Bradley, S., Chimwaza-Manda, W., & McAuliffe, E. (2016). Working relationships between obstetric care staff and their managers: a critical incident analysis. *BMC health services research*, 16(1), 1-9.
- Clarke, G. M., Conti, S., Wolters, A. T., & Steventon, A. (2019). Evaluating the impact of healthcare interventions using routine data. *BMJ*, 365. <https://doi.org/10.1136/bmj.l2239>
- Cole, Z. D., Donohoe, H. M., & Stellefson, M. L. (2013). Internet-based Delphi research: case based discussion. *Environmental management*, 51, 511-523.

- Connell, J., Zurn, P., Stilwell, B., Awases, M., & Braichet, J. M. (2007). Sub-Saharan Africa: beyond the health worker migration crisis? *Social science & medicine*, 64(9), 1876-1891.
- Cosgrave, C. (2020). The whole-of-person retention improvement framework: a guide for addressing health workforce challenges in the rural context. *International Journal of Environmental Research and Public Health*, 17(8), 2698.
- Couper, I. D., Hugo, J. F., Conradie, H., & Mfenyana, K. (2007). Influences on the choice of health professionals to practise in rural areas. *South African Medical Journal*, 97(11), 1082-1086.
- Coyne, E., Briggs, J., Loud, F., Bristow, P., Young, H. M. L., Castle, E. M., Lightfoot, C. J., Graham-Brown, M., Eyre, M., Ormandy, P., Sachar, A., Bevin, A., Burton, J. O., Wilkinson, T. J., Koufaki, P., Macdonald, J., Ashman, N., & Greenwood, S. A. (2023). Achieving consensus on psychosocial and physical rehabilitation management for people living with kidney disease [Article; Early Access]. *Clinical Kidney Journal*, 9. <https://doi.org/10.1093/ckj/sfad116>
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Crosbie, J. (1993). Interrupted Time-Series Analysis with Brief Single-Subject Data. *Journal of Consulting and Clinical Psychology*, 61(6), 966–974.
- Curtin, K., Beckman, H., Pankow, G., Milillo, Y., & Greene, R. A. (2006). Return on investment in pay for performance: a diabetes case study. *Journal of Healthcare Management*, 51(6), 365.
- Daniels, A. A., & Abuosi, A. (2020). Improving emergency obstetric referral systems in low and middle income countries: a qualitative study in a tertiary health facility in Ghana. *BMC health services research*, 20(1), 32.
- de Vries, H., Vahl, J., Muris, J., Evers, S., van der Horst, H., & Cheung, K. L. (2021). Effects of the reform of the Dutch healthcare into managed competition: Results of a Delphi study

among experts [Article]. *Health Policy*, 125(1), 27-33.
<https://doi.org/10.1016/j.healthpol.2020.10.010>

Deressa, A. T., & Zeru, G. (2019). Work motivation and its effects on organizational performance: The case of nurses in Hawassa public and private hospitals: Mixed method study approach. *BMC Research Notes*, 12(1), 1–6. <https://doi.org/10.1186/s13104-019-4255-7>

Dieleman, M., & Harnmeijer, J. W. (2006). Improving health worker performance: in search of promising practices. *Geneva: World Health Organization*, 1(01), 1-64.

Dolea, C., Stormont, L., Shaw, D., Zurn, P., & Braichet, J. M. (2009). Increasing access to health workers in remote and rural areas through improved retention. *Geneva: World Health Organization*.

Dovlo, D. (2003). The brain drains and retention of health professionals in Africa. In A case study prepared for a regional training conference on Improving Tertiary education in Sub-Saharan Africa: Things That Work (pp. 23-25).

Dovlo, D. (2005). Taking more than a fair share? The migration of health professionals from poor to rich countries. *PLoS medicine*, 2(5), e109.

Dovlo, D. (2007). Migration of nurses from Sub-Saharan Africa: A review of issues and challenges. *Health Services Research*, 42(3 II), 1373–1388.

du Toit, S. H. J., Baldassar, L., Raber, C. L., Millard, A. M., Etherton-Beer, C. D., Buchanan, H. A., du Toit, D. S., Collier, L. J., Cheung, G., Peri, K., Webb, E. A., & Lovarini, M. (2020). Embracing Cultural Diversity - Leadership Perspectives on Championing Meaningful Engagement for Residents Living with Advanced Dementia [Article]. *Journal of Cross-Cultural Gerontology*, 35(1), 49-67. <https://doi.org/10.1007/s10823-019-09387-3>

- Duplantie, J., Gagnon, M. P., Fortin, J. P., & Landry, R. (2007). Telehealth and the recruitment and retention of physicians in rural and remote regions: a Delphi study. *Can J Rural Med*, 12(1), 30-6.
- Dussault, G., & Franceschini, M. C. (2006). Not enough there, too many here: understanding geographical imbalances in the distribution of the health workforce. *Human resources for health*, 4, 1-16.
- Ensor, T., & Witter, S. (2001). Health economics in low income countries: adapting to the reality of the unofficial economy. *Health Policy*, 57(1), 1-13. [https://doi.org/10.1016/S0168-8510\(01\)00125-7](https://doi.org/10.1016/S0168-8510(01)00125-7)
- Falzarano, M., & Zipp, G. P. (2013). Seeking consensus through the use of the Delphi technique in health sciences research. *Journal of allied health*, 42(2), 99-105.
- Farmer, J., Kenny, A., McKinstry, C., & Huysmans, R. D. (2015). A scoping review of the association between rural medical education and rural practice location. *Human resources for health*, 13, 1-15.
- Franklin, K. K., & Hart, J. K. (2007). Idea generation and exploration: Benefits and limitations of the policy Delphi research method. *Innovative Higher Education*, 31, 237-246.
- Gagnon, M. P., Ngangue, P., Payne-Gagnon, J., & Desmartis, M. (2016). m-Health adoption by healthcare professionals: a systematic review. *Journal of the American Medical Informatics Association*, 23(1), 212-220.
- Geist, M. R. (2010). Using the Delphi method to engage stakeholders: A comparison of two studies. *Evaluation and program planning*, 33(2), 147-154.
- Ghana Health Service (2017). Restructure and administration of harmonized policy. Accra.
- Ghana Health Service (2018). GHS Human Resource Directorate Annual Report for 2017.
- Ghana Health Service (2019). 2019 Annual Report (pp. 1-129). Accra: Ghana Health Service.

- Ghana Ministry of Health. (2007). *Human resource policies and strategies for the health sector 2007-2011*. Ministry of Health.
- Glass, G. V., Willson, V. L., & Gottman, J. M. (Eds.). (2008). *Design and analysis of time-series experiments*. IAP.
- Glenn, J., Moucheraud, C., Payán, D. D., Crook, A., Stagg, J., Sarma, H., Ahmed, T., Epstein, A., Luies, S. K., Rahman, M., Kruk, M. E., & Bossert, T. J. (2021). What is the impact of removing performance-based financial incentives on community health worker motivation? A qualitative study from an infant and young child feeding program in Bangladesh. *BMC Health Services Research*, 21(1), 1–11. <https://doi.org/10.1186/s12913-021-06996-y>
- Goel, S., Angeli, F., Singla, N., & Ruwaard, D. (2018). Measuring the reasons that discourage medical students from working in rural areas: Development and validation of a new instrument. *Medicine*, 97(2).
- Goodfellow, A., Ulloa, J. G., Dowling, P. T., Talamantes, E., Chheda, S., Bone, C., & Moreno, G. (2016). Predictors of primary care physician practice location in underserved urban or rural areas in the United States: a systematic literature review. *Academic Medicine*, 91(9), 1313-1321.
- Grant, C., Nawal, D., Guntur, S. M., Kumar, M., Chaudhuri, I., Galavotti, C., ... & Jiwani, S. (2018). 'We pledge to improve the health of our entire community': Improving health worker motivation and performance in Bihar, India through teamwork, recognition, and non-financial incentives. *PLoS One*, 13(8), e0203265.
- Green, C., Bilyanska, A., Bradley, M., Dinsdale, J., Hutt, L., Backhaus, T., ... & Lynch, I. (2023). A horizon scan to support chemical pollution–related policymaking for sustainable and climate-resilient economies. *Environmental Toxicology and Chemistry*, 42(6), 1212-1228.

- Grimshaw, J., Campbell, M., Eccles, M., & Steen, N. (2000). Experimental and quasi-experimental designs for evaluating guideline implementation strategies. *Family practice*, 17(suppl_1), S11-S16.
- Grisham, T. (2009). The Delphi technique: a method for testing complex and multifaceted topics. *International Journal of Managing Projects in Business*, 2(1), 112-130.
- Grobler, L., Marais, B. J., & Mabunda, S. (2015). Interventions for increasing the proportion of health professionals practising in rural and other underserved areas. *Cochrane database of systematic reviews*, (6).
- Gros, J. G. (2016). *Healthcare policy in Africa: Institutions and politics from colonialism to the present*. Rowman & Littlefield.
- Gudu, W. (2017). Prodromal symptoms, health care seeking in response to symptoms and associated factors in eclamptic patients. *BMC Pregnancy and Childbirth*, 17(1), 1-7.
- Guzys, D., Dickson-Swift, V., Kenny, A., & Threlkeld, G. (2015). Gadamerian philosophical hermeneutics as a useful methodological framework for the Delphi technique. *International journal of qualitative studies on health and well-being*, 10(1), 26291.
- Haines, H. M., & Critchley, J. (2009). Developing the nurse practitioner role in a rural Australian hospital: a Delphi study of practice opportunities, barriers and enablers. *Australian Journal of Advanced Nursing*, 27(1), 30-36.
- Harris, A. D., McGregor, J. C., Perencevich, E. N., Furuno, J. P., Zhu, J., Peterson, D. E., & Finkelstein, J. (2006). The use and interpretation of quasi-experimental studies in medical informatics. *Journal of the American Medical Informatics Association*, 13(1), 16-23.
- Hasson, F., & Keeney, S. (2011). Enhancing rigour in the Delphi technique research. *Technological forecasting and social change*, 78(9), 1695-1704.
- Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of advanced nursing*, 32(4), 1008-1015.

