



**Public Versus Private Hospitals:  
Sources and Constraints of Financing  
Public Healthcare Units:  
A Case Study of Hospitals  
in the Delta State of Nigeria**

VERSÃO FINAL APÓS DEFESA

**Abraham Christopher Okwuarinma**

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Orientador: Prof. Doutor. João Dionisio Monteiro

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## Declaração de Integridade

Eu, Abraham Christopher Okwuarinma, abaixo assinado, como estudante com o número de matrícula M12460 do 2º ciclo de gestão nas unidades de saúde da Faculdade de Ciências Sociais e Humanas, declaro que desenvolvi este trabalho e preparei este texto em total conformidade com o Código de Integridade da Universidade da Beira Interior.

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A handwritten signature in black ink, appearing to be 'Abraham Christopher Okwuarinma', written in a cursive style.

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## **Dedication**

To my supervisor, Professor João Dionisio Monteiro, for all his contribution, support, criticism, and encouragement in the preparation of this work. Due to complete availability, a spirit of cooperation and knowledge sharing made this journey a success.

To the secretary of our department, Dra Carla Loureiro, for all her prompt response to my emails.

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To someone special, to whom I partly owe this master's degree. Without his strength, I would have given up.

Time will fail me if I should start expressing how grateful I am and finding the right words to express my feelings has become impossible, but in a nutshell, I am grateful to ALL

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## **Abstract**

The study highlighted the substantial impact of financial constraints on both public and private healthcare facilities in Delta State, Nigeria. It emphasized the need for improved funding mechanisms and policy reforms to address these challenges and enhance healthcare delivery. The findings underscore the preference of low and middle-income patients for public hospitals, driven by factors such as effectiveness, satisfaction, and access to health insurance, despite the pervasive financial constraints faced by both public and private health sectors. The study's policy recommendations aim to mitigate these financial barriers and support the sustainable growth of health outcomes in Nigeria, aligning with the broader goal of achieving universal health coverage.

## **Keywords**

Delta State- Nigeria, healthcare facilities, financial constraints, funding mechanisms, public healthcare, private healthcare, policy reforms, healthcare delivery, low-income patients, middle-income patients, public hospitals, patient preference, effectiveness.

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## Resumo

Este estudo investiga as fontes e as restrições de financiamento das unidades de saúde públicas e privadas na Nigéria. O estudo baseou-se num desenho de investigação descritivo para examinar a relação entre as restrições financeiras nos hospitais públicos e privados, a preferência e o resultado dos serviços de saúde das pacientes pré-natais e pós-natais no Estado do Delta, Nigéria, durante o período de 23 de janeiro a 15 de fevereiro de 2024. Os dados foram coletados através de um questionário estruturado e auto-elaborado. Os dados coletados foram analisados usando os métodos de análise de variância de dois fatores, de análise de componentes principais e análise de regressão linear múltipla. O principal resultado deste estudo mostra que a natureza e o tipo de hospital determinam a fonte de financiamento proveniente do governo, de agências doadoras e de organizações internacionais, enquanto as mães que recorrem aos serviços de saúde de acompanhamento da gravidez e a serviços de saúde pós-nascimento em hospitais públicos e privados, sejam eles primários, com fins lucrativos, secundários ou terciários no Estado do Delta, Nigéria, ainda pagam significativamente pelos seus serviços de saúde do próprio bolso. Outro resultado revela que a eficácia e a satisfação com os serviços recebidos pelas mães no período de gravidez e pós-nascimento, bem como o acesso destas ao seguro de saúde e a proximidade aos hospitais, impactam significativamente a sua preferência pelos hospitais públicos em detrimento dos hospitais privados com fins lucrativos. O estudo conclui que, apesar dos desafios, as pacientes de baixo e médio rendimento têm preferência pelos hospitais públicos em relação aos hospitais privados, que consideram um setor de serviços elitista. O estudo tem uma importante implicação de políticas públicas ao proporcionar uma melhor compreensão de como superar as restrições financeiras melhorará os resultados de saúde na Nigéria e ajudará o país a alcançar suas aspirações de cobertura universal de saúde.

## Palavras-chave

Financiamento de saúde, Hospitais públicos, Hospitais privados, Restrições financeiras, Fontes de financiamento, Resultados de saúde, Pacientes pré-natais, Pacientes pós-natais, Pagamentos do próprio bolso, Acesso ao seguro de saúde, Satisfação dos pacientes, Proximidade do hospital, Pacientes de baixo rendimento.

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## List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
BHSS	Basic Health Services Scheme
DSCHC	Delta State Contributory Health Commission
FMC	Federal Medical Centre
FMH	Federal Ministry of Health
FMHN	Federal Ministry of Health of Nigeria
GBD	Global Burden of Diseases
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
MDG	Millennium Development Goals
NHIS	National Health Insurance Scheme
NSHDP	National Strategic Health Development Plan
UHC	Universal Health Coverage
UN	United Nations
SAP	Structural Adjustment Program
SDG	Sustainable Development Goals
SPSS	Statistical Package of Social Science
WBG	World Bank Group
WHO	World Health Organization

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# Chapter 1

## Introduction

As an integral part of the health care system, health units carry a lot of financial risks. It is important to understand the financial risks of different health units in Nigeria. In Nigeria, as in most parts of the world, financing of health units is done under the Universal Health Coverage (UHC) model (Abimbola, 2015). While the UHC as a global agenda covers policy grounds, allowing many international agencies such as the World Bank Group and the United Nations institutions as well as private donor agencies to access and finance health systems and hospitals in various countries, on a national level, and from a more managerial perspective, financing of health unit could be viewed from a private versus public perspective (Makinde et al., 2018).

Health units are conveniently classified either based on management or services rendered. Under the management-based classification, the health units are divided into government and private hospitals (Okpani & Abimbola, 2015). Although the private healthcare sector in Nigeria plays a major role in healthcare services provision, the public healthcare units owned and managed by the government have approximately 70% of the total number of 34,000 recorded healthcare facilities in the country at various levels (World Health Organization, [WHO], 2022). The classification based on the type and nature of service rendered defines the health units in terms of primary, secondary, and tertiary hospitals. While private health facilities participate in the primary and secondary tiers, the tertiary health sector is further decentralized alongside the three tiers of government with specified varying duties in order of capital involvement with the federal government playing a major role in its funding than the state, and local governments (Makinde et al., 2018). While each state of the federation has at least one tertiary health unit owned and managed by the federal government, which is often located in the cities, the secondary health units are owned by individual state governments to complement the health service provided by the central government. Furthermore, local governments are obliged to provide basic primary healthcare services through primary health centers which are meant to serve their purposes in rural communities (Okpani & Abimbola, 2015).

While the financing of public hospitals follows a more national agenda where investment in health is carried out as a form of public goods, financing private hospitals follows a more market-orientated approach (Makinde et al., 2018). The same can also be said of their sources of finance. While the sources of finance for private health units in Nigeria, as in most developing nations are

known to come from different private investment sources such as equity, loans, and grants, the sources of public health unit financing mainly come from national budgetary allocation, funding by local and international donor agencies, private funding, and the National Health Insurance Scheme (NHIS) (Asuzu, 2005).

There is evidence in favor of a positive association between healthcare financing and the performance of a country's health system, (Tayo-Ladega et al., 2021; Onwujekwe et al., 2019; Onisanwa et al., 2018; Asogwa & Odoziobodo, 2016). The poor state of the health system in Nigeria (WHO, 2018) therefore begs the question of whether health unit financing models in Nigeria truly reflect the efficiency and sustainability of the country's health system. After two decades since WHO ranked Nigeria as having the fourth worst health system in the world, the country still records some of the most abysmal health indicators in the African continent. For example, while infant mortality in 2022 in African countries including Cameroun, Nigeria, and Ghana are 57, 43, 57 deaths per 1000 births, that of Nigeria is approximately 69 deaths per 1000 births. Similarly, while the recorded life expectancy at birth in Senegal, Ghana, and Kenya, is 68.5, 66.8, and 66.0 in the same year, life expectancy in Nigeria is 62.7 (WHO, 2022). Even though these abysmal health indices are a result of many attendant consequences, factors associated with poor financing are believed to be some of the proximate factors constraining the growth and sustainability of the Nigerian health system (Tayo-Ladega et al., 2021).

The private health sector in Nigeria, as in other developing countries is constrained by many financial challenges. Many private healthcare units in Nigeria find it difficult to raise investment funds as investors generally consider the domestic private healthcare business as highly risky. This in addition to poor public health outcomes and preferences of the middle and upper classes of the country for medical tourism has hindered the free flow of long-term financial resources for many private healthcare units in the country. Moreover, the belief that profit-oriented private hospitals are capable of generating their own funds also hinders international and local donor organizations from investing financial resources in private hospitals in Nigeria (Oyefabi et al, 2014).

Similarly, financing public hospitals in Nigeria is constrained by many financial-related factors. The budgetary allocation to the health sector in Nigeria compared to many countries around the world is very low and has been dwindling in recent years. Since 2017, the Nigerian government has allocated only about 4% of its yearly budgetary allocation to the health sector. Even though

the country is a major beneficiary of health-related developmental assistance in the sub-Saharan Africa region, public health unit funding in Nigeria is further constrained by counterpart funding, poor tracking of financial resources, high cost of technical assistance, and high out-of-pocket expenditure among others. The declining investment of financial resources in private and public health units in Nigeria is believed to not only increase the cost of healthcare delivery but also hinder the achievement of Sustainable Development Goals (SDGs) health-related targets in the country (Asogwa & Odoziobodo, 2016).

In the context of the foregoing discussion, it becomes important therefore to investigate the importance of sources and constraints of healthcare financing in Nigeria and how they impact on health outcomes of different health units in the country. This could help trace which sources of funding are more appropriate as well as understand better the constraining variables punctuating the growth of the Nigerian healthcare system.

Existing research in the field has highlighted emerging sources of financing (Tayo-Ladega et al., 2021) and important financial-related constraints facing healthcare service delivery (Makinde et al., 2018). However, there is a scarcity of empirical evidence on important sources of finances and financial constraints at the health unit level especially in the context of Nigeria. Recent pieces of evidence such as Onwujekwe et al. (2019), Bein et. al. (2017), Asbu et al. (2017), Uzochukwu et al. (2015), Idowu et al. (2018) and Anton and Onofrei (2012), have focused attention in investigating financial constraints at the health systems levels. This approach tends to be too broad, fails to elicit evidence at the health unit level, and often results in generalization that may not reflect the true picture of what is obtained at the more specific health unit level. Even though efforts were made by Umoru and Omolara (2013) to investigate financial-related challenges in hospitals, the scope of their study was restricted to investigating financial challenges in health facility management. The recognition that a holistic understanding of financial constraints facing health units goes beyond investigating the facilities of a health unit informs the need for an investigation that will look at not just the proximate causes of financial constraints but also the managerial and economic causes of financial challenges facing health units in Nigeria.

This research therefore is a comparative study with a main object of investigating the sources and constraints of financing public healthcare units as compared to private healthcare units in Nigeria. Specifically, this study seeks to:

- i) identify the sources of financing public and private hospitals and their effect on health outcomes in Delta State of Nigeria,
- ii) investigate constraints in financing public and private hospitals and their effect on health outcomes in Delta State of Nigeria,
- iii) investigate the determinants of patients' preferences between public and private healthcare units in Delta State of Nigeria.

The research questions that will guide this study are:

- i. What are the sources of financing public and private hospitals and what is their effect on health outcomes in Delta State of Nigeria?
- ii. What are the constraints in financing public and private hospitals and what is their effect on health outcomes in Delta State of Nigeria?
- iii. What are the determinants of patients' preferences between public and private healthcare units in Delta State of Nigeria?

An important justification for this study is that while public healthcare units in Nigeria follow the three-tier categorization including tertiary, secondary, and primary healthcare systems, studies tend to focus on investigating the tertiary and secondary hospitals while little attention is given to financial challenges in primary healthcare units. In this direction, there is no known study that empirically investigated the financial constraints of the three categories of public health care centers as individual health units. This is another important gap that this proposed study seeks to cover.

Central to this research is providing a better understanding of the sources of finance and financial constraints of the Nigeria health sector at the health unit levels. The proposed study therefore shall contribute to addressing the existing knowledge gap by allowing for a far more detailed empirical analysis that shall take into consideration specific elements in investigating the financial-related constraints facing both private and public hospitals in Nigeria and in various categories. This will pave the way for developing a more evidence-based framework for measuring the performance of the health system in Nigeria.