- Healy, L. J., Beccaria, G., & McIlveen, P. (2021). Revised model for evaluating visiting health care services in rural and remote settings. *Australian Journal of Rural Health*, 29(5), 779-788.
- Hsu, C. C., & Sandford, B. A. (2019). The Delphi technique: making sense of consensus. *Practical assessment, research, and evaluation*, 12(1), 10.
- Hu, X., Dill, M., & Conrad, S. (2021). What Moves Physicians to Work in Rural Areas? An In-depth Examination of Physician Rural Practice Reasons and Determinants. *Hu X, Dill MJ, Conrad SS. What Moves Physicians to Work in Rural Areas.*
- Humphrey-Murto, S., Varpio, L., Gonsalves, C., & Wood, T. J. (2017). Using consensus group methods such as Delphi and Nominal Group in medical education research. *Medical teacher*, 39(1), 14-19.
- Iipinge, S., Dambisya, Y. M., Loewenson, R., Chimbari, M., Ndeti, D., Munga, M., ... & Lugina, H. (2009). Incentives for health worker retention in east and southern Africa: Learning from country research. *Equinet Discussion Papers: Regional Network for Equity in Health in East and Southern Africa.*
- Jandoc, R., Burden, A. M., Mamdani, M., Lévesque, L. E., & Cadarette, S. M. (2015). Interrupted Time Series Analysis in Drug Utilization Research is Increasing: Systematic Review and Recommendations. *Journal of Clinical Epidemiology*.
<https://doi.org/10.1016/j.jclinepi.2014.12.018>
- Jarju, S. (2016). Description of the Perceived Incentives Effect on Mid-Level Managers' Motivation and Performance in the Health Programme Management at Central Level of the Public Health Sector of the Gambia (Master's dissertation, University of Ghana).
- Jha, A. K., Orav, E. J., & Epstein, A. M. (2010). The effect of financial incentives on hospitals that serve poor patients. *Annals of internal medicine*, 153(5), 299-306.
- Johnson, G., Foster, K., Blinkhorn, A., & Wright, F. C. (2019). Exploration of the factors that influence new Australian dental graduates to work rurally and their perspectives of rural

- versus metropolitan employment. *European Journal of Dental Education*, 23(4), 437-447.
- Jorm, A. F. (2015). Using the Delphi expert consensus method in mental health research. *Australian & New Zealand Journal of Psychiatry*, 49(10), 887-897.
- Kawakatsu, Y., Adesina, A. O., Kadoi, N., & Aiga, H. (2020). Cost-effectiveness of SMS appointment reminders in increasing vaccination uptake in Lagos, Nigeria: a multi-centered randomized controlled trial. *Vaccine*, 38(42), 6600-6608.
<https://doi.org/10.1016/j.vaccine.2020.07.075>
- Khim, K. (2016). Are health workers motivated by income? Job motivation of Cambodian primary health workers implementing performance-based financing. *Global health action*, 9(1), 31068.
- Korah, P. I., Nunbogu, A. M., & Ahmed, A. (2023). Measuring access to health facilities in Ghana: Implications for implementation of health interventions and the Sustainable Development Goal 3. *Applied Geography*, 158, 103026.
- Kruk, M. E., Johnson, J. C., Gyakobo, M., Agyei-Baffour, P., Asabir, K., Kotha, S. R., ... & Dzodzomenyo, M. (2010). Rural practice preferences among medical students in Ghana: a discrete choice experiment. *Bulletin of the World Health Organization*, 88, 333-341.
- Kumar, S., Tian, E. J., May, E., Crouch, R., & McCulloch, M. (2020). “You get exposed to a wider range of things and it can be challenging but very exciting at the same time”: enablers of and barriers to transition to rural practice by allied health professionals in Australia. *BMC health services research*, 20, 1-14.
- Kwansah, J., Dzodzomenyo, M., Mutumba, M., Asabir, K., Koomson, E., Gyakobo, M., Agyei-Baffour, P., Kruk, M. E., & Snow, R. C. (2012). Policy talk: Incentives for rural service among nurses in Ghana. *Health Policy and Planning*, 27(8), 669–676.
<https://doi.org/10.1093/heapol/czs016>

- Levine, G., Salifu, A., Mohammed, I., & Fink, G. (2021). Mobile nudges and financial incentives to improve coverage of timely neonatal vaccination in rural areas (GEVaP trial): A 3-armed cluster randomized controlled trial in Northern Ghana. *PLoS ONE*, 16(5 May), 1–19. <https://doi.org/10.1371/journal.pone.0247485>
- Lewis, M. E., & Myhra, L. L. (2018). Integrated care with Indigenous populations: considering the role of health care systems in health disparities. *Journal of Health Care for the Poor and Underserved*, 29(3), 1083-1107.
- Li, Y. H., Tsai, W. C., Khan, M., Yang, W. T., Lee, T. F., Wu, Y. C., & Kung, P. T. (2010). The effects of pay-for-performance on tuberculosis treatment in Taiwan. *Health Policy and Planning*, 25(4), 334-341.
- Lin, T. K., Werner, K., Witter, S., Alluhidan, M., Alghaith, T., Hamza, M. M., ... & Alazemi, N. (2022). Individual performance-based incentives for health care workers in Organisation for Economic Co-operation and Development member countries: a systematic literature review. *Health Policy*, 126(6), 512-521.
- Linden, A. (2017). Challenges to validity in single-group interrupted time series analysis. *Journal of Evaluation in Clinical Practice*, 23(2), 413–418. <https://doi.org/10.1111/jep.12638>
- Linden, M., & Ray, D. (2017). Aggregation bias-correcting approach to the health–income relationship: life expectancy and GDP per capita in 148 countries, 1970–2010. *Economic Modelling*, 61, 126-136. <https://doi.org/10.1016/j.econmod.2016.12.001>
- Lissauer, D., Cheshire, J., Dunlop, C., Taki, F., Wilson, A., Smith, J. M., Daniels, R., Kissoon, N., Malata, A., Chirwa, T., Lwesh, V. M., Mhango, C., Mhango, E., Makwenda, C., Banda, L., Munthali, L., Nambiar, B., Hussein, J., Williams, H. M., Devall, A. J., Gallos, I., Merriel, A., Bonet, M., Souza, J. P., & Coomarasamy, A. (2020). Development of the FAST-M maternal sepsis bundle for use in low resource settings: a modified Delphi process [Article]. *Bjog-an International Journal of Obstetrics and Gynaecology*, 127(3), 416-423. <https://doi.org/10.1111/1471-0528.16005>

- Lopez Bernal, J., Cummins, S., & Gasparrini, A. (2018). The use of controls in interrupted time series studies of public health interventions. *International journal of epidemiology*, 47(6), 2082-2093.
- Lorgelly, P. K., Lawson, K. D., Fenwick, E. A. L., & Briggs, A. H. (2010). Outcome Measurement in Economic Evaluations of Public Health Interventions: a Role for the Capability Approach? *International Journal of Environmental Research and Public Health*, 7, 2274–2289.
- Maassen, S. M., Van Oostveen, C., Vermeulen, H., & Weggelaar, A. M. (2021). Defining a positive work environment for hospital healthcare professionals: A Delphi study. *PloS One*, 16(2), e0247530.
- Malik, A. A., Yamamoto, S. S., Souares, A., Malik, Z., & Sauerborn, R. (2010). Motivational determinants among physicians in Lahore, Pakistan. *BMC health services research*, 10, 1-11.
- Martin, R., Mandrusiak, A., Lu, A., & Forbes, R. (2021). Competencies for entry-level rural and remote physiotherapy practice: a Delphi approach. *Rural and Remote Health*, 21(4).
- Masango, S., Gathu, K., & Sibandze, S. (2008). Retention strategies for Swaziland's health sector workforce: Assessing the role of non-financial incentives. *EQUINET Discussion Papers*, (68).
- Mathauer, I., & Imhoff, I. (2006). Health worker motivation in Africa: the role of non-financial incentives and human resource management tools. *Human resources for health*, 4(1), 1-17.
- McDowall, D., R. McCleary, E. E. Meidinger, and R. A. H. (1980). Interrupted Time Series Analysis. *Sage Publications*.
- McGrail, M. R., & Russell, D. J. (2017). Australia's rural medical workforce: Supply from its medical schools against career stage, gender and rural-origin. *Australian Journal of Rural Health*, 25(5), 298–305. <https://doi.org/10.1111/ajr.12323>

- McGrail, M. R., O'Sullivan, B. G., & Russell, D. J. (2018). Rural training pathways: the return rate of doctors to work in the same region as their basic medical training. *Human resources for health*, 16(1), 1-10. <https://doi.org/10.1186/s12960-018-0323-7>
- McPake, B., Maeda, A., Araújo, E. C., Lemiere, C., El Maghraby, A., & Cometto, G. (2013). Why do health labour market forces matter?. *Bulletin of the World Health Organization*, 91, 841-846.
- Ministry of Health. (2022). *Health sector annual programme of work: 2021 holistic assessment report*. Ministry of Health, Republic of Ghana.
https://www.moh.gov.gh/wp-content/uploads/2022/08/2021-Holistic-Assessment-Report_v1.7.3.pdf
- Miseda, M. H., Were, S. O., Murianki, C. A., Mutuku, M. P., & Mutwiwa, S. N. (2017). The implication of the shortage of health workforce specialist on universal health coverage in Kenya. *Human resources for health*, 15, 1-7.
- Moussawi, S., & Koufaris, M. (2015). Working on low-paid micro-task crowdsourcing platforms: An existence, relatedness and growth view.
- Munga, M., & Mbilinyi, D. (2008). Non-financial incentives and retention of health workers in Tanzania. *Dar es Salaam: National Institute for Medical Research*.
- Munga, M. A., Torsvik, G., & Mæstad, O. (2014). Using incentives to attract nurses to remote areas of Tanzania: a contingent valuation study. *Health policy and planning*, 29(2), 227-236.
- Nahra, T. A., Reiter, K. L., Hirth, R. A., Shermer, J. E., & Wheeler, J. R. (2006). Cost-effectiveness of hospital pay-for-performance incentives. *Medical Care Research and Review*, 63(1_suppl), 49S-72S.
- Ndeti, D. M., Khasakhala, L., & Omolo, J. O. (2008). Incentives for health worker retention in Kenya: An assessment of current practice. *EQUINET*, 62, 29.