## Chapter 2

### Literature Review

#### 2.1 Brief Review of the Nigerian Public and Private Health Unit Financing

Ever since Nigerian independence in 1960, the Nigerian healthcare system has remained a public sector-led institution. Hence, financing of the health units in Nigeria has evolved through numerous reforms in the health sector. The earliest of these reforms can be seen in the four national development plans between 1962 and 1985, all of which gave great impetus to the improvement of the Nigerian healthcare system (Ogaji & Brisibe, 2015). This period witnessed massive financial investment in infrastructures in public hospitals. One such investment was the inauguration of the Basic Health Services Scheme (BHSS) which was aimed at increasing health coverage, developing auxiliary health manpower, and return of emphasis on preventive healthcare delivery (Federal Ministry of Health [FMH] 2010).

Following Nigeria's transition back to a democratic form of government in the year 1999, the country's healthcare sector evolved through different healthcare reforms, the most important of which is the National Health Insurance Scheme (NHIS) projected to address the finance-related challenges facing the Nigerian healthcare system (Okpani & Abimbola, 2015). These reforms were driven by important public healthcare delivery goals with the sole objective of ensuring easy access to quality healthcare, provision of funds for risk prevention, reducing the costs incurred in health services, and ensuring an efficient healthcare delivery system (Uneke, et al., 2013).

Evidence has shown that public hospitals in Nigeria as compared to private hospitals are the most cost-effective, reliable, and sustainable means by which Nigeria and its citizens can improve their health outcomes (Ogaji & Brisibe, 2015; WHO, 2008). However, poor management of public hospitals has led to a decline in patronage. This has made many lose faith in the Nigerian public healthcare system. The public health units have lost relevance to the healthcare units run by private individuals. Although a significant portion of health facilities in Nigeria is under the control of the public sector, a substantial amount of healthcare services is still delivered by the private sector. This disparity illustrates a significant problem with the effectiveness of Nigeria's healthcare system (WHO, 2018).

Despite the comparatively huge financial resources invested in public hospitals in Nigeria, recent evidence has found Nigeria's health performance indicators to be inadequate. The average life expectancy at birth has slightly risen, however, the mortality rate for infants and children under five years old remains high, at 70 and 104 deaths per 1000 live births, respectively. Additionally, the pregnancy-related ratio is still on the high side at 814 per 100,000 inhabitants. Communicable diseases, such as malaria (27%), HIV/AIDS (3.2%), and malnutrition (47%), are major public health issues in Nigeria. The prevalence of tuberculosis is 323 cases per 100,000 people. Death from non-infectious diseases now accounts for a more increasing share of cases (25% to 30%) as against falling infectious diseases (58% to 51%) which used to be more prevalent between 2010 and 2019. The 21% of deaths among children below the age of 5 stem from enteric infections, which is higher than the average of 15% for sub-Saharan Africa (Global Burden of Diseases [GBD], 2021; WHO, 2018).

These attendant consequences of the healthcare crisis in Nigeria and their limiting effects on personal and national health development have received renewed attention. Generally, people have a better understanding of the factors that negatively impact health outcomes, especially the connection between the constraints of public health financing and health outcomes (Oko, 2022). Even though, it is noted that the constraints faced by the Nigerian public healthcare units are interrelated and interdependent (Adebowale, 2018). Previous research has identified several financial-related constraints facing the Nigerian public health units. These financial constraints encompass various factors such as inadequate government spending on healthcare (Lowell, 2010), excessive costs for healthcare borne by individuals (Imafidon, 2018), and the overall instability and unsustainability of public healthcare funding (Assien, 2014).

These financial constraints are exemplified by the fact that high out-of-pocket expenses for healthcare can exacerbate financial difficulties for patients, particularly those who are already economically disadvantaged as stated by Lowell (2010). According to the WHO 2021 annual report, out-of-pocket expenditure for Nigerians ranges between 70% and 77% between 2017 and 2020. Further, over 8% of total household expenditures on health are paid out of pocket on transportation to healthcare facilities, outpatient care, and most importantly, medication. This evidence supports the conclusion that among developing countries, Nigeria possesses one of the highest total household health expenditures (Okpani & Abimbola, 2015). The Nigerian government's spending on healthcare over time has been quite minimal, with a majority (70%) of healthcare expenses being paid for directly by individuals. Prepaid health plans account for only

a small portion (5%) of total healthcare spending, while government healthcare spending accounts for 30% of the total healthcare expenditure, according to the World Health Organization in 2021.

Another significant financial issue in the Nigerian healthcare system is the way public health units are financed. Generally, there are two main methods of financing healthcare: through public funding and through market-driven financing through out-of-pocket payments. Nigerians and indeed, many public health units especially the primary health centers have come to embrace the latter form of health financing as the former seems not to always reach its target citizens (Lowell, 2010). Hence, in Nigeria, the cost of healthcare services, similar to other services, is determined by the principles of supply and demand, with providers setting prices based on their own economic benefit, as stated by Assien (2014). Due to the low income of a significant number of Nigerians, when households reach their "catastrophic threshold" - the point at which a specific healthcare expenditure becomes detrimental to their survival - they resort to begging on the streets and on social media to raise funds for their health needs (Dan-Nwafor, 2020).

The role of mitigating against the financial constraints faced by the public health units in Nigeria is clear in the country's current healthcare reform. As all current national development efforts in Nigeria are anchored on Sustainable Development Goals (SDGs), the focus of Nigeria's current healthcare policies is geared toward achieving the SDG3-healthy lives, of the UN Agenda 2030. Currently, Nigeria's healthcare policy is based on the National Strategic Health Development Plan (NSHDP III) 2023-2026, which was developed by the Federal Ministry of Health of Nigeria (FMHN, 2022). This development plan is an extension of the previous NSHDP II. The main objectives of the NSHDP are to decrease the number of under-five deaths from 120 deaths per 1,000 live births to 64 deaths and to decrease the rate of death of mothers from 565 pregnancy-related deaths per 100,000 live births, which was estimated in 2013, to 288 by the year 2026 (FMHN, 2022).

With respect to sustainability, the WHO has always advised that regardless of the funding system a nation may choose, it is always important to adapt its health system in a sustainable way in the long term. WHO emphasizes the importance of ensuring that the financing system a country chooses does not discourage people from accessing and utilizing healthcare services, especially in the long term. This means that payments at the time of service will have to be minimized or based on the principle of ability to pay (Obansa & Orimisan, 2013). Olawale and Adewale (2021) also

pointed out that the healthcare financing system in Nigeria is not only not in line with the WHO principles but also does not prevent individuals from experiencing financial hardship when they fall ill, does not provide necessary treatment, and does not incentivize healthcare providers to offer a combination of curative and preventive services at reasonable costs.

## **2.2 Challenges of Nigeria's Healthcare System**

In recent years, the healthcare crisis and its limiting effects on personal and national health development have received renewed attention. This is against the backdrop of the emergence of novel COVID-19 and increases in the intensity of other communicable diseases. Generally, people have a better understanding of the factors that negatively impact health and the connection between health and economic growth (Oko, 2022). Previous research (Assien, 2014; Lowell, 2010; Imafidon, 2018) has identified several challenges faced by the Nigerian healthcare system. Even as these studies in line with their peculiar objectives have highlighted broad and specific challenges, this paper focuses on the broader challenges. Unsurprisingly, it is noted that the challenges faced by the Nigerian healthcare system are interrelated and interdependent (Adebowale, 2018). Some of these factors include inadequate healthcare financing, poor investment in medical infrastructure, poor human resource management, and medical tourism corruption in the health sector, among others. What follows is a brief exposition of these problems.

### **Underfunded Healthcare Sector**

The problem of financing remains among the major challenges facing the healthcare system in Nigeria. The challenge encompasses various factors such as inadequate government spending on healthcare, excessive costs for healthcare borne by individuals, and the overall stability and sustainability of healthcare funding. This is exemplified by the fact that high out-of-pocket expenses for healthcare can exacerbate financial difficulties for patients, particularly those who are already economically disadvantaged as stated by Lowell, 2010. According to the WHO 2021 annual report, out-of-pocket expenditure for Nigerians ranges between 70% and 77% between 2017 and 2020. Further, over 8% of total household expenditures on health are paid out of pocket on transportation to healthcare facilities, outpatient care, and most importantly, medication. This evidence supports the conclusion that among developing countries, Nigeria possesses one of the highest total household health expenditures (Okpani & Abimbola, 2015).

The Nigerian government's spending on healthcare over time has been quite minimal, with a majority (70%) of healthcare expenses being paid for directly by individuals. Prepaid health plans account for only a small portion (5%) of total healthcare spending, while government healthcare spending accounts for 30% of the total healthcare expenditure, according to the World Health Organization in 2021.

Another significant financial issue in the Nigerian healthcare system is the way healthcare is financed. Generally, there are two main methods of financing healthcare: through public funding and through market-driven financing through out-of-pocket payments. Nigerians have come to embrace the latter form of health financing as the former seems not to always reach its target citizens (Lowell, 2010). Hence, in Nigeria, the cost of healthcare services, similar to other services, is determined by the principles of supply and demand, with providers setting prices based on their own economic benefit, as stated by Assien (2014). Due to the low income of a significant number of Nigerians, when households reach their "catastrophic threshold" - the point at which a specific healthcare expenditure becomes detrimental to their survival - they resort to begging on the streets and on social media to raise funds for their health needs, as stated by Dan-Nwafor (2020).

Further still, with respect to sustainability, the WHO has always advised that regardless of the funding system a nation may choose, it is very important it adapts it to its health system in a sustainable way in the long term. The WHO emphasizes the importance of ensuring that the financing system a country chooses does not discourage people from accessing and utilizing healthcare services, especially in the long term. This means that payments at the time of service will have to be minimized or based on the principle of ability to pay (Obansa & Orimisan, 2013). Olawale and Adewale (2021) also pointed out that the healthcare financing system in Nigeria is not only not in line with the WHO principles but also does not prevent individuals from experiencing financial hardship when they fall ill, does not provide necessary treatment, and does not incentivize healthcare providers to offer a combination of curative and preventive services at reasonable costs.

### **Poor Investment in medical infrastructure and Equipment**

Sequel to the problem of financing, basic medical infrastructural facilities are also in acute short supply in Nigeria. Even though this problem is not peculiar to the country but is the reality of many developing African nations, the ratio of infrastructure to the population makes the situation more alarming in Nigeria. Hence, the Nigerian health sector is believed to be in an infrastructure crisis (Dan-Nwafor, 2020). This issue is partly caused by a lack of resources, however, even when

there is a significant increase in funding, there remain problems. And same can also be said about the availability of health-related commodities especially drugs (Mafidon, 2018).

However, many States in Nigeria have a common problem of medical facilities that lack safe water and electricity, have broken equipment, and face frequent shortages of drugs, diagnostic materials, and other supplies (Obansa & Orimisan, 2013). Tosan (2021) findings support the argument of Obansa and Orimisan (2013) that similar infrastructure challenges are prevalent in the primary healthcare system in Nigeria as primary healthcare centers typically have insufficient and poorly maintained facilities. The poor state of infrastructure is so severe that in some areas, people have to travel over 5 km to access healthcare because the establishment of medical facilities is often done on political grounds rather than the real needs of the people (Health Reform Foundation of Nigeria, [HERFON], 2006).

Furthermore, the out-of-pocket syndrome and the disorganized drug distribution system stems from the need to comply with expensive pharmaceutical regulations (Assien, 2014). Drug resistance, such as the resistance of malaria pathogens to anti-malaria drugs, is a result of a flawed drug supply process, according to Lowell (2010). As the forces of demand and supply dictate, whenever there is poor client satisfaction as a result of poor delivery of public healthcare facilities, customers shift to another provider of healthcare service. Hence, this results in a situation where individuals seek medical care from private healthcare facilities, with those who have lower incomes receiving treatment from unqualified healthcare professionals, and those with higher incomes seeking medical treatment abroad (Obansa & Orimisan, 2013).

### **Brain Drain and Poor Human Resources Management**

Another critical problem bedeviling the Nigerian healthcare system is poor human resource management. In as much as human resources remain the most important factor in the service sector, no health intervention can be successful without good utilization of human resources. Recently, there has been an increase in the number of medical practitioners leaving Nigeria, which is referred to as the "supply side" of medical emigration (Ogaji & Brisibe, 2015). This brain drain of medical practitioners has unsurprisingly increased the challenges facing the public healthcare system in Nigeria. The loss of medical practitioners in Nigeria has resulted in additional difficulties for the country's public healthcare system, which has led to a widening of the disparities in health

outcomes between Nigeria and other countries around the world (Anyangwe & Mtonga, 2007). Evidence shows that in the year 2021 alone, an estimated 50 medical doctors left the country every week. This has put the patient-doctor ratio in Nigeria at an alarming 1 doctor to 6,000 patients (Oko, 2022). It has been reported that in the UK alone, there are over 8,178 medical doctors of Nigerian descent currently practicing (Maunya et al., 2021). It is noteworthy that some of the most accomplished doctors in the world, known for their significant contributions to the field of medicine, are from Nigeria (Akande, 2015). Many factors responsible for medical emigration in Nigeria are believed to be associated with poor human resource management. Mafidon (2018) has argued that these factors can be categorized into the pull and push factors. Push factors including low wages and poor working conditions among other things push medical practitioners out of Nigeria seeking more appealing pecuniary and non-pecuniary conditions of work in Europe, America, and the Arab world. The need for skilled labor in advanced countries, economic and social opportunities, and greater political security all contribute to the phenomenon of medical professionals leaving Nigeria, known as the "medical brain drain." (Anyangwe & Mtonga, 2007; Imafidon, 2018).

### **Medical Tourism Syndrome**

Medical tourism is another major telling challenge of the Nigerian healthcare system. The elicits consumption behavior of Nigerians as explained in the demonstration effect (see Bruce, 2016) that makes them prefer anything foreign, coupled with the underdevelopment of the healthcare sector motivates the political and the higher income classes of the country to seek quality medical services abroad. This is the demand-side medical emigration. The problem of medical tourism in Nigeria is believed to create a lot of leakage in the domestic economy. Evidence suggests that the country lost N576 billion (\$1.2 billion) yearly as a result of medical tourism. Similarly, 5000 people are estimated to leave the country in search of medical treatment abroad every month (Ogaji & Brisibe, 2015). According to Illesanmi (2020), the higher-income class in Nigeria spends around 20% of the government's total expenditure on public healthcare, which includes salaries for health professionals, and funding for programs such as malaria and HIV/AIDS prevention. It has been suggested that medical tourism worsens the state of healthcare in a country, as it can lead politicians to neglect their responsibilities towards the healthcare system since they themselves do not use it. This implies a lack of concern for the overall state of healthcare in the country (Abubakar et al., 2018).

## **Corruption**

As corruption remains one of the most endemic problems in Nigeria, its tentacles have permeated into and have held a firm grip on the Nigerian health system. Corruption manifests itself in several forms such as poor health record-keeping culture, intentional misdiagnosis, substandard infrastructure, misappropriation of health-related funds, contract inflation and kickbacks, and fake and expired drug usage among others.

It has also been found that medical doctors employed in the public healthcare system engage in illegitimate rent-seeking activities they often divert public resources and even patients to their privately owned facilities (Obansa & Orimisan, 2013; Oluwadare & Abe, 2011). At the health facility level, cadre health workers in the hospitals or clinics are found to usually possess extortionist tendencies which they leverage at the first opportunity. These practices add to the already exorbitant out-of-pocket cost of treatment and hence, discourage the uptake of quality services, especially by low-income households (Uneke, et al., 2013). In a nutshell, corruption in the healthcare sector in Nigeria is believed to raise a moral argument, one that emphasizes contempt for human life (Oluwadare & Abe, 2011).

## **Lack of a Cohesive System for Preventing, Monitoring, and Treating Diseases**

This is another structural problem of the Nigerian healthcare system. This problem usually manifests itself in the form of poor outreach in creating awareness, preventive measures, and coping strategies in the face of new and even perennial diseases, especially for people at the primary healthcare level. This weakness of Nigeria's disease control strategy during the COVID-19 pandemic was particularly apparent (Ilesanmi & Fagbule, 2020). This has led to a low rate of immunization, inadequate prenatal and postnatal care, stigmatization, and the rapid spread of highly contagious diseases (Gidado et al., 2014). Additionally, Oluwadare and Abe (2011) previously noted that the lack of active measures to encourage changes in behavior or attitudes that reduce the risk of disease exacerbates the health crisis in Nigeria.

Furthermore, the immediate consequences of poor integration of disease control and prevention strategies in Africa are that many children do not receive vaccinations, pregnant women do not receive proper prenatal care, and older individuals do not receive regular screenings for conditions such as blood sugar and cholesterol, and lack of breast and cervical cancer awareness and prevention is widespread (Workneh et al., 2018).

## **2.3 Theoretical Framework on the Relationship between Healthcare Unit Financing and Performance**

Since the 1970s following the debate on how much presence of government is acceptable in resource allocation and management, there has been a stream of theoretical propositions that have evolved explaining the place of financing in health system measurement and management. Earlier theories of health care financing such as Grossman (1972), Kelman (1975), and World Bank suggest that human capital models were developed to answer these questions. Grossman (1972) forged a relationship between financial resources and health outcomes, arguing that finance is an important input that leads to health outcomes such as access to modern health facilities and health system improvement. While healthcare financing usually is informed by the existing health system, sustainable healthcare funding remains the prerogative of the public sector domain. Hence, government sources are always and everywhere responsible for healthcare funding (Asogwa & Odoziobodo, 2016).

The Kelman (1975) schema is another established theory in health system management. Kelman introduced the 4-pillars of interrelated and interdependent stakeholders in health care including financial mechanisms, primary and secondary providers of healthcare, and consumers of healthcare services. By financing mechanism, he meant expenditures of health services by government, institutions, and private individuals. The main arguments of this theory rest to a vicious cycle sequence between a country's health outcome and its health financing. A country with poor health outcomes experiences a higher disease burden. Higher disease burden in turn leads to below-average productivity of labor which ultimately results in lower GDP and hence lower financial resources available for the healthcare sector. The individual healthcare spending of government, institutions, and private consumers therefore all depend on the level of productivity of the country measured in terms of the country's GDP per capita (Dunlop & Martins, 1995).

In the late 1970s, the World Bank Group heavily relied on the human capital development perspective to develop its programs in providing financial assistance, technical assistance to countries, policymaking, and implementation, arguing that the health outcome of a country is a function of its accumulated health stock. Hence, health stock accumulation is a viable means of combatting and controlling diseases. Healthcare financing programs therefore must focus on

improving the health stock of the population (Tichenor et al., 2021). A more practical sense of the World Bank's theory could be seen in the mid-1960s. Following the Structural Adjustment Programmes (SAP), the World Bank perspective of healthcare financing took a liberal form, hence becoming a major reference point for modelling health system financing programmes in many developing economies (Obansa & Orimisan, 2013).

Since the SAP era, the liberal model of health care financing has been used by the World Bank institutions and other international donors and funding agencies in providing loans, trust funds, and other forms of financial assistance in disease control and health infrastructure. This made Hofman (1990) develop a framework that lent a voice to the World Bank argument by taking it to another level, arguing in favor of the private sector being better equipped to manage financial healthcare resources, hence emphasizing that assistance must shift in the direction of funding private health units as against public health units. However, Hofman's (1990) arguments would later be developed as a theory of public-private partnership (PPP) of healthcare financing on the premise of social, political, and business justice (Onisanwa et al., 2018).

In the early 2000s, the World Bank's healthcare financing theory came under heavy criticism, bordering on being excessively private-oriented and universal inequity. Prior to this period, Musgrave (1996) in this direction developed his theory around equity as a major rationale for public sector intervention in healthcare financing. For reasons of information asymmetry and natural causes of monopoly, it is impossible for the private-sector-oriented model to allocate financial resources equitably. In the last two decades, Musgrave's theory of universal equity in health care financing has found practical support with the re-echo of the Universal Health Coverage (UHC) principles of the MDGs and SDGs (Okpani & Abimbola, 2015).

The UHC principle argues that healthcare financing in addition to the 'revenue generation' objective of the private sector-led argument has another objective of 'equity'. And the revenue generation objective sometimes conflicts with equity (Yamin, 2008). While a nation's view on social justice affects to a large extent how important it weighs equity over revenue generation, the UHC argues that countries must place quality, need, and affordability of health services over profit. It argues that in the absence of these equity considerations, policies of health financing will make choices of health financing policy worse through persisting inequalities (Wong, 2017).

The UHC framework further emphasized major constraints that persist inequalities in health care financing hence, laying to waste efforts at achieving UHC. Such constraints among other things include poor compensations for cases of high out-of-pocket health financing, increase in revenue generation without commiserate equitable distribution of post-tax income, disregard for higher health risk factors in the disbursement of pooled voluntary financial resources, the introduction of health interventions and policies that are high-cost, low-benefit especially in emergency cases and in areas with low access to financial health facilities. A closer look at all these constraints reveals that the UHC debate is mainly about emphasizing the role of equity over revenue generation in healthcare financing policy (Yamin, 2008; Wong, 2017).

Having reviewed the evolutionary current of the major theories of healthcare financing, the theoretical framework for this study is anchored on the UHC model. This proposed research shall rely on the UHC model because, in addition to being the currently most relevant theory in the global context of SDGs, Nigeria has since 2005 anchored its health financing policies along the UHC principles. Hence, it becomes easy to use the UHC as a reference point for elicited findings from this study which shall be conducted in Nigeria. Further than that, the UHC theory unlike Kelman (1975) and the World Bank human capital theory is not only able to forge a relationship between healthcare financing and health outcomes but through its emphasis on inequalities is also able to highlight major limitations constraining proper funding of the health system. To the extent that this research proposes to investigate the impact of financing sources and constraints on health outcomes, a framework anchored on the UHC allows room for modeling of all variables of concern in a single equation. Above all, the UHC model is expected to guide the findings and conclusions of this study in a comparatively more systematic and empirical direction.

## **2.4 Empirical Evidence on the Relationship between Healthcare Unit Financing and Performance**

Many researchers have analyzed the empirical relationship between healthcare financing and the health system and the path through which financing affects health outcomes. A recent investigation by Onwujekwe et al. (2019) explored how effective is the healthcare financial mechanism in Nigeria. Relying on official government document analysis and interview methods of data collection, the study revealed that the allocation of financial resources in healthcare financing is not evidence-based and not result-driven. They further revealed that the healthcare financing mechanism in Nigeria does not meet the UHC threshold of saving the people from

catastrophic health spending, hence, concluding in favor of stricter oversight in the disbursement and utilization of healthcare resources.

A study by Idowu et al. (2018) investigated the association between public health unit financial position and health outcomes in Nigeria. Findings from this study highlighted that the financial position of public health units has a positive and significant impact on the efficiency and outcomes of health units in Nigeria. The study further revealed that an increase in the financial positions of public health units will significantly reduce morbidity and mortality rates. The study therefore concludes in favor of diversification of the sources of finances and a significant increase in financial allocation for public health units.

In a multi-country study, Bein et al. (2017) investigated the link between healthcare financing and the efficiency of health systems among selected East African countries. Taking life expectancy, infant mortality, and neonatal deaths as a proxy for the efficiency of a country's health system found that countries in the region with higher health spending have higher life expectancy. However, the study found a negative association between higher health expenditure and infant mortality and neonatal deaths in most countries in the region.

Asbu et al. (2017) analyzed the link between health system financing and economic growth in Nigeria using secondary time series data between the period 1986-2015. Findings revealed that health expenditure has no significant impact on Nigerian economic growth. Findings further suggest that high out-of-pocket spending was a major constraint to the growth of the Nigerian economy and a cause of the increase in impoverishment of the people during the period analyzed. The study concludes in favor of an increase in government funding of the healthcare sector as a way of improving economic growth and reducing the level of poverty.

A study by Uzochukwu et al. (2015) that sought to identify sources of healthcare financing in Nigeria revealed that out-of-pocket health expenditure, taxation, domestic and foreign grants, and health insurance are the main sources of healthcare financing in Nigeria. The study further revealed that inadequate funding of the healthcare system in Nigeria is a major constraint in the way of its sustainable development, hence concluding in favor of a re-examination of the current means of funding and healthcare policies in Nigeria. In a different approach, Umoru & Omolara (2013) identified the factors constraining the efficiency of public and private health units in

Nigeria and found poor funding, low growth of the economy and high cost of medical care, and high out-of-pocket private spending to hinder the efficiency of facilities of health units in Nigeria.

A multi-country study done by Kim and Lane (2013) studied the performance of health systems of selected countries in Europe by investigating the relationship between health unit financing and the health outcomes of their citizens. An increase in financing of health units was found to positively impact the health outcomes of the people. Findings further suggest that differences in health status across European countries were significantly explained by differences in per capita differences in health financing. In a related study, Anton and Onofrei (2012) have earlier analyzed the challenges of healthcare systems in developing countries. In their investigations, they found that most health systems in developing countries of Africa are characterized by poor funding due largely to the poor state of their economies.