- Niederberger, M., & Spranger, J. (2020). Delphi technique in health sciences: a map. *Frontiers in public health*, 8, 457.
- Niyitegeka, J., Nshimirimana, G., Silverstein, A., Odhiambo, J., Lin, Y., Nkurunziza, T., ... & Hedt-Gauthier, B. (2017). Longer travel time to district hospital worsens neonatal outcomes: a retrospective cross-sectional study of the effect of delays in receiving emergency cesarean section in Rwanda. *BMC pregnancy and childbirth*, 17(1), 1-10.
- Njuguna, J., Mwangi, P., & Kamau, N. (2014). Incentives among health workers in a remote Kenyan district: implications for proposed county health system. *Journal of health care for the poor and underserved*, 25(1), 204-214.
- Norris, E., Prescott, A., Noone, C., Green, J. A., Reynolds, J., Grant, S. P., & Toomey, E. (2022). Establishing open science research priorities in health psychology: a research prioritisation Delphi exercise [Article; Early Access]. *Psychology & Health*, 25. <https://doi.org/10.1080/08870446.2022.2139830>
- Nwosu, A. C., McGlinchey, T., Sanders, J., Stanley, S., Palfrey, J., Lubbers, P., ... & Mason, S. (2022). Identification of digital health priorities for palliative care research: modified delphi study. *JMIR aging*, 5(1), e32075.
- Ogbeifun, E., Agwa-Ejon, J., Mbohwa, C., & Pretorius, J. H. (2016). The Delphi technique: A credible research methodology.
- Okereke, E., Eluwa, G., Akinola, A., Suleiman, I., Unumeri, G., & Adebajo, S. (2021). Patterns of financial incentives in primary healthcare settings in Nigeria: implications for the productivity of frontline health workers. *BMC research notes*, 14(1), 1-6.
- Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: an example, design considerations and applications. *Information & management*, 42(1), 15-29.
- Okyere, E., Mwanri, L., & Ward, P. (2017). Is task-shifting a solution to the health workers' shortage in Northern Ghana? *PLoS ONE*, 12(3), 1-22. <https://doi.org/10.1371/journal.pone.0174631>

- Onnis, L. A. (2019). Human resource management policy choices, management practices and health workforce sustainability: Remote Australian perspectives. *Asia Pacific Journal of Human Resources*, 57(1), 3-23.
- Ormel, H., Kok, M., Kane, S., Ahmed, R., Chikaphupha, K., Rashid, S. F., ... & de Koning, K. (2019). Salaried and voluntary community health workers: exploring how incentives and expectation gaps influence motivation. *Human resources for health*, 17(1), 1-12.
- Owusu-Addo, E., Cross, R., & Sarfo-Mensah, P. (2017). Evidence-based practice in local public health service in Ghana. *Critical Public Health*, 27(1), 125-138.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *International journal of surgery*, 88, 105906.
- Pandya, A., Asch, D. A., Volpp, K. G., Sy, S., Troxel, A. B., Zhu, J., Weinstein, M. C., Rosenthal, M. B., & Gaziano, T. A. (2018). Cost-effectiveness of Financial Incentives for Patients and Physicians to Manage Low-Density Lipoprotein Cholesterol Levels. *JAMA Network Open*, 1(5), e182008. <https://doi.org/10.1001/jamanetworkopen.2018.2008>
- Penfold, R. B., & Zhang, F. (2013). Use of interrupted time series analysis in evaluating health care quality improvements. *Academic pediatrics*, 13(6), S38-S44. <https://doi.org/10.1016/j.acap.2013.08.002>
- Priebe, S., Sinclair, J., Burton, A., Marougka, S., Larsen, J., Firn, M., & Ashcroft, R. (2010). Acceptability of offering financial incentives to achieve medication adherence in patients with severe mental illness: a focus group study. *Journal of medical ethics*, 36(8), 463-468.
- Prust, M. L., Kamanga, A., Ngosa, L., McKay, C., Muzongwe, C. M., Mukubani, M. T., ... & Wilmink, N. (2019). Assessment of interventions to attract and retain health workers in rural Zambia: a discrete choice experiment. *Human resources for health*, 17, 1-12.

- Rabinowitz, H. K., Petterson, S., Boulger, J. G., Hunsaker, M. L., Diamond, J. J., Markham, F. W., Bazemore, A., & Phillips, R. L. (2012). Medical school rural programs: A comparison with international medical graduates in addressing state-level rural family physician and primary care supply. *Academic Medicine*, 87(4), 488–492.
<https://doi.org/10.1097/ACM.0b013e3182488b19>
- Ramadhan, H. (2015). Retention challenges of human resources for health: what are the alternatives incentives for retention of skilled health workers in Uganda health sector. *Med Pract Rev*, 6(2), 16-23.
- Rosenthal, M. B., Landon, B. E., Howitt, K., Song, H. R., & Epstein, A. M. (2007). Climbing up the pay-for-performance learning curve: where are the early adopters now? *Health affairs*, 26(6), 1674-1682.
- Rowe, G., & Wright, G. (1999). The Delphi technique as a forecasting tool: issues and analysis. *International journal of forecasting*, 15(4), 353-375.
- Rudasingwa, M., & Uwizeye, M. R. (2017). Physicians' and nurses' attitudes towards performance-based financial incentives in Burundi: A qualitative study in the province of Gitega. *Global Health Action*, 10(1), 1–15.
<https://doi.org/10.1080/16549716.2017.1270813>
- Saleh, K. (2012). *The health sector in Ghana: a comprehensive assessment*. World Bank Publications.
- Scheil-Adlung, X. (2013). Health workforce benchmarks for universal health coverage and sustainable development. *Bulletin of the World Health Organization*, 91, 888-888.
- Schuster, R. C., De Sousa, O., Reme, A. K., Vopelak, C., Pelletier, D. L., Johnson, L. M., ... & Young, S. L. (2018). Performance-based financing empowers health workers delivering prevention of vertical transmission of HIV services and decreases desire to leave in Mozambique. *International Journal of Health Policy and Management*, 7(7), 630.

- Scott, K., Beckham, S. W., Gross, M., Pariyo, G., Rao, K. D., Cometto, G., & Perry, H. B. (2018). What do we know about community-based health worker programs? A systematic review of existing reviews on community health workers. *Human resources for health*, 16(1), 1-17.
- Serneels, P., Montalvo, J., Pettersson, G., Lievens, T., Butera, J. and Kidanu, A. (2010). Who wants to work in a rural health post? The role of intrinsic motivation, rural background and faith-based institutions in Ethiopia and Rwanda. *Bulletin of the World Health Organization*, 88(5), pp.342-349.
- Sirunyan, A. M., Tumasyan, A., Adam, W., Ambroggi, F., Bergauer, T., Brandstetter, J., ... & Chen, M. (2020). Running of the top quark mass from proton-proton collisions at $\sqrt{s}=13\text{TeV}$. *Physics Letters B*, 803, 135263.
- Snow, R. C., Asabir, K., Mutumba, M., Koomson, E., Gyan, K., Dzodzomenyo, M., Kruk, M., & Kwansah, J. (2011). Key factors leading to reduced recruitment and retention of health professionals in remote areas of Ghana: A qualitative study and proposed policy solutions. *Human Resources for Health*, 9, 1–11. <https://doi.org/10.1186/1478-4491-9-13>
- Songstad, N. G., Rekdal, O. B., Massay, D. A., & Blystad, A. (2011). Perceived unfairness in working conditions: the case of public health services in Tanzania. *BMC health services research*, 11(1), 1-15.
- Spranger, J., Homberg, A., Sonnberger, M., & Niederberger, M. (2022). Reporting guidelines for Delphi techniques in health sciences: A methodological review. *Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen*, 172, 1-11.
- Stennett, A., De Souza, L., & Norris, M. (2020). A qualitative exploration of physiotherapists' perceptions about exercise and physical activity: reflections on the results from a Delphi Study. *Disability and Rehabilitation*, 42(22), 3142-3151.
- Stennett, A. M., De Souza, L. H., & Norris, M. (2021). Flipping the ICF: Exploring the Interplay of Theory and the Lived Experience to Reconsider Physical Activity in Community-

- Dwelling People With Multiple Sclerosis. *Frontiers in Rehabilitation Sciences*, 2, 710618.
- Stennett, A., De Souza, L., & Norris, M. (2018). Physical activity and exercise priorities in community dwelling people with multiple sclerosis: a Delphi study [Article]. *Disability and Rehabilitation*, 40(14), 1686-1693. <https://doi.org/10.1080/09638288.2017.1309464>
- Sterne, J. A. C., Higgins, J. P. T., Elbers, R. G., & Reeves, B. C. (2016). Risk of bias in non-randomized studies of interventions (ROBINS-I): detailed guidance, updated 12 October 2016. Available from www.riskofbias.info.
- Sumsion, T. (1998). The Delphi technique: an adaptive research tool. *British Journal of Occupational Therapy*, 61(4), 153-156.
- Surowiecki, J. (2004). The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business. *Economies, Societies and Nations*, 296(5).
- Taderera, B. H., Hendricks, S., & Pillay, Y. (2016). Health personnel retention strategies in a peri-urban community: an exploratory study on Epworth, Zimbabwe. *Human resources for health*, 14, 1-14.
- Thi Hoai Thu, N., Wilson, A., & McDonald, F. (2015). Motivation or demotivation of health workers providing maternal health services in rural areas in Vietnam: findings from a mixed-methods study. *Human resources for health*, 13, 1-11.
- Tripathy, J. P., Goel, S., & Kumar, A. (2016). Measuring and understanding motivation among community health workers in rural health facilities in India-a mixed method study. *BMC health services research*, 16(1), 1-10.
- Tsiachristas, A., Holland, J., Guo, B., Chitsabesan, P., Sayal, K., & Pari, A. A. A. (2024). The impact of the COVID-19 pandemic on children and adolescent mental health in-patient service use in England: interrupted time-series analysis of national patient records. *BJPsych Open*, 10(2), e69.

- Turner, S. L., Forbes, A. B., Karahalios, A., Taljaard, M., & McKenzie, J. E. (2021). Evaluation of statistical methods used in the analysis of interrupted time series studies: a simulation study. *BMC medical research methodology*, 21, 1-18.
- Turoff, M., & Linstone, H. A. (2002). *The Delphi method-techniques and applications*.
- United Nations Children's Fund (UNICEF) (2018). Every Child Alive: the urgent need to end newborn deaths.
- United Nations. (2016). The Sustainable Development Goals 2016.
- Velicer, W. F., & McDonald, R. P. (1991). Cross-Sectional Time Series Designs: A General Transformation Approach. *Multivariate Behavioral Research*, 26(2), 247–254.
- Versteeg, M., Du Toit, L., & Couper, I. (2013). Building consensus on key priorities for rural health care in South Africa using the Delphi technique. *Global health action*, 6(1), 19522.
- Vilendrer, S., Brown-Johnson, C., Kling, S. M., Veruttipong, D., Amano, A., Bohman, B., ... & Asch, S. M. (2021). Financial incentives for medical assistants: a mixed-methods exploration of bonus structures, motivation, and population health quality measures. *The Annals of Family Medicine*, 19(5), 427-436.
- Vos, T., Allen, C., Arora, M., Barber, R. M., Bhutta, Z. A., Brown, A., ... & Boufous, S. (2016). Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The lancet*, 388(10053), 1545-1602.
- Waage, J., Banerji, R., Campbell, O., Chirwa, E., Collender, G., Dieltiens, V., ... & Unterhalter, E. (2010). The Millennium Development Goals: a cross-sectoral analysis and principles

- for goal setting after 2015: Lancet and London International Development Centre Commission. *The lancet*, 376(9745), 991-1023.
- Walker, A. M., & Selfe, J. (1996). The Delphi method: a useful tool for the allied health researcher. *British Journal of Therapy and Rehabilitation*, 3(12), 677-681.
- Walker, S., Mason, A. R., Claxton, K., Cookson, R., Fenwick, E., Fleetcroft, R., & Sculpher, M. (2010). Value for money and the Quality and Outcomes Framework in primary care in the UK NHS. *British Journal of General Practice*, 60(574), e213-e220.
- Walters, L. K., McGrail, M. R., Carson, D. B., O'Sullivan, B. G., Russell, D. J., Strasser, R. P., ... & Kamien, M. (2017). Where to next for rural general practice policy and research in Australia?. *The Medical Journal of Australia*, 207(2), 56-58. <https://doi.org/10.5694/mja17.00216>
- Wikipedia. (2020). List of Ghanaian regions by Human Development Index. Wikipedia. https://en.wikipedia.org/wiki/List_of_Ghanaian_regions_by_Human_Development_Index
- Willcox, M., Moorthy, A., Mohan, D., Romano, K., Hutchful, D., Mehl, G., ... & LeFevre, A. (2019). Mobile technology for community health in Ghana: is maternal messaging and provider use of technology cost-effective in improving maternal and child health outcomes at scale? *Journal of medical Internet research*, 21(2), e11268. <https://doi.org/10.2196/11268>
- Willis-Shattuck, M., Bidwell, P., Thomas, S., Wyness, L., Blaauw, D., & Ditlopo, P. (2008). Motivation and retention of health workers in developing countries: a systematic review. *BMC health services research*, 8, 1-8.
- Wilson, M. S. J., Knight, S., Vaughan-Shaw, P., Blakemore, A. I., O'Kane, M., Boyle, C., Small, P., Mahawar, K., Augis, & Bomss. (2020). A modified AUGIS Delphi process to establish research priorities in bariatric and metabolic surgery [Article]. *Clinical Obesity*, 10(1), 5, Article e12344. <https://doi.org/10.1111/cob.12344>

- World Bank. (2016). Universal Health Coverage (UHC) in Africa: a framework for action: Main report.
- World Health Organization (2013). *Road map for scaling up the human resources for health: For improved health service delivery in the Africa region 2012-2025*.
- World Health Organization. (2016). *Global strategy on human resources for health: workforce 2030*.
- World Health Organization. (2016). Health workforce requirements for universal health coverage and the Sustainable Development Goals. *Human resources for health observer*, 17.
- Wurie, H. R., Samai, M., & Witter, S. (2016). Retention of health workers in rural Sierra Leone: findings from life histories. *Human resources for health*, 14(1), 1-15.
<https://doi.org/10.1186/s12960-016-0099-6>
- Ye, M., Diboulo, E., Kagone, M., Sie, A., Sauerborn, R., & Loukanova, S. (2016). Health worker preferences for performance-based payment schemes in a rural health district in Burkina Faso. *Global health action*, 9(1), 29103.
- Yousaf, S., Latif, M., Aslam, S., & Saddiqui, A. (2014). Impact of financial and non-financial rewards on employee motivation. *Middle-East journal of scientific research*, 21(10), 1776-1786.

APPENDICES

Appendix 1: Pilot review

Introduction

The purpose of this pilot review is to identify studies on incentive schemes and search terms frequently used by systematic reviews that evaluate incentive packages for healthcare workforces. This pilot review, therefore, provides information on the methods used, the main findings and identify gaps in the examined literature.

Methods

Search Strategy

Scopus, the largest database with over 37,000 titles from medicine, technology and social sciences, which is used by over 5,000 academic, government and corporate institutions, was searched

between 15th December and 4th January 2020 for relevant systematic reviews. Scopus was chosen as the search engine due to its larger coverage of citation and consistency of results. This pilot review used ‘Healthcare Incentive’ as the key search term. The search terms that were subsequently used in this review verbatim were: (TITLE-ABS-KEY (healthcare AND incentive) AND DOCTYPE (re) AND PUBYEAR > 2009) AND ((cost)) AND (effectiveness) AND TITLE-ABS-KEY (Review)) AND (LIMIT-TO (LANGUAGE, “English”)). The search result from Scopus database is illustrated in Table 1

Table 1: Search terms

Database	Initial hits	Filter	Final
Scopus	3879	Limit to reviews	132

Eligibility Criteria

A predetermined eligibility criterion was used to determine whether a systematic review can be included in the pilot review. To identify and select current articles related to this study, the search was limited to papers that were published between the year 2010 and 2020. The table below shows the eligibility criteria that were used in this study.

Table 2: Eligibility Criteria

Inclusion criteria	Exclusion criteria
Systematic reviews evaluating effectiveness	Systematic reviews examining health of incentives in healthcare
Systematic reviews must be in English	Systematic reviews in any other language apart from English Full text of the systematic review must be Full text not available and accessible
Systematic reviews published between 2010	Systematic reviews published before the year and 2020

Data extraction

A developed data extraction question was used to extract data from the selected systematic reviews. Five main questions were used to extract the relevant data from the selected systematic reviews. The questions were;

- What database/databases were used in the studies or reviews?
- What search terms were used in the studies?
- Who are the authors?
- What year did they publish the reviews?
- What were the main findings of the study?

Quality appraisal

After extracting the relevant data, the Critical Appraisal Skills Program (CASP) tool for systematic reviews was used to appraise the quality of the selected studies. This was to ensure that the quality of the study met the required standard of a systematic review to avoid potential bias (Harris et al., 2014).

Result

Overall, one hundred and thirty-two (132) systematic reviews were identified and selected from Scopus database after the database specific filters were applied. The titles of these papers were then screened to ensure their relevance to the topic under study. After screening, one hundred and twentyone (121) reviews were removed because they were not related to the topic under study. The abstracts of the eleven (11) remaining reviews were screened to ensure they met the eligibility criteria. This second screening resulted in the elimination of four (4) more systematic reviews that did not meet the inclusion criteria. Consequently, only seven (7) systematic reviews met the eligibility criteria for the pilot review. The Prisma diagram below has been used to demonstrate the selection process. Fig. 1 provides the search diagram.

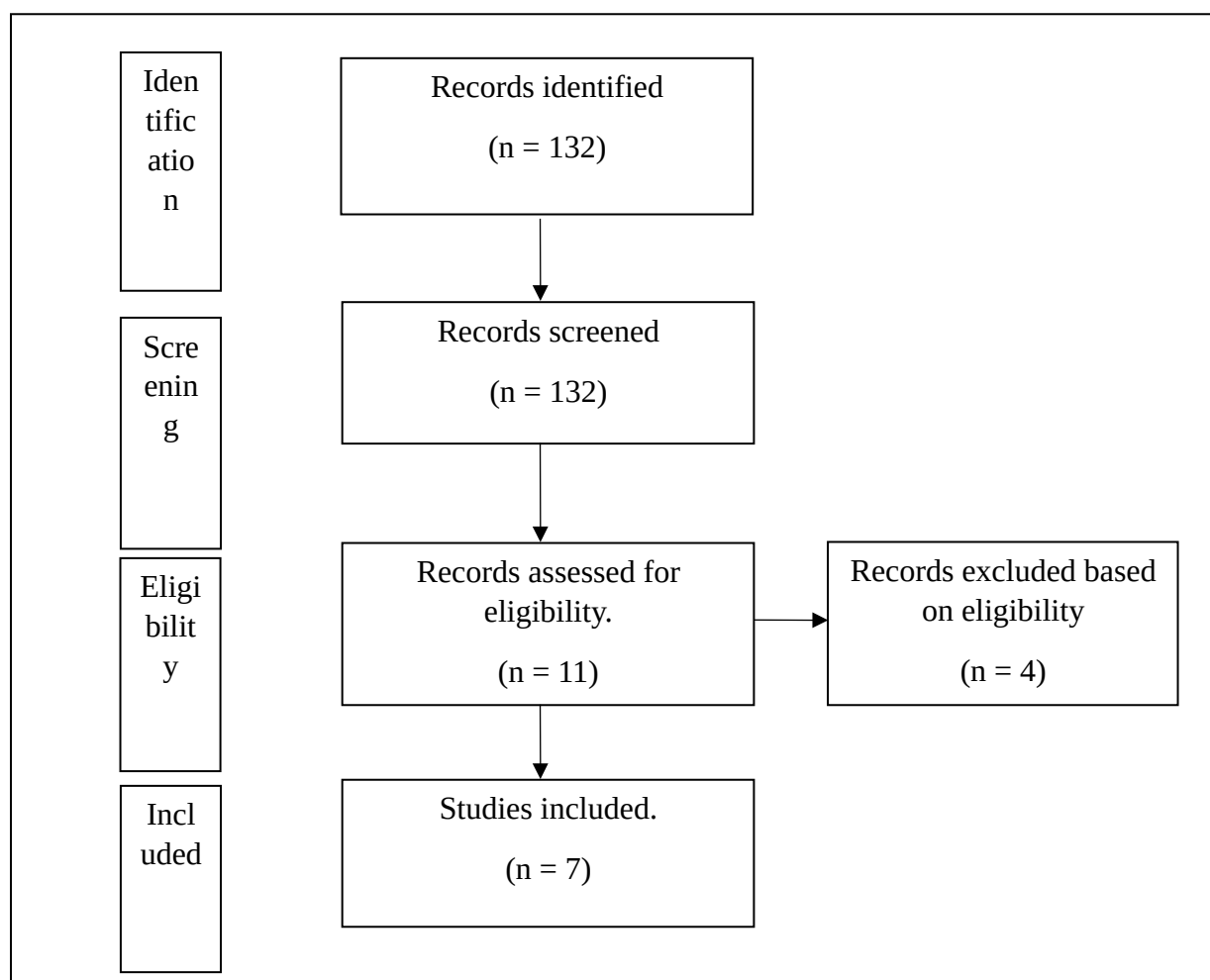


Figure 1: Search diagram and reasons for exclusion

Table 3 below shows the extracted data

REVIEWS	AUTHOUR/YEAR	DATABASE	SEARCH TERMS
Design of financial incentives and payment schemes healthcare systems: A review	Fainman, E. Z., & Kucukyazici, B.(2020).	Google Scholar and ScienceDirect	'healthcare' plus 'financial incentive'; or 'health Care' plus 'financial compensation'; or 'healthcare provider' plus 'financial incentive'
Effects of Monetary Incentives in Physician Groups: A Systematic Review of Reviews	Heider, A. K., & Mang, H. (2020).	MEDLINE (PubMed), Cochrane Library, CINAHL, PsycINFO, EconLit, and ISI Web	'monetary incentives' plus 'physician groups' or 'economic'; 'effective'
Recruitment and retention of healthcare professionals in rural Canada: A systematic review.	Koebisch, S. H., Rix, J., & Holmes, M. (2020).	PubMed, Medline Complete, Index of Chiropractic Literature (ICL) and Cochrane Library	'recruitment', 'retention', 'healthcare professionals'
How are pay-for-performance (P4P) schemes in healthcare designed in low- and middle-income countries? Typology and systematic literature review	Kovacs, R. J., et al. (2020)	Medline, Embase, EconLit, Google Scholar and Emerald Insight.	'design of P4P schemes', 'incentivised'