Riman and Akpan (2012) investigated the relationship between public healthcare financing and health outcomes in Nigeria. Considering infant mortality rate as the dependent variable while out-of-pocket spending, income distribution, and distribution of health units as explanatory variables, major findings from the study suggest that high out-of-pocket expenditure, the urban concentration of public health units, and unequal distribution of income all have negatively affected health outcomes in Nigeria.

Alabi (2010) investigated the level of government spending in the health sector during the 1981-2006 period. The finding of the study suggests that the government during this period invested less than 1% of the increase in the country's GDP in catering for the public health units. The study further revealed that low funding of health units accounts for an increase in preventable health conditions in the country. A similar study conducted by Saad and Kalakech (2009) relied on the cointegration technique to investigate the long-run determinants of healthcare financing in Nigeria for the period 1970-2003. Findings from this study revealed the GDP as the major determinant of health expenditure in Nigeria while population growth and literacy rate were found to have a weak effect on health care financing in Nigeria during the study period. The study concluded in favor of the need to increase the rate of economic growth in order to improve the level of expenditure in the healthcare sector.

Bokhari et al. (2007) empirically analyzed the financing position of health units in Nigeria using a survey research method. The results from this study revealed that life expectancy and literacy

level are highly influenced by government spending in the public health care system, however, governments at all levels have shown low commitment to increasing the financing of public health care units.

# Chapter 3

## Research Methodology

### 3.1 Research Approach

An Ex-post facto design is adopted for this study, where the variables of interest already behave in a specific form without any need for manipulation. Data will be observed in their natural occurrences. As asserted by McNiff, (1995), data collection method is research specific, in that, the data collection method a researcher adopts must be appropriate for the research and be applicable in answering the research questions. Hence, taking this into consideration and having permission as well as fulfilling all ethical and safety considerations, a descriptive survey method design is utilized. In order to reduce bias and increase reliability and overall robustness of research findings, this study further uses the hypothesis-testing design following the principle of randomization.

### 3.2 Research Hypotheses

In line with the objectives of the study, the hypotheses are formulated in null format:

- i. **HO<sub>1</sub>**: Differences in private and public hospitals have no significant association with sources of funding health units in Delta State of Nigeria.
- ii. **HO<sub>2</sub>**: Differences in private and public hospitals have no significant association with financial constraints of health units in Delta State of Nigeria.
- iii. **HO<sub>3</sub>**: Perceived health outcome and satisfaction do not significantly determine preference of private hospitals over public hospitals by antenatal and postnatal mothers in Delta State of Nigeria
- iv. **HO<sub>4</sub>**: Perceived health outcome and satisfaction do not significantly determine the preference of public hospitals over private hospitals by antenatal and postnatal mothers in the Delta State of Nigeria.

### 3.3 Methodological Procedures

#### 3.3.1 Population, Sample and Sampling Techniques

The population of this study consists of all registered hospitals including: tertiary, secondary, primary, and private hospitals in the Delta State of Nigeria. Two major samples of interest, A and B, are drawn from this population.

Sample A consists of finance managers and resource personnel of healthcare units in the Delta State of Nigeria. This group represents respondents from which information on the explanatory variables is elicited. Sample B consists of patients undergoing antenatal and post-natal care, from January 23<sup>rd</sup> - February 15<sup>th</sup>, 2024, in accredited and functional hospitals in Delta State. This group serves as respondents from which information on the dependent variable is elicited. Another major characteristic of this population is that only accredited and functional hospitals that are under the Delta State Contributory Health Commission (DSCHC) program are considered.

According to DSCHC (2023), there is 1 tertiary hospital, 66 secondary hospitals, 109 primary hospitals, 46 profit-oriented private hospitals, and 6 non-profit-oriented private/missionary accredited and functional hospitals in the Delta State of Nigeria.

Therefore, the target population of the study for sample A is  $1 + 65 + 109 + 46 + 6 = 228$  hospitals.

The sample size for A is determined using the Taro Yamane (1967) procedure. Based on the population size, the confidence level of 90% and the error tolerance of 10% are used. Accordingly, the sample size is determined by:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

where  $n$  is the sample size,  $N$  is the population size and  $e$  is the margin of error. Given these, the sample size is made up of  $69.51 \approx 70$  respondents.

The number of respondents from each stratum, except for the tertiary hospitals, will be determined using the proportional allocation formula (PAF):

$$PAF = \frac{\text{stratum size}}{\text{population size}} \times \text{sample size}$$

By implication, the questionnaire targets 1 respondent from the identified tertiary hospital, 20 from secondary hospitals, 33 from primary hospitals, 14 from private-oriented hospitals, and 2

from non-profit-oriented private/missionary hospitals. Given the riverine terrain of the study area, accessibility by road will be the major criterion for the inclusion of hospitals.

The data collection method for sample B is as follows. Owing to the non-availability and inconsistencies of data, this study finds it hard to acquire reliable aggregate patient information, hence, the population size for this sample is unknown. To this end, snowball sampling is proposed following the work of Dragan and Isaic-Maniu (2013).

### **3.3.2 Method of Data Collection**

Considering the nature of the research variables including sources of financing, financial related constraints on the one hand, and health outcomes and patients' preferences on the other hand, two streams of structured questionnaires each consisting of 2 sections of items are administered to the sampled population. 3 out of the aggregate 4 sections of the questionnaires generate data needed to answer each of the 3 research questions as well as serve as explanatory variables of the study. The last section consistent with the information on health outcomes shall represent the dependent variable of the study and the basis on which hypotheses are tested.

The proposed questionnaire for this research shall be adapted from the work of Oluwole et al. (2019) whose research was based on the preferred place of treatment for common health conditions in the Lagos State of Nigeria. The choice of the work by Oluwole et al. (2019) was anchored on the premise that it shares a similar variable with this study. Moreover, major modifications will be made to suit the peculiarities of the study area. In view of the fact that "primary hospitals" are the stratum with the most sampled patients, and this group can intuitively be said to be characterized by comparatively less literate respondents, the questionnaire is constructed in the simplest form and structured among the options to answers given, in addition to allowing respondents to air their views accordingly.

### **3.3.3 Variables and Analysis Model**

This study aims to analyse the relationship between the sources and constraints of funding for public and private hospitals and the corresponding health preferences and outcomes in Delta State, Nigeria. To carry out this study, the following variables were considered to represent the sources and restrictions of funding and which act as potential explanatory variables of health preferences and outcomes. The values of these variables are expressed on a 7-level Likert scale.

Table 1: Sources of Finance (SF) in Public and Private Hospitals in the Delta State of Nigeria

Item	Description
SF1	Government funding constitutes the main source of funding for your hospital
SF2	Patients' out-of-pocket payment is the most reliable source of financing for your hospital.
SF3	Grants from international and local donor organizations are a source of alternative funding for your hospital.
SF4	Government healthcare sector loans provide easy and affordable contingent funding and investment for your hospital.
SF5	Your hospital significantly benefits from emergency response funding during an epidemic e.g., EBOLA or a pandemic e.g., COVID-19.
SF6	Your hospital has received reasonable financial attention and commitment specifically in achieving the UN SDG-3 target of ending preventable death and reducing maternal mortality and communicable diseases.

Table 2: Financial Constraints (FC) in Public and Private Hospitals in Delta State of Nigeria

Item	Description
FC1	Your hospital is struggling with the problem of financial misappropriation.
FC2	Your hospital is in a state of severe to chronic underfunding.
FC3	The efficiency of your hospital is compromised by the wastefulness of financial resources.
FC4	Lack of financial accountability is a major constraint in effective service delivery in your hospital.
FC5	Your hospital's budget and financial policies are not able to cater to the infrastructures, equipment, and medical commodities needed for effective service delivery.

The following variables were used to capture patients' preferences and health outcomes, acting as dependent variables in the conceptual model. The values of these variables are also expressed on a 7-level Likert scale, where 1- "Strongly Disagreed" and 7 – "Strongly Agree".

Table 3: Health Preferences and Outcomes in Public and Private Hospitals in the Delta State of Nigeria

Item	Description
HPO1	Preferred place for treatment (private hospital).
HPO2	Preferred place for treatment (Government hospital).
HPO3	You pay your medical bills mainly out of pocket.
HPO4	You are a beneficiary of the Nigerian Government Health Insurance Scheme (NHIS)
HPO5	You have received any form of financial support from the government or any private agency for your medical services.
HPO6	You have easy access and proximity to antenatal and postnatal services from your house.
HPO7	Services in this hospital are affordable.
HPO8	Services in this hospital are fast.
HPO9	Treatments in this hospital are effective.
HPO10	You and your baby are well taken care of at all times of visit.
HPO11	You are fully satisfied with your overall ante-natal and (or) post-natal experience at this hospital.

### 3.3.4 Statistical Analysis of Data

In this research, the data collected refers to ordinal qualitative variables measured on a Likert scale with values ranging from 1 (strongly disagree) to 7 (strongly agree). The data obtained focuses on the three areas of analysis of the health units under study in this research: sources of funding, funding restrictions, and health outcomes and preferences. These ordinal variables are intended to capture the relationships of order perceived by the respondents in terms of the degree of agreement/occurrence of a given phenomenon. The statistical analysis of the data was conducted using three statistical methods: Two-way analysis of variance, Principal component analysis, and Multiple linear regression analysis.

#### 3.3.4.1 Two-way Analysis of Variance

To investigate the dependency effects that the type of hospital (public and private) and the type of facility (primary, secondary, profit-orientation, and tertiary level) have on the sources and constraints of funding observed in health facilities in Delta State of Nigeria we shall use a two-way analysis of variance.

Essentially, application of two-way analysis of variance to the data set of declarations of agreement by those in charge on the sources of funding and financial restrictions for health units will enable us to answer questions about mean differences in the response variable between populations defined by either factor (Hospital and Facility) and, in addition, to assess whether there is any interaction between the two factors, i.e., whether or not the separate effects of each factor on the response variable are additive.

The model for a two-way analysis of variance design is the following:

$$y_{ijk} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + \varepsilon_{ijk} \quad (2)$$

where  $y_{ijk}$  represents the value of the response variable (degree of agreement on funding sources and funding restrictions) for the  $k$  th financial manager/personnel manager, at the  $i$  th level of the Hospital factor (public and private) and at the  $j$  th level of the Facility factor (primary, profit-orientation, secondary and tertiary).

In the model  $\mu$  represents the overall mean of the response variable,  $\alpha_i$  represents the effect of level  $i$  th of the Hospital factor,  $\beta_j$  represents the effect of level  $j$  th of the Facility factor and  $\alpha\beta_{ij}$  the interaction effect between the two factors on the response variable. The residual term,  $\varepsilon_{ijk}$ , is assumed to be normally distributed, with mean zero and variance  $\sigma^2$ . As the model in equation (2) is overparameterized, the following restrictions are applied to the parameters to overcome the problem of overparameterization:

$$\sum_{i=1}^2 \alpha_i = 0 ; \quad \sum_{j=1}^4 \beta_j = 0 ; \quad \sum_{i=1}^2 \alpha\beta_{ij} = \sum_{j=1}^4 \alpha\beta_{ij} = 0$$

The total variation of the observations is divided between that due to the differences between the averages of the levels of the "Hospital" factor, that due to the differences between the averages of the levels of the "Facility" factor, that due to the interaction of "Hospital" and "Facility" factors and that due to the differences between the observations in the same combination of levels of the factor (within each cell).

The null hypotheses of interest are presented in terms of the model parameters as:

$$H_0^{(1)}: \alpha_1 = \alpha_2 = 0 \text{ (no main effect is attributed to the Hospital factor)}$$

$$H_0^{(2)}: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0 \text{ (no main effect is attributed to the Facility factor)}$$

$H_0^{(3)}: \alpha\beta_{11} = \alpha\beta_{12} = \alpha\beta_{13} = \dots = \alpha\beta_{24} = 0$  (there is no interaction effect between the Hospital factor and the Facility factor)

### 3.3.4.2 Principal Components Analysis

Essentially, the Principal Components method is a method of data reduction that aims to produce a small number of derived variables that can be used in place of the larger number of original variables to simplify subsequent analysis of the data. In this dissertation, the principal components method is used to extract and summarize the information contained in the set of 9 questionnaire items, from HPO<sub>3</sub> to HPO<sub>11</sub>, relating to patients' Health preferences and outcomes (HPO) about their ante-natal and post-natal experience. The 9 items are described in table 3 and are measured using a Likert-type scale, ranging from 1 (strongly disagreed) to 7 (strongly agreed). The components extracted from the 9 items will then be used as explanatory variables in the regression model to explain the variability in patients' preferences for using ante-natal and post-natal services in private hospitals (model 1) and public hospitals (model 2).

The principal components method is a multivariate technique which, in this study, is used to transform a set of related (correlated) variables, i.e., items HPO<sub>3</sub> to HPO<sub>11</sub>, into a set of unrelated (uncorrelated) variables (i.e., principal components) which represent decreasing proportions of the variation in the original observations. The logic behind the method is an attempt to reduce the complexity of the data by reducing the number of variables that need to be considered. If the first few derived variables (i.e., the principal components) among them represent a large proportion of the total variation in the observed variables, they can be used both to provide a convenient summary of the data and to simplify subsequent analyses.

As the principal components are extracted from the observed correlation matrix, the number of components that should be taken into account to adequately summarize the set of 9 items consists of the components that have a standardized variance greater than one. The coefficients defining the principal components are found by solving a series of equations involving the elements of the observed correlation matrix.

The principal component variables  $PC_1, PC_2, \dots, PC_9$  are defined to be linear combinations of the original variables  $HPO_3, HPO_4, \dots, HPO_{11}$ , that are uncorrelated and account for maximal proportions of the variation in the original data, i.e.,  $PC_1$  accounts for the maximum amount of

the variance among all possible linear combinations of  $HPO_3, HPO_4, \dots, HPO_{11}$ ,  $PC_2$  accounts for the maximum variance subject to being uncorrelated with  $PC_1$  and so on.

$$\begin{aligned}
 PC_1 &= a_{11}HPO3 + a_{12}HPO4 + \dots + a_{19}HPO11 \\
 PC_2 &= a_{21}HPO3 + a_{22}HPO4 + \dots + a_{29}HPO11 \\
 &\vdots \\
 PC_9 &= a_{91}HPO3 + a_{92}HPO4 + \dots + a_{99}HPO11
 \end{aligned} \tag{3}$$

where the coefficients  $a_{ij}$  ( $i = 1, \dots, 9, j = 1, \dots, 9$ ) are chosen so that the required maximal variance and uncorrelated conditions hold.

To better interpret the principal components, the coefficients are generally rescaled so that their sum of squares is equal to the variance of the component they define. In the case of components derived from the data correlation matrix, these rescaled coefficients provide the correlations between the components and the original variables. These rescaled coefficients make it possible to assess what information contained in the original variables each component is representing.

The coefficients defining the principal components are given by what are known as the *eigenvectors* of the sample correlation matrix,  $\mathbf{R}$ . Principal component scores for an individual/patient  $i$  with vector of variable values  $\mathbf{HPO}_i^T$  can be obtained by simply applying the derived coefficients to the observed variables, generally after subtracting the mean of the variables, i.e., from the equations:

$$\begin{aligned}
 PC_{i1} &= \mathbf{a}_1^T [\mathbf{HPO}_i - \overline{\mathbf{HPO}}] \\
 PC_{i2} &= \mathbf{a}_2^T [\mathbf{HPO}_i - \overline{\mathbf{HPO}}] \\
 &\vdots \\
 PC_{i9} &= \mathbf{a}_9^T [\mathbf{HPO}_i - \overline{\mathbf{HPO}}]
 \end{aligned} \tag{4}$$

where  $\mathbf{a}_i^T = [a_{i1}, a_{i2}, \dots, a_{i9}]$ ,  $\mathbf{HPO}_i^T = [HPO3_i, HPO4_i, \dots, HPO11_i]$  and  $\overline{\mathbf{HPO}}$  is the sample mean vector of the variables HPO3, ..., HPO11.

### 3.3.4.3 Multiple Regression Analysis

Multiple linear regression is a method of analysis for assessing the strength of the relationship between each of a set of explanatory variables and a single response (or dependent) variable.

In this section, regression analysis is used to answer the question of how variables representing users' perceptions of the results and quality parameters of ante-natal and post-natal services

provided by health units affect mothers' preference for using services provided by private hospitals and public hospitals.

To capture these relationships, we will use two multiple linear regression models to explain the variation in user preference for private hospitals (model 1) and public hospitals (model 2), as a function of mothers' perceptions of the results and quality parameters of the ante-natal and post-natal health treatments obtained, as well as the costs and affordability inherent in these health services.

The principal components extracted from the original variables, HPO3,...,HPO11, are used as explanatory variables in the two regression models. The specifications of the two multiple linear regression for the two regression models with the dependent variables HPO1 (private hospitals) and HPO2 (public hospitals), which are also measured on a Likert-type scale, are as follows:

Private Hospitals:

$$HPO1_i = \beta_{0,1} + \beta_{1,1}PC_{1,i} + \beta_{2,1}PC_{2,i} + \dots + \beta_{k,1}PC_{k,i} + \varepsilon_{i,1} \quad (5)$$

Government Hospitals:

$$HPO2_i = \beta_{0,2} + \beta_{1,2}PC_{1,i} + \beta_{2,2}PC_{2,i} + \dots + \beta_{k,2}PC_{k,i} + \varepsilon_{i,2} \quad (6)$$

where  $\beta_1$  represents the coefficients associated with the model's explanatory variables, *i.e.*, the extracted principal components that have an eigenvalue greater than one.

The variation in the response variables, *i.e.*, preferences for Private and Government hospitals, are partitioned into a part due to regression on the explanatory variables (Principal components) and a residual term (variation not attributed to the explanatory variables). The ratio of the regression mean square to the residual mean square provides an *F*-test statistic of the hypothesis that each of  $\beta_0, \beta_1, \dots, \beta_k$  takes the value zero, *i.e.*, that the information contained in all the original variables do not affect preferences for choosing a public or private hospital when seeking ante-natal and post-natal health care.

Individual significance of each principal component in explaining the variation in the preference for choosing a public or private hospital when seeking ante-natal and post-natal health care can be assessed using the Student's *t*-statistic  $\beta_j/SE(\beta_j)$ .

Statistical software SPSS 29 (Statistical Package for the Social Sciences) was used to process the data.

## Chapter 4

# Data Presentation, Analysis, and Discussion of Findings

### 4.1 Introduction

This chapter presents analyses of results on data collected for answering the research questions of the study using the methods previously presented: Two-way analysis of variance, principal component method, and multiple regression analysis.. The section begins with a summary of descriptive statistical tables and their analyses. After that, the inferential presentation and analyses of results are done by which the two research hypotheses of this study are tested using two-way analysis of variance, principal components, and multiple regression analysis. The section ends with a discussion of the findings.

### 4.2 Descriptive Statistics

The table 4 presents descriptive statistics of samples A and B of this study.

Table 4: Sample A Respondents Profile

<b>Observation</b>	<b>Frequency</b>	<b>Percent</b>
<b>Gender</b>		
Female	50	74.6
Male	17	25.4
<b>Age</b>		
Greater than 40	31	46.3
Less than 40	36	53.7
<b>Hospital</b>		
Private	17	25.4
Public	50	74.6
<b>Facility</b>		
Primary	30	44.8
Secondary	36	53.7
Tertiary	1	1.5
<b>Position</b>		
Financial manager	12	17.9
Resource Personnel	55	82.1

From the sample, 74.6% of respondents were female and 25.4% male. This is not unexpected as antenatal and postnatal care units of most health facilities are populated and headed by the female gender, especially in primary health care centers which was the predominant source of responses for both samples A and B of this research. From the sample A, a larger percentage of 53.7% were aged less than 40, while 46.3% aged greater than 40. This finding is suggestive that most of the resource persons of health facilities in Delta State are economically viable members of the population, hence, justifying the claim that the Nigerian labour force is mainly characterized by a young population.

Furthermore, the distribution of hospitals in Delta State of Nigeria is seen to follow a pattern where a larger percentage of hospitals (74.6%) are due to the public sector while the private health sector has 25.4%. A plausible explanation to this is that, despite its numerous challenges, healthcare in Nigeria still largely remains a public good, hence, the government at the state level has a comparatively larger share of hospitals than the private sector. Thus, even as the healthcare sector in Nigeria is fairly privatized, the private sector is yet to penetrate and have a firm grip of large share of the market. As for the distribution of the nature of health services rendered in the sample, the secondary health facility has the largest share (53.7%), then the primary health facility (44.8%) and tertiary health facility (1.5%). While overall, the primary healthcare center has the highest numerical advantage, most of the services rendered by the private health facilities are secondary in nature, hence, secondary health facility is seen to be highest in the study area. Further evidence from the descriptive statistics shows that a higher percentage of respondents in sample A are resource persons rather than financial managers.

Table 5: Sample B Respondents Profile of antenatal and postnatal patients

<b>Observation</b>	<b>Frequency</b>	<b>Percent</b>
<b>Age</b>		
18-40	130	90.9
Greater than 40	5	3.5
Less than 18	8	5.6
<b>Marital Status</b>		
Married	138	96.5
Single	5	3.5
<b>Hospital</b>		
Government	136	95.1
Private	7	4.9
<b>Facility</b>		
Primary	118	82.5
Secondary	17	11.9
Tertiary	8	5.6
<b>Nature of Health Service</b>		
Antenatal	69	48.3
Postnatal	74	51.7

From Table 5, the age distribution of respondents in sample B, reveals that a far greater percentage, 90.9%, of antenatal and postnatal patients in the study area are aged between 18 and 40. While 3.5% of patients are aged greater than 40, 5.6% of patients are aged less than 18. Similarly, a higher percentage of respondents, 96.5%, are found to be married while 3.5% are single. This finding has a strong cultural connotation as childbearing in Dela state, as in most part of Nigeria, is deemed appropriate only for a married person.

With regard to the hospitals where patients' responses were collected, findings show that most of the responses, 95.1%, were elicited in the government owned hospitals while 4.9% were elicited from private hospitals. Even though, the data collection process for this category of sample followed a snowball technique, most of the antenatal and postnatal patients were found in the government-owned hospitals as against the private hospitals. This suggests the confidence of patients in the public healthcare system especially in the primary tier.

Furthermore, most of the responses, 82.5%, were elicited in the primary health facilities while 11.9% were collected in the secondary facilities and 5.6% in the tertiary facility. This is not unexpected, as most of the respondents reside in local communities characterized by comparatively high fertility rates and easier access to primary healthcare facilities than they have to secondary and tertiary facilities. Finally, a fair share of patients was split between antenatal

and postnatal healthcare services demands. This suggests a high level of awareness of patients in the study area to the importance of after-birth follow-up clinical services.

### 4.3 Inferential Statistics

This section presents inferential statistics of the samples A and B of this study. The hypotheses are analyzed using Two-way ANOVA, Principal Components analysis and multiple regression analysis.

#### 4.3.1 Two-way ANOVA (2 factors: Hospital and Facility): Sources of Finance (SF)

Table 6: Two-way Analysis of Variance on dependent variable: SF1

Source	Sum of Squares	df	Mean Squares	F	Sig.
Corrected Model	259,946 <sup>a</sup>	5	51,989	21,852	<,001
Facility	23,176	3	7,725	3,247	,028
Hospital	19,520	1	19,520	8,205	,006
Facility * Hospital	10,371	1	10,371	4,359	,041
Residuals	145,129	61	2,379		
Corrected Total	405,075	66			

a. R Square = ,642 (R Square Adjusted = ,612)

Table 6 shows the effect of the type of facility and hospital on the government's source of funding. The result revealed that the F-ratios for facility, hospital, and their interaction is significant at 5% and 1% significant levels respectively. Hence, the null hypotheses are rejected and it is concluded that the type of facility, being either primary, profit-oriented, secondary, or tertiary, as well as being either private or public hospital strongly determines whether government spending constitutes the major source of financing the health unit in Delta State of Nigeria.

Table 7: Two-way ANOVA on dependent variable SF2

Source	Sum of Squares	df	Mean Squares	F	Sig.
Corrected Model	163,591 <sup>a</sup>	5	32,718	6,917	<,001
Facility	35,807	3	11,936	2,523	,066
Hospital	14,894	1	14,894	3,149	,081
Facility * Hospital	,111	1	,111	,023	,879
Residuals	288,529	61	4,730		
Corrected Total	452,119	66			

a. R Square = ,362 (R Square Adjusted = ,310)

Table 7 shows the effect of the type of facility and hospital on patients' out-of-pocket payment. The result revealed that the F-ratios for facility, hospital and their interaction are not significant at 5% or 1% significant levels. Hence, the hypotheses for the tests are accepted. The study therefore concludes that the type of facility, being either primary, profit-oriented, secondary or tertiary, as well as being either private or public hospital do not determine patients' out-of-pocket payment as the major source of financing the health units in Delta State of Nigeria.