A systematic review of financial incentives given in the healthcare setting; do they effectively improve physical activity levels?	Molema, C. C., et al. (2016).	Medline, Embase and SciSearch	'primary care', 'delivery of healthcare', 'financial support', 'access', 'price', 'leisure center' and 'active transport'
Retaining health workforce in rural and underserved areas of India: What works and what doesn't? A critical interpretative Synthesis	Goel, S., et al. (2016).	PubMed, Google Scholar and IndMed	'health workers or nurses or doctors or mid-level workers' AND 'retention or recruitment or shortage' AND 'rural area or underserved area in India'
Financial interventions and movement restrictions for managing the movement of health workers between public and private organizations in low- and middle-income countries.	Rutebemberwa, E., et al. (2014).	Cochrane Central Register of Controlled Trials (CENTRAL), EMBASE, LILACS MEDLINE, CINAHL and the British Nursing Index.	'special allowances', 'increasing salaries', 'bonding health workers', 'offering bursary schemes', 'scholarships', 'lucrative' plus 'terminal benefits', 'hiring' plus 'contract basis'.

Databases

The common databases used by the selected reviews were Medline, PubMed, Google Scholar, CINAHL, EconLit, The Cochrane Database of Systematic Reviews and EconLit. Table 4 below has been used to show the databases and the frequency of use across the selected reviews.

Table 4: Databases used

Database	Number of reviews that used it
Medline	5/7
PubMed	3/7
Google Scholar	3/7
CINAHL	2/7
Cochrane	3/7

EconLit,	2/7
ScienceDirect	1/7
British Nursing Index	1/7
SciSearch	1/7
ICL	1/7
Emerald Insight	1/7
PsycINFO	1/7

Search terms

The following keywords ‘healthcare’, ‘incentives’, ‘retention’ were the most frequent search terms used by the selected systematic reviews. The search terms and frequency of use have been demonstrated in Table 5 below.

Table 5: Search terms and frequency

Search terms	Number of reviews that used it
Healthcare	3/7
Incentives	3/7
Retention	3/7
monetary (financial)	3/7
physician	1/7
Effective	1/7
scheme	1/7
terminal benefits	1/7

Quality Appraisal

All the selected systematic review papers answered ‘YES’ to the appraisal questions. This suggested that they were of high quality with regard to the CASP tool quality requirement (CASP, 2020). In addition, all the four studies showed the systematic processes they used to select and assess the quality of their selected primary studies in accordance with the principles of systematic reviews (Akobeng, 2005). Hence, this additional quality made the selected review papers reliable.

Conclusion

In conclusion, Medline, PubMed, Google Scholar, CINAHL, EconLit, The Cochrane Database of Systematic Reviews and EconLit were the most common databases used by the selected systematic reviews evaluate incentive regime in the health sector. In addition, ‘healthcare’, ‘incentives and ‘retention’ were the most frequent search terms used by the identified systematic reviews. Therefore, these databases and search terms informed the search strategy in the main systematic review of this thesis.

Appendix 2: Study characteristics and outcomes measured in the systematic review

Author (Year)	Aim	Study Settings and design	Participant	Sample Size	Incentive package	Outcomes measured	Theory
Levine et al., 2021	To assess mobile phone-based reminders and incentives to health workers and caregivers on neonatal vaccination in a rural, low-resource setting.	Rural Karaga District in Ghana's Northern Region. RCT	Community health volunteers (CHVs)	690	Two Ghana cedis reward (USD 0.50) for each birth reported by CHVs within the first week of life.	On-time completion of both polio vaccinations.	-
Okereke et al., 2021	To assess the patterns of financial incentives on frontline health workers productivity within rural settings in Nigeria.	Alkaleri & Giade and Etung and Yala rural areas in Nigeria. Cross-sectional	Nurses, midwives, and community health workers	114	Rural posting allowance; stipends for adhoc jobs such as immunization; (20%); loans (20%); per diem for conference attendance or trainings; reimbursements for transport fare referrals.	The number of patients/clients a frontline health worker provides healthcare services to on daily basis.	-
Bernal & Martinez, 2020	To evaluate the effects of in-kind team incentives on health workers performance	Rural and Urban areas in El Salvador. RCT	Doctors, nurses, and community health workers	670	Non-financial incentives like computers, microwaves, air conditioners and other workplace assets.	Health workers performance based on community outreach, quality of care, timeliness of care, and care utilization.	-
Ye' et al., 2016	To explore healthcare providers' preferences for an incentive scheme to improve the quality of maternal and child health care.	Rural Nouna Health District in Burkina Faso. Mixed methods	Nurses, midwives, and Ward managers	6	Staff per diems	Staff performance based on antenatal care, family planning, consumables, and new-born care management indicators.	-
Grant et al.,	To examine the impact	Bilhar, India	Midwives and	5	Valuable household	Job motivation	-

2018	of “TeamBased Goals and Incentives” intervention on the psychosocial and behavioural outcomes of frontline health workers.	RCT	Nurses		items		
Khim, 2016	To examine association between income and job motivation for primary health workers (PHWs).	Cambodia Health facilities Cross-sectional	Primary health care workers		Financial incentives	Job motivation	-
Alhassan et al., 2016	To evaluate the effect of incentives on health workers’ motivation and experiences with clients.	Primary Health Facilities in Ghana Cluster randomized trial	Clinical and non-clinic primary health workers in private and public health facilities	3	Both financial and nonfinancial incentives	Health workers job motivation	-
Prust et al., 2019	To assess the influence of nonmonetary incentives on odds of working in rural areas among health-care professionals	Zambia Mixed methods approach	Healthcare students	3	Non-monetary incentives such as housing, education, and facility improvements	Odds of working in rural health facilities	-
Aninanya et al., 2016	The goal of this study was to determine the impact of PBIs on maternal health worker motivation in two districts in northern Ghana.	Ghana A quasi-experimental study design Mixed study	All nurses and midwives providing maternal and neonatal care	50	PBIs consisting of financial and non-financial awards were provided to the best-performing health workers at biannual ceremonies.	Job motivation	-
Carmichael et al., 2019	To evaluate the impact of a ‘Team-Based Goals and Incentives’ (TBGI) intervention in Bihar, India	India Cluster randomised controlled trial design and	front-line (community health) worker Mothers	1300 front line workers and 3600 mothers	Team-Based Goals and Incentives’ (TBGI) intervention	frequency of antenatal home visits receipt of iron-folic acid Improved attitudes	-

		difference-in-difference analyses				related to coordination and teamwork; and increased provision of advice to mothers related to IFA, clean cord care, breast feeding, complementary feeding and family planning.	
Taderera et al., 2016	To explore retention strategies implemented in a Zimbabwean peri-urban community between 2009 and 2014 and its implications for peri-urban communities towards the health system reform agenda.	Zimbabwean Cross-sectional	registered general nurses, state-certified nurses, midwives, environmental health technicians, nurse aids and community health volunteers	-	Payment of salaries and provision of support for post-basic training and development top-up allowances and provision non-monetary incentives	Retention strategies	-
Thu et al., 2015	To examine the impact of motivation on maintenance of professional competence among maternal health workers in Vietnam.	Vietnam Mixed method	maternal health workers from commune health centres (CHC) and district hospitals	240 questionnaires and 43 interviews	-	Motivation	-
Chandler et al., 2009	To understand what motivated non-physician clinicians	Tanzania Mixed method	clinicians working in routine patient care	observation of over 2000 clinician-patient consultations, 80 clinical meetings and the day-to-day routine of clinicians as well as informal and formal interviews with 34	Non-financial incentives	Motivation	-

				clinicians 177 surveys for the quantitative aspect			
Ormel et al., 2019	To analyse the effect of incentives on CHWs job motivation.	Bangladesh, Ethiopia, Kenya, Indonesia, Malawi, and Mozambique. Qualitative study	Community health centres workers (CHWs)		Financial, material, nonmaterial, and intrinsic incentives	Job motivation	-
Glenn et al., 2021	To explore the impact of performance based financial incentives on CHWs motivation.	Bangladesh Qualitative study	Community health centres workers (CHWs)	43	Both financial and nonfinancial incentives	Job motivation	-
Deressa et al., 2019	To assess how level of motivation influences nurses work performance in Hawassa public and private hospitals.	Hawassa, Ethiopia Mixed methods	Nurses	241	Both financial and nonfinancial incentives	Worker performance, job motivation, good team spirit, patient satisfaction and job attachments	-
Njuguna et al, 2014	To investigate the impact of incentives among health workers in Ijara district	Kenya. Cross-sectional study	Nurses, Registered clinical officers, pharmaceutical technologists, Laboratory technologists, Nutritionists, Public health officers, Doctors, Health information and records officers, and Community	38	Extraneous allowance in addition to hardship allowances in the range of 4000–12500 Shillings (\$50– 156).	Staff retention	-

			health extension workers.				
Chatio et al., 2017	To examine factors influencing retention and sustainability of CHVs' activities in a rural setting in Northern Ghana.	Northern Ghana Mixed method	Community health care volunteers	32	Both financial and nonfinancial incentives	Retention of community health care workers	-
Schuster et al., 2018	To access the effectiveness of financial incentive in retaining health workers in two districts in northern Inhambane province.	Mozambique Mixed methods approach	Health care workers	83	Financial incentives	Health workers retention	-
Rudasingwa & Uwizeye, 2017	To assess the influence of financial incentives on physicians and nurses' attitudes towards service delivery	The province of Gitega, Burundi Mixed method	Physicians and nurses	36	Financial incentives	Quality and utilization of health services.	-
Munga et al., 2014	To explore how both financial incentives and nonfinancial incentives affect nurses' willingness to work in remote areas of Tanzania and if magnitude of incentives needed to attract health workers varies across geographic location.	Tanzania Cross sectional	Nurses	540	Salary top-ups, housing, and education package	Rural job uptake levels	-
Tripathy et al., 2016	To measure and identify important aspects of health workers' motivation	Haryana, India. A mixed method design	Community Health Workers	62	Financial incentives, interpersonal relations, family support, skill and career development, cheap loans,	Health workers motivation	Existence Relatedness Growth model motivation

					opportunities for career advancement and professional development.		
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Appendix 3: Risk of bias summary for Cohort study using the Newcastle Ottawa Scale

Author /year	Selection				Comparability of cohorts on the basis of the design or analysis	Outcome			Final score
	Representativeness of the exposed cohort	Selection of the non- exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at the start of study		Assessment of outcome	Was follow- up long enough for outcomes to occur	Adequacy of follow- up of cohort	
Aninanya et al., 2016	1	1	1	1	2	1	0	0	7

Based on Newcastle Ottawa Scale (NOS), the maximum score is 9. Selection domain has a maximum score of 4, each subdivision ranges from 0-1.