Table 8: Two-away ANOVA on dependent variable SF3

Source	Sums Squares	df	Mean Squares	F	Sig.
Corrected Model	256,758 <sup>a</sup>	5	51,352	22,211	<,001
Facility	41,272	3	13,757	5,950	,001
Hospital	5,280	1	5,280	2,284	,136
Facility * Hospital	,189	1	,189	,082	,776
Residuals	141,033	61	2,312		
Corrected Total	397,791	66			

a. R Square = ,645 (R Square Adjusted = ,616)

Table 8 shows the effect of type of facility and hospital on grants from international and local donor organizations are a source of alternative funding hospitals. The test result for facility reveals that the F-ratio for facility is significant at 1% level of statistical significance. The null hypothesis is therefore rejected which informs the conclusion that the nature of facility being either primary, profit-oriented, secondary or tertiary strongly determines grants from international and local donor organizations are a source of alternative funding health unit in Delta State of Nigeria. However, the tests for hospital and interaction between facility and hospital reveals their respective F-ratios to be insignificant at 1% and 5% levels. Hence, the acceptance of the null hypotheses and conclusion that hospital either private or public does not strongly determine grants from international and local donor organizations are a source of alternative funding health unit in Delta State of Nigeria.

Table 9: Two-way ANOVA on dependent variable SF4

Source	Sums of Squares	df	Mean Squares	F	Sig.
Corrected model	72,807 <sup>a</sup>	5	14,561	3,272	,011
Facility	19,948	3	6,649	1,494	,225
Hospital	,027	1	,027	,006	,938
Facility * Hospital	3,101	1	3,101	,697	,407
Residuals	271,462	61	4,450		
Corrected Total	344,269	66			

a. R Square = ,211 (R Adjusted Square = ,147)

Table 9 shows the effect of the type of facility and hospital on receipt of government loans as easy and affordable contingent funding. Result revealed that the F-ratios for facility, hospital and their interaction are not significant at 5% or 1% significant levels. Hence, all null hypotheses for the tests are accepted. The study therefore concludes that the type of facility, being either primary, profit-oriented, secondary or tertiary, as well as being either private or public hospital do not determine receipt of government loans as easy and affordable contingent funding of health units in Delta State of Nigeria.

Table 10: Two-way ANOVA on dependent variable SF5

Source	Sum of Squares	df	Mean Squares	F	Sig.
Corrected model	177,060 <sup>a</sup>	5	35,412	8,759	<,001
Hospital	136,781	1	136,781	33,833	<,001
Facility	38,752	3	12,917	3,195	,030
Hospital * Facility	1,526	1	1,526	,378	,541
Residuals	246,612	61	4,043		
Corrected Total	423,672	66			

a. R Squares = ,418 (R Adjusted Square = ,370)

Table 10 shows the effect of the type of facility and hospital on receipt of emergency funding during epidemic and pandemic. The result reveals that the F-ratios for facility, hospital, and their interaction are significant at 1% level of statistical significance. The null hypotheses are therefore rejected and it is concluded that the type of facility, being either primary, profit-oriented, secondary or tertiary, as well as being either private or public hospital strongly determine whether the health unit in Delta State of Nigeria receive emergency funding during epidemic and pandemic.

Table 11: Two-away ANOVA on dependent variable SF6

Source	Sum Squares	df	Mean Squares	F	Sig.
Modelo corrigido	175,579 <sup>a</sup>	5	35,116	8,736	<,001
Hospital	122,474	1	122,474	30,469	<,001
Facility	52,553	3	17,518	4,358	,008
Hospital * Facility	,552	1	,552	,137	,712
Padrão	245,198	61	4,020		
Total corrigido	420,776	66			

a. R Square = ,417 (R Adjusted Square = ,370)

Table 11 shows the effect of the type of facility and hospital on receipt of reasonable financial attention and commitment specific in achieving the UN SDG-3 targets. The result reveals that the F-ratios for facility, hospital and their interaction are significant at 1% level of statistical significance. The null hypotheses are therefore rejected and it is concluded that the type of facility, being either primary, profit-oriented, secondary or tertiary, as well as being either private or public hospital strongly determine whether the health unit in Delta State of Nigeria receive reasonable financial attention and commitment specific to achieving UN SDG-3 targets.

#### 4.3.2 Two-way ANOVA (2 factors: Hospital and Facility): Financial Constraints (FC)

Table 12: Two-away ANOVA on dependent variable FC1

Source	Sum squares	df	Mean squares	F	Sig.
Corrected model	27,888 <sup>a</sup>	5	5,578	1,346	,257
Hospital	15,187	1	15,187	3,664	,060
Facility	10,359	3	3,453	,833	,481
Hospital * Facility	2,342	1	2,342	,565	,455
Residuals	252,829	61	4,145		
Corrected Total	280,716	66			

a. R Square = ,099 (R adjusted square= ,026)

Table 12 shows the effect of the type of facility and hospital on financial misappropriation. The result reveals that the F-ratios for facility, hospital, and their interaction are not significant at 1% and 5% levels of statistical significance. The null hypotheses are therefore accepted and it is concluded that the type of facility, being either primary, profit-oriented, secondary, or tertiary, as

well as being either private or public hospital do not significantly affect financial misappropriation as a financial constraint facing health units in Delta State of Nigeria.

Table 13: Two-away ANOVA on dependent variable FC<sub>2</sub>

Source	Sum Squares	df	Mean Squares	F	Sig.
Corrected model	41,907 <sup>a</sup>	5	8,381	1,490	,206
Hospital	6,154	1	6,154	1,094	,300
Facility	35,635	3	11,878	2,111	,108
Hospital * Facility	,118	1	,118	,021	,885
Residuals	343,198	61	5,626		
Corrected Total	385,104	66			

a. R Square = ,109 (R Adjusted Square= ,036)

Table 13 shows the effect of the type of facility and hospital on underfunding as a financial constraint facing health unit. The result reveals that the F-statistics for facility, hospital, and their interaction are not significant at 1% and 5% levels of statistical significance. The null hypotheses are therefore accepted and it is concluded that the type of facility, being either primary, profit-oriented, secondary, or tertiary, as well as being either private or public hospital do not significantly affect underfunding as a financial constraint facing health unit in Delta State of Nigeria.

Table 14: Two-away ANOVA on dependent variable FC<sub>3</sub>

Source	Sum Squares	df	Mean Squares	F	Sig.
Corrected model	11,591 <sup>a</sup>	5	2,318	,560	,730
Hospital	,057	1	,057	,014	,907
Facility	4,937	3	1,646	,398	,755
Hospital * Facility	6,597	1	6,597	1,593	,212
Residuals	252,529	61	4,140		
Corrected Total	264,119	66			

a. R Square = ,044 (R Adjusted square= -,034)

Table 14 shows the effect of the type of facility and hospital on the wastefulness of financial resources as a financial constraint facing health units. The result reveals that the F-statistics for facility, hospital, and their interaction are not significant at 1% and 5% levels of statistical significance. The null hypotheses are therefore accepted and it is concluded that the type of facility, being either primary, profit-oriented, secondary, or tertiary, as well as being either private

or public hospital do not significantly affect wastefulness of financial resources as a financial constraint facing health unit in Delta State of Nigeria.

Table 15: Two-away ANOVA on dependent variable FC4

Source	Sum Squares	df	Mean squares	F	Sig.
Corrected Model	6,257 <sup>a</sup>	5	1,251	,241	,943
Hospital	,009	1	,009	,002	,966
Facility	5,523	3	1,841	,354	,787
Hospital * Facility	,725	1	,725	,139	,710
Padrão	317,414	61	5,204		
Corrected Total	323,672	66			

a. R Square = ,019 (R Adjusted Square = -,061)

Table 15 shows the effect of the type of facility and hospital on lack of financial accountability as a financial constraint facing health unit. The result reveals that the F-ratios for facility, hospital and their interaction are not significant at 1% and 5% levels of statistical significance. The null hypotheses are therefore accepted and it is concluded that the type of facility, being either primary, profit-oriented, secondary or tertiary, as well as being either private or public hospital do not significantly affect lack of financial accountability as a financial constraint facing health unit in Delta State of Nigeria.

Table 16: Two-away ANOVA on dependent variable FC5

Source	Sum Squares	df	Mean Square	F	Sig.
Corrected Model	44,964 <sup>a</sup>	5	8,993	1,963	,097
Hospital	,438	1	,438	,096	,758
Facility	37,144	3	12,381	2,702	,053
Hospital * Facility	7,382	1	7,382	1,611	,209
Residuals	279,483	61	4,582		
Corrected Total	324,448	66			

a. R Square = ,139 (R Adjusted Square = ,068)

Table 16 shows the effect of the type of facility and hospital on inadequate budget and financial policy as a financial constraint facing health units. The result shows that the F-ratio for facility is significant at a 5% level of statistical significance. The null hypothesis is rejected and it is concluded that the type of facility, being either primary, profit-oriented, secondary, or tertiary strongly determine whether health units in the Delta State of Nigeria are facing inadequacy of financial budget and financial policy. Further findings show that the F-ratios for hospital and that

of the interaction between hospital and facility are statistically insignificant, hence, the acceptance of their corresponding null hypotheses and the conclusion that being private or public hospital do not determine whether health units in Delta State of Nigeria are facing inadequacy of financial budget and financial policy.

### 4.3.3 Principal Components Analysis

Table 17: Correlation matrix

	HPO3	HPO4	HPO5	HPO6	HPO7	HPO8	HPO9	HPO10	HPO11	
Correlation	HPO3	1,000								
	HPO4	-,087	1,000							
	HPO5	-,354***	,053	1,000						
	HPO6	-,158*	,297***	,226***	1,000					
	HPO7	-,208***	,028	,338***	,279***	1,000				
	HPO8	-,115	,172**	,185**	,249***	,360***	1,000			
	HPO9	-,233***	,010	,393***	,201**	,473***	,518***	1,000		
	HPO10	-,265***	-,028	,360***	,275***	,625***	,514***	,670***	1,000	
	HPO11	-,207***	,023	,242***	,286***	,586***	,627***	,553***	,753***	1,000

\*\*\*, \*\*, \* statistical significance at the 1%, 5%, 10% level;

The correlation matrix of the data shows that there are many significant correlations between the variables HPO3, ..., HPO11, suggesting that the extraction of some principal components to adequately represent the information contained in the original variables will be possible.

Table 18: Rotating component matrix

	Component		
	1	2	3
HPO3	-,078	-,804	-,097
HPO4	-,064	-,001	,877
HPO5	,248	,765	,062
HPO6	,261	,191	,684
HPO7	,700	,266	,051
HPO8	,752	-,100	,276
HPO9	,752	,274	-,009
HPO10	,860	,251	-,009
HPO11	,878	,067	,087

Based on the rotated component matrix table, principal component 1 has a high correlation coefficient and represents the information contained in the original HPO7, HPO8, HPO9, HPO10,

and HPO11 variables. Principal component 2 has a high negative (positive) correlation coefficient with the HPO3 (HPO5) variables and essentially represents the information contained in these two variables. Principal component 3 has a high positive correlation coefficient with variables HPO4 and HPO6.

Using these three principal components, the corresponding principal component score values were generated for the 142 observations of the original variables. The score values of these three main components were then used as independent variables in the two regression models to explain patients' preferences for using the services of private hospitals (model 1) and public hospitals (model 2).

#### 4.3.4 Results of Regression Analysis

Table 19: Estimated regression coefficients of model 1: Private Hospitals

Variable	Coefficient	Standard Error	t-stat	Sig.
Constant	1,873	,145	12,879	<,001
Principal Component 1	-,321	,146	-2,197	,030
Principal Component 2	-,917	,146	-6,282	<,001
Principal Component 3	-,025	,146	-,168	,866
$\hat{\sigma}_\varepsilon$			1.733	
F-Statistics		14.774 (sig. <,001)		
R (multiple correlation coefficient)			0.493	
$R^2$			0.243	
$R^2$ adjusted			0.227	

Dependent variable: HPO1

Table 19 presents estimated regression coefficients for the three main principal components of health preference and outcome for private hospitals in the Delta State of Nigeria. The sign, size and significance of the principal components effects in explaining variability for preference for private hospitals as well as the coefficient of determination and overall robustness of the regression model are analyzed.