Comparability domain has a maximum score of 2. Outcome domain has a maximum score of 3, each subdivision ranges from 0-1.

Appendix 4: AHRQ check list for cross-sectional studies

Study \ Questions	Q1. Define the source of information (Survey, record review)	Q2. List inclusion and exclusion criteria for subjects or refer to previous publications	Q3. Indicate whether subjects were consecutive if not population based. Whether subjects are representative of the average in the community?	Q4. Indicate time period used for	Q5. Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants. Are the evaluators professional	Q6. Is the examination method	Q7. Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements)	Q8. Are the assessments and classification of caries index and	Q9. If any, explain any subject exclusions from analysis	Q10. Describe how confounding was assessed and/or controlled.	Q11. Summarize patient response rates and completeness of data collection
Okereke et al., 2021	Yes	No	Yes	No	Yes	Yes	Yes	NA	Unclear	Unclear	No
Ye et al., 2016	Yes	No	Yes	Yes	Unclear	Yes	Yes	NA	Unclear	Unclear	No
Khim, 2016	Yes	No	Yes	Yes	Unclear	Yes	Yes	NA	Unclear	Unclear	Yes
Prust et al., 2019	Yes	No	Yes	Yes	Unclear	Yes	Yes	NA	Unclear	Unclear	No
Taderera et al., 2016	Yes	No	Yes	No	Unclear	Yes	Unclear	NA	Unclear	Unclear	No
Thu et al., 2015	Yes	No	Yes	No	Unclear	Yes	Yes	NA	Unclear	Unclear	Yes
Chandler et al., 2009	Yes	No	Yes	Yes	Unclear	Yes	Yes	NA	Unclear	Unclear	Yes

Deressa & Zeru, 2019	Yes	No	Yes	No	Unclear	Yes	yes	NA	Unclear	Unclear	Yes
Njuguna et al, 2014	Yes	No	Unclear	Yes	Unclear	Yes	Unclear	NA	Unclear	Unclear	No
Ormel et al., 2019	Yes	Yes	Yes	Yes	Unclear	Yes	No	NA	Unclear	Unclear	No
Glenn et al., 2021	Yes	No	Yes	Yes	Yes	Yes	Yes	NA	Unclear	Unclear	No
Chatio et al., 2017	Yes	No	Yes	No	Yes	Yes	Unclear	NA	Unclear	Unclear	No
Schuster et al., 2018	Yes	No	Yes	Yes	Yes	Yes	Yes	NA	Unclear	Unclear	Unclear
Rudasingwa &Uwizeye, 2017	Yes	No	Yes	Yes	Unclear	Yes	Unclear	NA	Unclear	Unclear	No
Munga et al., 2014	Yes	No	Yes	Yes	Unclear	Yes	Unclear	NA	Unclear	Unclear	Unclear
Tripathy et al., 2016	Yes	No	Yes	Yes	Yes	Yes	Yes	NA	Unclear	Unclear	Yes

Appendix 5: Cumby-Huizinga test for autocorrelation (National level single group monthly analysis)

lags	chi2	df	p-value	lag	chi2	df	p-value
1-1	1.544	1	0.2140	1	1.544	1	0.0140
1-2	6.342	2	0.0420	2	5.163	1	0.2231
1-3	8.155	3	0.0429	3	4.026	1	0.0448
1-4	11.826	4	0.0187	4	4.013	1*	0.0452
1-5	11.861	5	0.0367	5	0.676	1*	0.4110
1-6	11.975	6	0.0625	6	3.162	1	0.0754
1-7	11.976	7	0.1014	7	3.524	1	0.0605
1-8	12.000	8	0.1512	8	0.180	1	0.6714
1-9	12.000	9*	0.2133	9	6.170	1	0.0130
1-10	12.000	10*	0.2851	10	0.739	1	0.3901

Appendix 6: Cumby-Huizinga test for autocorrelation (National level single group daily analysis)

lags	chi2	df	p-value	lag	chi2	df	p-value
1-1	1020.519	1	0.0000	1	1020.519	1	0.0000
1-2	1043.249	2	0.0000	2	269.734	1	0.0000
1-3	1046.886	3	0.0000	3	108.740	1	0.0000
1-4	1063.801	4	0.0000	4	83.549	1	0.0000
1-5	1212.553	5	0.0000	5	200.246	1	0.0000
1-6	1535.395	6	0.0000	6	462.417	1	0.0000
1-7	2263.155	7	0.0000	7	827.018	1	0.0000
1-8	2265.282	8	0.0000	8	264.525	1	0.0000
1-9	2268.548	9*	0.0000	9	88.016	1	0.0000
1-10	2277.207	10*	0.0000	10	30.780	1	0.0000

Appendix 7: Rapid review

Introduction

The purpose of this rapid review is to identify studies utilizing the Delphi technique in the health sciences. Its aim is to synthesize the common reporting procedures of the Delphi studies to make an informed decision on the methodology of the current study. The rapid review is limited to only publications with Brunel University London affiliation for ease of use. This rapid review therefore provides information on the characteristics of the included studies and their common reporting procedures highlighting commonalities, differences and areas for improvement that the Delphi study on the drivers and barriers of incentive adoption can benefit from.

Methods

Search Strategy

Scopus and Web of Science databases were searched between 25th October and 10th November 2023 for relevant Delphi studies published by authors with Brunel University affiliation. The review used 'Delphi' as the key search term. The search sequence used for Scopus database was: (TITLE-ABS-KEY (delphi) AND ALL (brunel AND university)) AND PUBYEAR > 2016 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "english")) AND (LIMIT-TO (OA , "all")) AND (LIMIT-TO (AF-ID , "brunel university london" 60020623)).

Eligibility Criteria

A predetermined eligibility criterion was used to determine whether a Delphi study can be included in this rapid review. To identify and select current articles related to this study, the search was limited to papers that were published between the year 2017 and 2023. The table below shows the eligibility criteria that were used in this study.

Table 1: Eligibility Criteria

Inclusion criteria	Exclusion criteria
Studies using Delphi technique	Studies not using the Delphi technique

Full text Delphi studies published by an author or co-author with Brunel University London affiliation.	Delphi studies in any other language apart from English. Unavailable/inaccessible full text articles. Articles not published with a Brunel University London affiliation
Delphi studies published between 2017 to 2023	Delphi studies published before 2017
Original Delphi studies	Systematic reviews, conference papers, letters to the editor, book chapters
Delphi studies in the health sciences	Delphi studies outside the health sciences

Data extraction

The data was extracted based on the recommendation of Spranger et al. (2022) reporting guidelines for Delphi studies. 15 main themes were identified and extracted from the included studies. These are; the identification of the study as a Delphi process in the title and abstract sections, epistemological background, formal context, the evidence base, knowledge and knowledge integration, identification of Delphi variant, expert sample, survey instrument, Delphi rounds, feedback, result, quality of data and interpretation, discussion and limitation of the findings and information o dissemination of the findings.

Result

Overall, twenty-two (22) articles were identified and retrieved from Scopus and Web of Science databases. Ten (10) and twelve (12) articles were retrieved from Scopus and Web of Science databases respectively. Nine (9) duplicated articles were identified and removed. The remaining thirteen (13) articles titles and abstracts were screened to ensure that there were related to the health sciences. This led to the removal of two (2) articles because they were related to physics and chemistry. Eleven (11) full text articles were retrieved for eligibility checks. Two of the articles were assessed to be ineligible because they did not describe the Delphi process itself but were rather related to previous Delphi articles published by the authors. Consequently, only nine (9) articles met the eligibility criteria for the rapid review. Table 4 provides the details of the excluded

articles. The Prisma diagram below based on the Prisma 2020 guidelines has been used to demonstrate the selection process (Page et al., 2021). Figure 1 provides the search and selection diagram.