The coefficient of principal component 1 (PC1) shows that principal outcome variables including: HPO7, HPO8, HPO9, HPO10, and HPO11 are negative determinants of preference for private hospitals. Hence, an increase in the levels of affordability, speed of service, effectiveness, care, and satisfaction of antenatal and postnatal mothers lead to a 0.321 mean reduction in their

preference for private hospitals as against public hospitals. The probability value of PC1 shows that the negative impact of PC1 on the preference of private hospitals is significant at a 5% level of statistical significance.

Similarly, the coefficient of principal component 2 (PC2) shows that principal outcome variables including: HO3 and HO5 are negative determinants of preference for private hospitals. Hence, an increase in access to health insurance and the payment of medical expenses essentially by the patient out of his own pocket lead to 0.917 mean reduction in preference for private hospitals over public hospitals by antenatal and postnatal mothers in Delta State of Nigeria. The probability value of PC2 shows that the negative impact of PC2 on the preference of private hospitals is highly significant at 1% level of statistical significance.

Moreover, the coefficient of for principal component 3 (PC3) shows that principal outcome variables including: HO4 and HO6 are weak determinants of preference for private hospitals as probability value for PC3 is statistically insignificant at 5% and 1% level of statistical significance. Further findings shown by the R squared adjusted reveal that a total of 23% variation in the dependent variable HPO1 in the regression model 1 is jointly explained by the regressors PC1, PC2, and PC3 which suggests the goodness of fit of the regression model. Moreover, the significant F-statistic suggests that the variables employed in the regression model are adequate in explaining variations in HPO1, hence the stability of the regression model.

Table 20: Estimated regression coefficients of model 2: Public Hospitals

Variable	Coefficient	Standard Error	t-stat	Sig.
Constant	6,366	,112	57,046	<,001
Principal Component 1	,420	,112	3,755	<,001
Principal Component 2	,873	,112	7,795	<,001
Principal Component 3	,362	,112	3,237	,002
$\hat{\sigma}_\varepsilon$			1.330	
F-Statistics			28.444 (sig. <,001)	
R (multiple correlation coefficient)			0.618	
$R^2$			0.382	
$R^2$ adjusted			0.369	

Dependent variable: HPO2

Table 20 presents coefficients for the three main principal components of health preference and outcome for public hospitals in Delta State of Nigeria. The sign, size and significance of the

principal components as well as the coefficient of determination and overall robustness of the regression model are analyzed.

The coefficients of for principal component 1 (PC1) shows that principal outcome variables including: HPO7, HPO8, HPO9, HPO10 and HPO11 are positive determinants of preference for public hospitals. Hence, other things being equal, increase in the levels of affordability, speed of service, effectiveness, care and satisfaction of antenatal and postnatal mothers lead to 0.420 mean increase in their preference for public hospitals as against private hospitals. The probability value of PC2 shows that the positive impact of PC2 on preference of public hospitals is highly significant at 1% level of statistical significance.

Similarly, the coefficient of for principal component 2 (PC2) shows that principal outcome variables including: HO3 and HO5 are positive determinants of preference of public hospitals. Hence, other things being equal, increase in out-of-pocket payment for healthcare and increase in financial support by government or private donors lead to 0.873 mean increase in preference for public hospitals over private hospitals by antenatal and postnatal mothers in Delta State of Nigeria. The probability value of PC2 shows that the positive impact of PC2 on preference of public hospitals is highly significant at 1% level of statistical significance.

Moreover, the coefficients of for principal component 3 (PC3) shows that principal outcome variables including: HO4 and HO6 are positive determinants of preference of public hospitals. Hence, other things being equal, increase in access to health insurance and proximity to hospital lead to 0.362 mean increase in preference for public hospitals over private hospitals by antenatal and postnatal mothers in Delta State of Nigeria. The probability value of PC3 shows that the positive impact of PC3 on the preference of public hospitals is highly significant at 1% level of statistical significance.

Further findings shown by the R squared adjusted reveal that a total of 37% variation in the dependent variable HPO2 in the regression model 2 are jointly explained by the regressors PC1, PC2 and PC3 which suggests the goodness of fit of the regression model. Moreover, the significant F-statistic suggests that the variables employed in the regression model are adequate in explaining variations in HPO2, hence the stability of the regression model.

## 4.4 Discussion of Findings

Major findings in sample A of this study revealed that the nature and type of hospital determine the source of funding from government, donor agencies, and international organizations in response to UN SDG health targets. Pre-natal and post-natal mothers in private and public hospitals, whether primary, profit-oriented, secondary, or tertiary facilities in the Delta State of Nigeria still pay heavily for their health services out-of-pocket. Moreover, both private and public hospitals in the study area do not significantly enjoy loans and contingency funding from the government. Payment of medical bills out-of-pocket in both private and public hospitals by pre-natal and post-natal mothers contradicts the earlier claim that health services in Nigeria are still considered a public good and its financing is determined mainly by criteria of social justice and equity rather than the market-oriented criteria (Makinde et al., 2018). Moreover, the lack of easy access to affordable loans and contingency funding by private and public hospitals in the study area fails to confirm the claim that financing health units in Nigeria is consistent with the principle of UHC of catering for health financing through various means of funding (Okpani & Abimbola, 2015). It also contradicts the empirical finding by Asogwa and Odoziobodo (2016) that government sources are always and everywhere responsible for healthcare funding.

Another major finding of this study is that financial misappropriation, underfunding, wastefulness, and poor financial accountability are financial-related constraints that compromise the performance and efficiency of health services in primary, profit-oriented, secondary, and tertiary facilities in the Delta State of Nigeria. This finding confirms earlier empirical findings by Asbu et al. (2017) and Onwujekwe et al. (2019) that healthcare financing in Nigeria is not evidence-based and not result-driven. It also conforms with the finding of Uzochukwu et al. (2015) who revealed that inadequate funding of the healthcare system in Nigeria is a major constraint in the way of sustainable development of the country's health system.

Major findings from sample B of this study show that principal components 1 and 2 have a significant negative impact on the preference for private hospitals by antenatal and postnatal mothers in the Delta State of Nigeria. This implies that the more effective and satisfied prenatal and postnatal mothers have in the health system and the increase in access to health insurance and proximity to hospitals make them lose preference for profit-oriented private hospitals. On the contrary, findings further revealed that principal components 1, 2, and 3 have a significant positive impact on the preference for public hospitals by antenatal and postnatal mothers in the Delta State of Nigeria. Hence, an increase in effectiveness and level of satisfaction with health

services as well as an increase in access to public health insurance, proximity to hospitals and higher out-of-pocket payment increase the preference of prenatal and postnatal mothers for public hospitals as against private hospitals. This finding is supported by Idowu et al. (2018) who conclude that the financial position of public health units has a positive and significant impact on the efficiency and outcomes of health units in Nigeria and Bein et al. (2017) who found that countries in the West Africa region with higher health spending have higher life expectancy. It however contradicts that of Onwujekwe et al. (2019) who in their empirical investigation found that healthcare financing and preference in Nigeria are not evidence-based and not result-driven.

In line with prior expectations, out-of-pocket health spending is a major determinant of the preference for the public over private hospitals and the outcome of the overall health system in Nigeria. As the Nigerian health sector remains grossly underfunded with high out-of-pocket health expenditure, ranging between 70% and 77% of household income, (WHO, 2021), this finding further exposes the negative consequences of poor funding on health outcomes in Nigeria. Even though the findings in this study affirm previous empirical findings such as Bein et al. (2017), Uzochukwu et al. (2015) and Umoru & Omolara (2013) have shown that high out-of-pocket health expenditure and inadequate funding of the healthcare system in Nigeria are major constraints in the way of its sustainable development of the country's health system.

Finally, it is my humble opinion that the state government, through the Ministry of Health, should pay closer attention to increasing the number of primary healthcare centers in the state and also endeavor to equip all the primary health centers which seem closer to the people especially those in the rural areas. The number of PHCs should be reviewed for improved health outcomes in the following areas: Umunede, Onicha-Ugbo, Igbodo, Isele-Ugwu, Alisimie, Agbor-Obi, Ewuru, Ekuoma, Owa-Alero, Owa-Oyibo, and Alihagu, to mention but a few.

## **Chapter 5**

# **Conclusions, Limitations, and Lines for Future Research**

### **5.1 Conclusions**

The major finding from this study is that the type of hospital and scale of service rendered strongly influence their source of finance as most hospitals are faced with limited sources of funding which impacts the performance and efficiency of health services in primary, profit-oriented, secondary, and tertiary facilities in Delta State of Nigeria. Moreover, antenatal and postnatal patients in the Delta State of Nigeria have an overall preference for public hospitals over private hospitals due to intervening factors such as effectiveness and level of satisfaction with health services as well as an increase in access to public health insurance, proximity to hospital and out-of-pocket payment.

The findings of this study inform the conclusion that while in principle, healthcare service delivery is relatively fairly privatized in Nigeria, in practice, it still operates as a public good based on principles of equity and social justice. Despite its challenges therefore, low and middle-income patients have preference for public hospitals to the private hospitals which they consider an elitist service sector. Moreover, private and public hospitals in Nigeria fall short of their potentials due to attending financials constraints which limit sustainable growth of health outcomes.

This conclusion has a major policy implication on the efficiency and sustainability of the healthcare system in Nigeria. Overcoming important financial constraints in the way of health outcomes in Nigeria can be achieved by significantly increasing non-budgetary financial reimbursements such as incentives to private health sector through tax-cuts and legislator health constituency projects and broadening of scope and full implementation of social health insurance schemes. This is predicated on the premise that reducing financial constraints will improve health outcomes in Nigeria and help the country achieve its UHC aspirations.

### **5.2 Limitations**

The study faced several limitations, including data availability, scope, time, and financial constraints. A significant challenge was the unavailability of monthly average data for prenatal

and postnatal patients, which affected the sampling process based on the Yamane (1967) calculation. Consequently, the study adopted a snowball sampling approach, which, despite its limitations, provided valuable insights and a broader range of respondents. Additionally, the research scope was restricted due to security issues in parts of the Delta South and Delta Central senatorial districts, known for oil bunkering and banditry, making these areas unsafe for data collection. Furthermore, harassment and financial extortions from officials in some of the health units were further not supportive of this research. These factors combined restricted data collection. This research could have been much easier without the attending shortcomings. However, the study covered a larger portion of the region, ensuring the findings' validity and robustness for generalization purposes.

### **5.3 Lines for future Research**

Future research should aim to overcome the data availability limitations by establishing a reliable database for prenatal and postnatal patient statistics. This will enhance the accuracy and reliability of sampling methods. Expanding the scope of the study to include more regions, particularly those affected by insecurity, will provide a more comprehensive understanding of the financial constraints and health outcomes in Nigeria. Finally, investigating the impact of specific policy interventions, such as tax incentives for the private health sector and the implementation of social health insurance schemes, would provide valuable information on effective strategies to overcome financial barriers and improve health outcomes.

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# Appendices

## Appendix: Survey Results

### Descriptive Statistics

#### Sample A

##### Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	50	74.6	74.6	74.6
	Male	17	25.4	25.4	100.0
	Total	67	100.0	100.0	

##### Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater than 40	31	46.3	46.3	46.3
	Less than 40	36	53.7	53.7	100.0
	Total	67	100.0	100.0	

##### Hospital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private	17	25.4	25.4	25.4
	Public	50	74.6	74.6	100.0
	Total	67	100.0	100.0	

##### Facility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	30	44.8	44.8	44.8
	Secondary	36	53.7	53.7	98.5
	Tertiary	1	1.5	1.5	100.0
	Total	67	100.0	100.0	

##### Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial Manager	12	17.9	17.9	17.9

	Resource personnel	55	82.1	82.1	100.0
	Total	67	100.0	100.0	

## Sample B

## Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-40	130	90.9	90.9	90.9
	Greater than 40	5	3.5	3.5	94.4
	Less than 18	8	5.6	5.6	100.0
	Total	143	100.0	100.0	

## Marital Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Married	138	96.5	96.5	96.5
	Single	5	3.5	3.5	100.0
	Total	143	100.0	100.0	

## Hospital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Government	136	95.1	95.1	95.1
	Private	7	4.9	4.9	100.0
	Total	143	100.0	100.0	

## Facility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	118	82.5	82.5	82.5
	Secondary	17	11.9	11.9	94.4
	Tertiary	8	5.6	5.6	100.0
	Total	143	100.0	100.0	

## Nature of Health Service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Antenatal	69	48.3	48.3	48.3
	Postnatal	74	51.7	51.7	100.0
	Total	143	100.0	100.0	

## Inferential Statistics

Method: Two-way ANOVA (2 factors: Hospital and Facility): Sources of Finance (SF)

		Pearson Correlations				
		SF1	SF2	SF3	SF4	SF5
SF2		-,531**				
SF3		,660**	-,544**			
SF4		,443**	-,244*	,211		
SF5		,703**	-,247*	,679**	,282*	
SF6		,626**	-,392**	,665**	,311*	,580**
N		67	67	67	67	67

\*\* . Significance at 1% level (2-tailed).