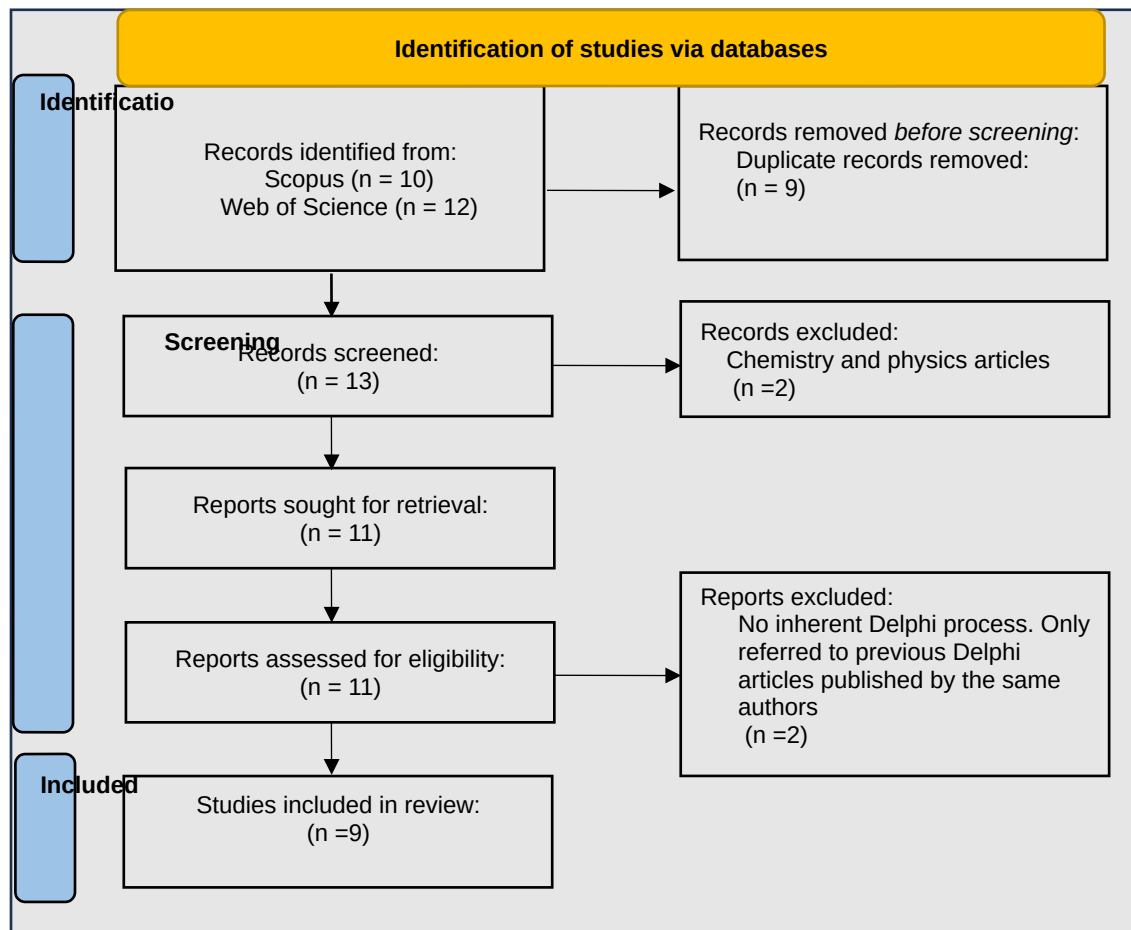


Figure 1: PRISMA selection process

Study characteristics

Characteristics of the study sample are provided in Table 2. Five of the selected studies were published in 2020. Two of the studies were published in 2023 while a study each was published in 2018 and 2022 respectively. Seven of the studies were completed in three rounds while a study each was completed in two and four rounds respectively. The articles selected were evenly balanced among the number of participants in the final round of the studies.

Table 2: Study Characteristics

Parameters	Number
Year published	
2018	1
2020	5
2022	1
2023	2
Number of rounds	
2	1
3	7
4	1
Number of participants in final round	
≤ 10	2
16 - 24	2
25 - 46	2
>50	3

Data fields extracted

The data was extracted based on the recommendation of Spranger et al. (2022). Although most of the selected articles were published before 2022, it is still helpful to know whether those articles considered other aspects of the reporting of their Delphi studies other than the selection of experts, the definition of consensus, number of rounds and response rates. Table 3 below shows the extracted data.

Table 3: Extracted data

Authors	Title and Abstract	Epistemology	Formal context	Knowledge base	Knowledge integration	Delphi variant	Sample	Survey instrument	Number of rounds	Feedback	Evaluation	Result	Quality of data and interpretation	Discussion and limitation	Dissemination
Barwood et al. 2020	Yes	Not stated	Yes	Yes	Yes	Modified	Yes	No particular tool mentioned	3	Yes	Yes	Yes	Yes	Yes	Yes
Blanco-Mavillard et al. 2023	Yes	Not stated	Yes	Yes	Yes	e-Delphi	Yes	survey monkey	3	Yes	Yes	yes	Yes	Yes	No
Coyne et al. 2023	Yes*	Not stated	Yes	Yes	Yes	Modified	Yes	Microsoft forms	2	Yes	Yes	Yes	Yes	Yes	Yes
de Vries et al. 2021	Yes	Not stated	Yes	Yes	Yes	e-Delphi	Yes	Qualtrics	3	Yes	Yes	Yes	Yes	Yes	Yes
du Toit et al. 2020	Yes*	Not stated	Yes	Yes	Yes	Modified	Yes	Qualtrics	3	Yes	Unclear	Yes	Yes	Yes	Unclear

Lissauer et al., 2020	Yes	Not stated	Yes	Yes	Yes	Modified	Yes	No particular tool mentioned	3	Yes	Unclear	Yes	Yes	Yes	Yes
Norris et al., 2022	Yes	Not stated	Yes	Yes	Yes	e-Delphi	Yes	Qualtrics	3	Yes	Unclear	Yes	Yes	Yes	Yes
Stennett et al., 2018	Yes	Not stated	Yes	Yes	Yes	Classic Delphi	Yes	No particular tool mentioned	4	Yes	Yes	Yes	Yes	Yes	No
Wilson et al., 2020	Yes	Not stated	Yes	Yes	Yes	Modified	Yes	Survey monkey	3	Yes	Yes	Yes	Yes	Yes	Yes

Yes* = Use of Delphi not mentioned in the title but is mentioned in the abstract

Synthesis of extracted data

Discussion of the context of the study, knowledge base, knowledge integration, Delphi variant, selection of experts (sample), number of rounds, feedback, presentation of result, quality of data and interpretation and discussion and limitation of the study have been mentioned in all the nine published papers examined. While Spranger et al. (2022) recommended that a study be identified as a Delphi process in both the title and abstract, two of the studies only identified as a Delphi process only in the abstract but not in the title (e.g., Coyne et al., 2023; du Toit et al., 2020). Again, Spranger et al. (2022) suggested that authors mention their survey instrument, scope and structure. Although all the studies mentioned the structure and scope of their instruments, three studies failed to name the specific instrument used. (eg., Barwood et al., 2020; Lissauer et al., 2020; Stennett et al., 2018). In terms of the evaluation criteria (definition and criterion of consensus), all except three articles (du Toit et al., 2020; Lissauer et al., 2020; Norris et al., 2022) had a consensus criteria set a priori. On the dissemination of the results, six selected studies clearly stated how their results would be used. Two of them did not indicate anything (Blanco-Mavillard et al., 2023; Stennett et al., 2018) while one study (du Toit et al., 2020) did not provide a clear indication. Finally, reflections on the epistemological foundations of the Delphi technique were not mentioned in any of the studies.

Limitation of the study

There are at least two potential limitations concerning this study. Firstly, the screening and inclusion of articles was based on the decision of a single researcher. Lastly, this rapid review of a Delphi reporting procedure cannot be assumed in terms of representativeness. Only published articles of researchers affiliated to Brunel University London were considered.

Conclusion

In line with the recommendation of Spranger et al. (2022), this rapid review extracted data that sought to understand the common reporting procedures of Delphi studies. All the included studies provided the appropriateness for selecting experts. Again, controlled feedback was an important core element in the included studies. All the studies provided feedback to participants

in each round of the studies. Clear reporting was also made of the items deleted and or added to each round for those studies that had them. Most of the studies had a consensus criteria set a priori. The number of experts varied greatly across the selected studies. All the included studies mentioned the variant of the Delphi technique used. The epistemological foundations of the Delphi technique were not mentioned in any of the studies.

Table 4: Excluded studies with reasons

Author and year	Title	Reason for exclusion
Green et al. (2023)	A Horizon Scan to Support Chemical Pollution-Related Policymaking for Sustainable and Climate-Resilient Economies	Not related to health sciences
Sirunyan et al. (2020)	Running of the top quark mass from proton-proton collisions at s=13 TeV	Not related to health sciences
Stennett et al. (2020)	A qualitative exploration of physiotherapists' perceptions about exercise and physical activity: reflections on the results from a Delphi Study.	Not an inherent Delphi study. It only referred to a previous Delphi article (Stennett et al., 2018) published by the same authors.
Stennett et al. (2021)	Flipping the ICF: Exploring the Interplay of Theory and the Lived Experience to Reconsider Physical Activity in Community-Dwelling People With Multiple Sclerosis	Not an inherent Delphi study. It only referred to a previous Delphi article (Stennett et al., 2018) published by the same authors.

Appendix 8: Delphi Round 1 Doctor (Consumer) Questionnaire

INCENTIVE PACKAGE FOR DOCTORS IN GHANA

BARRIERS AND FACILITATORS TO WORKING IN RURAL/URBAN SETTINGS

Dear Sir/Madam,

Thank you for agreeing to participate in this study. Your contribution is vital to understanding the factors that influence doctors' decisions to accept and remain in rural or urban postings in Ghana.

The purpose of this study is to explore the key drivers (facilitators) and barriers that shape doctors' willingness to work in different settings, with a particular focus on rural and underserved areas. By gathering expert insights, the study aims to identify which factors are

most important in influencing workforce motivation and retention, and to highlight areas where policy and practice can be strengthened.

All information you provide will remain confidential and will be used solely for academic research purposes. Your responses will be anonymised and reported only in aggregate form, as outlined in the participant information sheet and consent form. Participation is entirely voluntary, and you may withdraw at any time without consequence.

The following survey is stage 1 of a Delphi questionnaire. This is designed to obtain your opinion relating to a key issue. The Delphi process involves soliciting your response on three separate occasions: **Round 1:** Some open-ended questions will be submitted to you inviting your response. These are below for you to respond to. Please note that it is up to you to decide to answer all, none or some of the questions.

At a later date: - **Round 2:** Your answers (and those from the other participants) from round 1 will be summarized and formulated into a series of more specific questions that you will be invited to respond to. - **Round 3:** Round 2's questions will be submitted to you again but this time you will also be able to rank these in descending order from most important to least important.

SECTION A: SOCIO-DEMOGRAPHIC DETAILS

Kindly respond by ticking the box beside your choice.

1. Age

20 – 29 [☐] 30 – 39 [☐] 40 – 49 [☐] 50 – 59 [☐] 60+ [☐]

2. Gender

Male [☐] Female [☐]

3. Area of medical specialty practiced

.....

4. What is the setting of the facility?

Rural [☐] Urban [☐]

SECTION B: FACILITATORS AND BARRIERS.

5. If you ticked rural in Q4, what factors would encourage doctors to accept and remain in rural postings?

.....

6. Are there any barriers that would discourage you or other doctors from accepting or staying in rural postings?

.....

7. If you ticked urban in Q4, what factors would motivate doctors to move to or remain in urban postings?

.....

8. If you ticked urban in Q4, what barriers exist for doctors working in urban areas (if any)?

.....

Appendix 9: Delphi Round 1 Regional Directors (Implementers) Questionnaire

INCENTIVE PACKAGE FOR DOCTORS IN GHANA

BARRIERS AND FACILITATORS TO WORKING IN RURAL/URBAN SETTINGS

Dear Sir/Madam,

Thank you for agreeing to participate in this study. Your contribution is vital to understanding the factors that influence doctors' decisions to accept and remain in rural or urban postings in Ghana.

The purpose of this study is to explore the key drivers (facilitators) and barriers that shape doctors' willingness to work in different settings, with a particular focus on rural and underserved areas. By gathering expert insights, the study aims to identify which factors are most important in influencing workforce motivation and retention, and to highlight areas where policy and practice can be strengthened.

All information you provide will remain confidential and will be used solely for academic research purposes. Your responses will be anonymised and reported only in aggregate form, as outlined in the participant information sheet and consent form. Participation is entirely voluntary, and you may withdraw at any time without consequence.

The following survey is stage 1 of a Delphi questionnaire. This is designed to obtain your opinion relating to a key issue. The Delphi process involves soliciting your response on three separate occasions: **Round 1:** Some open-ended questions will be submitted to you inviting

your response. These are below for you to respond to. Please note that it is up to you to decide to answer all or some of the questions.

At a later date: - **Round 2:** Your answers (and those from the other participants) from round 1 will be summarized and formulated into a series of more specific questions that you will be invited to respond to. - **Round 3:** Round 2's questions will be submitted to you again but this time you will also be able to rank these in descending order from most important to least important.

SECTION A: SOCIO-DEMOGRAPHIC DETAILS

Kindly respond by ticking the box beside your choice.

1. Age

20 – 29 [] 30 – 39 [] 40 – 49 [] 50 – 59 [] 60+ []

2. Gender

Male [] Female []

3. What is the predominant setting of your region?

Rural [] Urban []

SECTION B: FACILITATORS AND BARRIERS.

4. What makes doctors in your region prefer postings in urban areas?

.....

5. What factors encourage doctors to accept and remain in rural postings in your region?

.....

6. What are the main barriers that discourage doctors from accepting or staying in rural postings.

.....

Appendix 10: Delphi Round 2 Doctor (Consumer) Questionnaire

BARRIERS AND FACILITATORS TO WORKING IN RURAL/URBAN SETTINGS

SECTION A BACKGROUND DATA								
Gender	a. Male b. Female							
Age	a. 20- 29 years b. 30 – 39 years c. 40 – 49 years d. 50 – 59 years e. 60+ years							
What is your area of medical specialty practiced?								
What is the setting of your facility?	a. Rural b. Urban							
SECTION B DRIVERS OF WORKING IN RURAL AREAS								
In your opinion, do you agree that the following items are factors encouraging Doctors to work in rural areas?								
Kindly use the following scale: 1= fully disagree; 2 = mostly disagree; 3 = somewhat disagree; 4 = neutral; 5 = somewhat agree; 6 = mostly agree and 7 = fully agree								
	Item	1	2	3	4	5	6	7
1.	Higher salaries or bonuses for rural postings							
2.	Student loan repayment assistance programs							
3.	Relocation allowances or housing subsidies							
4.	Tax breaks for rural practice							
5.	Allowances to purchase vehicle							
6.	Access to continuing medical education opportunities							
7.	Mentorship and support from experienced rural physicians							
8.	Opportunities to specialize or subspecialize in rural medicine							
9.	Participation in rural research or clinical trials							
10.	Recognition and awards for rural practice							

	excellence							
11.	Flexible work schedules, shorter commute times and reduced call frequency							
12.	Supportive and collegial work environment							
13.	Opportunities for community engagement and leadership							
14.	Access to outdoor activities, recreational facilities, and cultural attractions							
15.	A sense of purpose and fulfilment derived from serving underserved communities							
16.	Strong sense of community and belonging among rural residents							
17.	Safe and family-friendly living environment							
18.	Affordable housing and cost of living							
	Do you think any items are currently missing from this set? If so, please comment.							

SECTION C BARRIERS OF WORKING IN RURAL AREAS

In your opinion, do you agree that the following items are barriers that hinder working in rural areas?

Kindly use the following scale: **1= fully disagree; 2 = mostly disagree; 3 = somewhat disagree; 4 = neutral; 5 = somewhat agree; 6 = mostly agree and 7 = fully agree**

	Item	1	2	3	4	5	6	7
1.	Poor road networks							
2.	Poor drinking water							
3.	Unavailable electricity							
4.	Substandard educational facilities for wards							
5.	Little opportunity to do extra work at private health facilities for extra income							
6.	Inadequate professional support and guidance as a result of few specialists in rural areas							
7.	Few opportunities to specialise since most rural facilities offer primary care compared to the big hospitals in the cities with specialist departments that offer training							
8.	No assurance of release from rural duty post in the future							
	Do you think any items are currently missing from this set? If so, please comment.							

SECTION D DRIVERS OF WORKING IN URBAN AREAS

In your opinion, do you agree that the following items are drivers encouraging Doctors to work in urban areas?

Kindly use the following scale: **1= fully disagree; 2 = mostly disagree; 3 = somewhat disagree; 4 = neutral; 5 = somewhat agree; 6 = mostly agree and 7 = fully agree**

	Item	1	2	3	4	5	6	7
1.	Higher salaries through 'locum'							
2.	Opportunity to attend more conferences and workshops							
3.	Mentorship and support from experienced urban physicians							
4.	Access to a variety of cultural and entertainment options							
5.	Opportunities for socialization and networking							
6.	Access to quality childcare and educational opportunities							
7.	Availability of safe drinking water							
8.	Better transport network							
9.	Well-resourced health facilities							
	Do you think any items are currently missing from this set? If so, please comment.							

Appendix 11: Delphi Round 2 Regional Director (Implementer) Questionnaire

BARRIERS AND FACILITATORS TO WORKING IN RURAL/URBAN SETTINGS

SECTION A BACKGROUND DATA								
Gender	a. Male b. Female							
Age	a. 20- 29 years b. 30 – 39 years c. 40 – 49 years d. 50 – 59 years e. 60+ years							
What is the predominant setting of your region?	a. Rural b. Urban							
SECTION B DRIVERS OF WORKING IN RURAL AREAS								
In your opinion, do you agree that the following items are factors encouraging Doctors to work in rural areas? Kindly use the following scale: 1= fully disagree; 2 = mostly disagree; 3 = somewhat disagree; 4 = neutral; 5 = somewhat agree; 6 = mostly agree and 7 = fully agree								
	Item	1	2	3	4	5	6	7
1.	Opportunity to complete ‘housemanship’ faster							
2.	Flexible work schedules, shorter commute times and reduced call frequency							
3.	Supportive and collegial work environment							
4.	Opportunities for community engagement and leadership							
5.	Low cost of living							
6.	Chance to give back to the rural communities							
7.	Enjoy serenity and nature							
	Do you think any items are currently missing from this set? If so, please comment.							
SECTION C DRIVERS OF WORKING IN URBAN AREAS								
In your opinion, do you agree that the following items are drivers encouraging Doctors to work in urban areas?								

Kindly use the following scale: 1= fully disagree; 2 = mostly disagree; 3 = somewhat disagree; 4 = neutral; 5 = somewhat agree; 6 = mostly agree and 7 = fully agree								
	Item	1	2	3	4	5	6	7
1.	Opportunity to do extra work for more income							
2.	Motivation to learn more from more experienced doctors							
3.	Ability to specialise in diverse fields due to complexity of services rendered in urban facilities							
4.	Proximity to family and friends support groups							
5.	No late-night calls except those that are already scheduled							
6.	Availability of safe drinking water							
7.	Better transport network							
8.	Well-resourced health facilities							
9.	Quality educational facilities for wards							
	Do you think any items are currently missing from this set? If so, please comment.							

Appendix 12: Ethical clearance

In case of the reply, the number and the date of this letter should be quoted.

My Ref. No. GHS/DGS/G.2

Your Ref. No.



Ghana Health Service
Private Mail Bag
Ministries
Accra, Ghana.

GPS Address: GA-143-4609
Tel: 0302662014
Fax: 0302666808
Email: dg@ghs.gov.gh

17th August 2023

Dr. Bernard Okoe Boye
C/O Brunel University
2031153@brunel.ac.uk

Dear Dr. Okoe Boye,

Re: Letter of Recruitment

Further to our previous correspondence and discussions, we have carefully considered your request to provide the draft copy of the recruitment email that will be sent to potential respondents.

The Ghana Health Service will send your email address (2031153@brunel.ac.uk) to all doctors and regional directors and invite those who are interested in participating in the study to voluntarily reach out to you to indicate their interest in the study.

The draft of the recruitment email is provided for your reference as below:

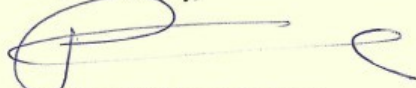
Dear Doctors and Regional Directors,

A doctoral researcher affiliated with Brunel University London is conducting a study on ***"Incentive Package for Healthcare Workforce in Ghana"***. The purpose of the study is to seek your views on the barriers and facilitators that influence the implementation and uptake of government's incentive program for doctors.

If you have any interest in the study, please contact the researcher via email at 2031153@brunel.ac.uk

Thank you.

Yours faithfully,



Dr. Patrick Kuma-Aboagye
Director-General
Ghana Health Service

21 September 2023

LETTER OF APPROVAL

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 25/09/2023 AND 08/12/2023

Applicant (s): Dr Bernard Boye

Project Title: Incentive Package for Healthcare Workforce in Ghana

Reference: 42304-LR-Sep/2023- 47156-5

Dear Dr Bernard Boye

The Research Ethics Committee has considered the above application recently submitted by you.

The Chair, acting under delegated authority has agreed that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that the conditions of approval set out below are followed:

- **The agreed protocol must be followed. Any changes to the protocol will require prior approval from the Committee by way of an application for an amendment.**
- **Please ensure that you monitor and adhere to all up-to-date local and national Government health advice for the duration of your project.**

Please note that:

- Research Participant Information Sheets and (where relevant) flyers, posters, and consent forms should include a clear statement that research ethics approval has been obtained from the relevant Research Ethics Committee.
- The Research Participant Information Sheets should include a clear statement that queries should be directed, in the first instance, to the Supervisor (where relevant), or the researcher. Complaints, on the other hand, should be directed, in the first instance, to the Chair of the relevant Research Ethics Committee.
- Approval to proceed with the study is granted subject to any conditions that may appear above.
- The Research Ethics Committee reserves the right to sample and review documentation, including raw data, relevant to the study.
- If your project has been approved to run for a duration longer than 12 months, you will be required to submit an annual progress report to the Research Ethics Committee. You will be contacted about submission of this report before it becomes due.
- You may not undertake any research activity if you are not a registered student of Brunel University or if you cease to become registered, including abeyance or temporary withdrawal. As a deregistered student you would not be insured to undertake research activity. Research activity includes the recruitment of participants, undertaking consent procedures and collection of data. Breach of this requirement constitutes research misconduct and is a disciplinary offence.



Professor Louise Mansfield

Chair of the College of Health, Medicine and Life Sciences Research Ethics Committee (DHS)

Brunel University London