\* . Significance at 5% level (2 tailed).

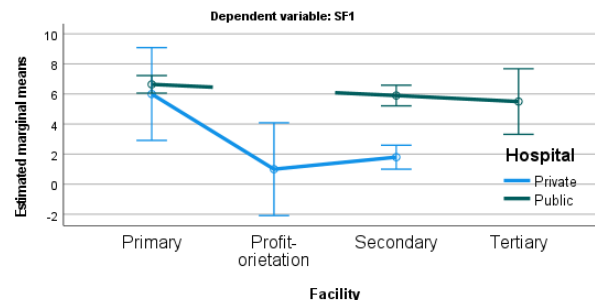
Table: Two-way Analysis of Variance; Marginal means for SF1 variable

Facility	Hospital	Mean	Stand. Error of the mean	N
Primary	Private	6,00	.	1
	Public	6,64	,826	28
	Total	6,62	,820	29
Profit-orientation	Private	1,00	.	1
	Total	1,00	.	1
Secondary	Private	1,80	1,935	15
	Public	5,90	1,971	20
	Total	4,14	2,819	35
Tertiary	Public	5,50	,707	2
	Total	5,50	,707	2
Total	Private	2,00	2,092	17
	Public	6,30	1,432	50
	Total	5,21	2,477	67

Table: Two-way Analysis of Variance on dependent variable: SF1

Source	Sum of Squares	df	Mean Squares	F	Sig.
Corrected Model	259,946 <sup>a</sup>	5	51,989	21,852	<,001
Facility	23,176	3	7,725	3,247	,028
Hospital	19,520	1	19,520	8,205	,006
Facility * Hospital	10,371	1	10,371	4,359	,041
Residuals	145,129	61	2,379		
Corrected Total	405,075	66			

a. R Square = ,642 (R Square Adjusted = ,612)



Note: Non-estimable averages are not plotted

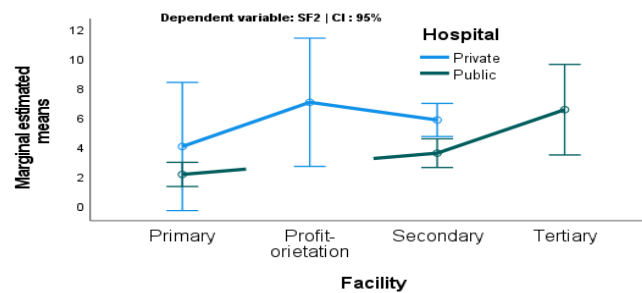
Dependent variable:SF2

Facility	Hospital	Mean	Stand. Error of the mean	N
Primary	Private	4,00	.	1
	Public	2,11	2,149	28
	Total	2,17	2,139	29
Profit-orientation	Private	7,00	.	1
	Total	7,00	.	1
Secondary	Private	5,80	2,484	15
	Public	3,55	2,012	20
	Total	4,51	2,466	35
Tertiary	Public	6,50	,707	2
	Total	6,50	,707	2
Total	Private	5,76	2,386	17
	Public	2,86	2,277	50
	Total	3,60	2,617	67

Table: Two-away ANOVA on dependent variable SF2

Source	Sum of Squares	df	Mean Squares	F	Sig.
Corrected Model	163,591 <sup>a</sup>	5	32,718	6,917	<,001
Facility	35,807	3	11,936	2,523	,066
Hospital	14,894	1	14,894	3,149	,081
Facility * Hospital	,111	1	,111	,023	,879
Padrão	288,529	61	4,730		
Corrected Total	452,119	66			

a. R Square = ,362 (R Square Adjusted = ,310)



estimable averages are not plotted

Note: Non-

Dependent variable:SF3

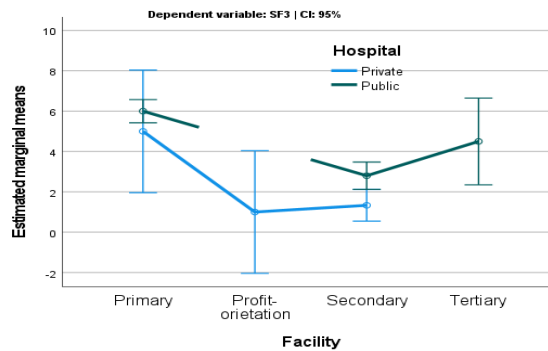
Facility	Hospital	Mean	Stand. Error of Mean	N
Primary	Private	5,00	.	1
	Public	6,00	1,440	28
	Total	5,97	1,426	29
Profit-orientation	Private	1,00	.	1
	Total	1,00	.	1
Secondary	Private	1,33	1,047	15

	Public	2,80	1,908	20
	Total	2,17	1,740	35
Tertiary	Public	4,50	,707	2
	Total	4,50	,707	2
Total	Private	1,53	1,328	17
	Public	4,66	2,237	50
	Total	3,87	2,455	67

Dependent variable: SF3

Origem	Sums Squares	df	Mean Squares	F	Sig.
Corrected Model	256,758 <sup>a</sup>	5	51,352	22,211	<,001
Facility	41,272	3	13,757	5,950	,001
Hospital	5,280	1	5,280	2,284	,136
Facility * Hospital	,189	1	,189	,082	,776
Residuals	141,033	61	2,312		
Corrected Total	397,791	66			

R Square = ,645 (R Square Adjusted = ,616)



Dependent variable: SF4

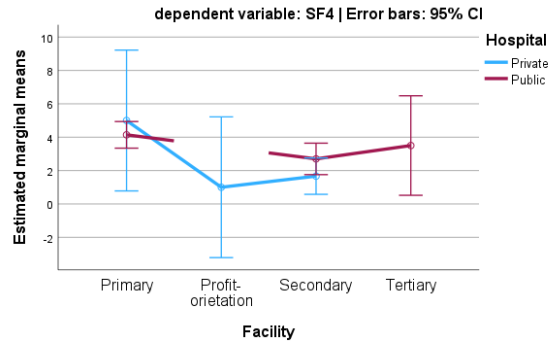
Facility	Hospital	Mean	Stand. Error	N
Primary	Private	5,00	.	1
	Public	4,14	2,475	28
	Total	4,17	2,436	29
Profit-orientation	Private	1,00	.	1
	Total	1,00	.	1
Secondary	Private	1,67	1,676	15
	Public	2,70	1,809	20
	Total	2,26	1,804	35
Tertiary	Public	3,50	2,121	2
	Total	3,50	2,121	2
Total	Private	1,82	1,776	17
	Public	3,54	2,288	50
	Total	3,10	2,284	67

Dependent variable: SF4

Source	Sums of Squares	df	Mean Squares	F	Sig.
Corrected model	72,807 <sup>a</sup>	5	14,561	3,272	,011
Facility	19,948	3	6,649	1,494	,225

Hospital	,027	1	,027	,006	,938
Facility * Hospital	3,101	1	3,101	,697	,407
Residuals	271,462	61	4,450		
Corrected Total	344,269	66			

R Square = ,211 (R Adjusted Square = ,147)



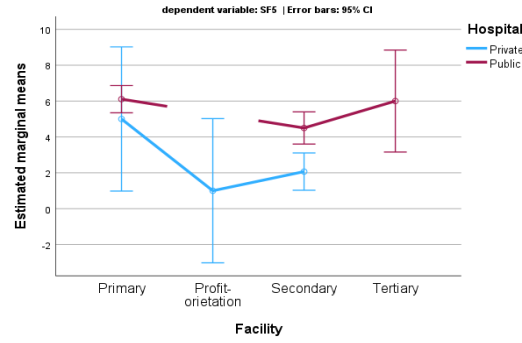
Dependent variable: SF5

Hospital	Facility	Mean	Stand. Error Mean	N
Private	Primary	5,00	.	1
	Profit-orientation	1,00	.	1
	Secondary	2,07	2,154	15
	Total	2,18	2,157	17
Public	Primary	6,11	1,750	28
	Secondary	4,50	2,259	20
	Tertiary	6,00	1,414	2
	Total	5,46	2,082	50
Total	Primary	6,07	1,731	29
	Profit-orientation	1,00	.	1
	Secondary	3,46	2,501	35
	Tertiary	6,00	1,414	2
	Total	4,63	2,534	67

Dependent variable:SF5

Source	Sum of Squares	df	Mean Squares	F	Sig.
Corrected model	177,060 <sup>a</sup>	5	35,412	8,759	<,001
Hospital	136,781	1	136,781	33,833	<,001
Facility	38,752	3	12,917	3,195	,030
Hospital * Facility	1,526	1	1,526	,378	,541
Residuals	246,612	61	4,043		
Corrected Total	423,672	66			

b. R Squares = ,418 (R Adjusted Square = ,370)



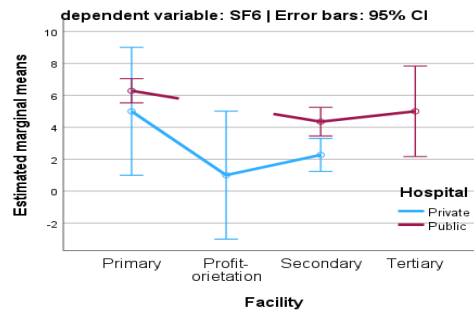
Dependent variable: SF6

Hospital	Facility	Mean	Stand. Error of Mean	N
Private	Primary	5,00	.	1
	Profit-orientation	1,00	.	1
	Secondary	2,27	1,944	15
	Total	2,35	1,967	17
Public	Primary	6,29	1,329	28
	Secondary	4,35	2,739	20
	Tertiary	5,00	1,414	2
	Total	5,46	2,197	50
Total	Primary	6,24	1,327	29
	Profit-orientation	1,00	.	1
	Secondary	3,46	2,616	35
	Tertiary	5,00	1,414	2
	Total	4,67	2,525	67

Dependent variable:SF6

Source	Sum Squares	df	Mean Squares	F	Sig.
Modelo corrigido	175,579 <sup>a</sup>	5	35,116	8,736	<,001
Hospital	122,474	1	122,474	30,469	<,001
Facility	52,553	3	17,518	4,358	,008
Hospital * Facility	,552	1	,552	,137	,712
Padrão	245,198	61	4,020		
Total corrigido	420,776	66			

a. R Square = ,417 (R Adjusted Square = ,370)



## Two-way ANOVA (2 factors: Hospital and Facility): Financial Constraints (FC)

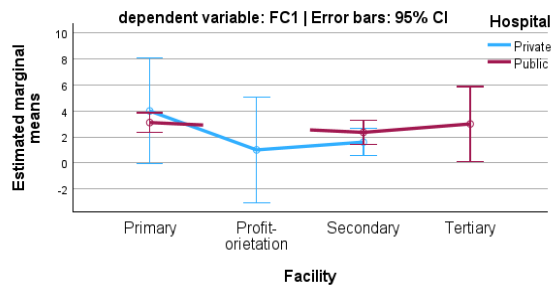
Dependent variable: FC1

Hospital	Facility	Mean	Stand. Error of Mean	N
Private	Primary	4,00	.	1
	Profit-orientation	1,00	.	1
	Secondary	1,60	1,242	15
	Total	1,71	1,312	17
Public	Primary	3,11	2,331	28
	Secondary	2,35	2,084	20
	Tertiary	3,00	1,414	2
	Total	2,80	2,204	50
Total	Primary	3,14	2,295	29
	Profit-orientation	1,00	.	1
	Secondary	2,03	1,790	35
	Tertiary	3,00	1,414	2
	Total	2,52	2,062	67

Dependent variable: FC1

Source	Sum squares	df	Mean squares	F	Sig.
Corrected model	27,888 <sup>a</sup>	5	5,578	1,346	,257
Hospital	15,187	1	15,187	3,664	,060
Facility	10,359	3	3,453	,833	,481
Hospital * Facility	2,342	1	2,342	,565	,455
Residuals	252,829	61	4,145		
Corrected Total	280,716	66			

a. R Square = ,099 (R adjusted square= ,026)



Dependent variable: FC2

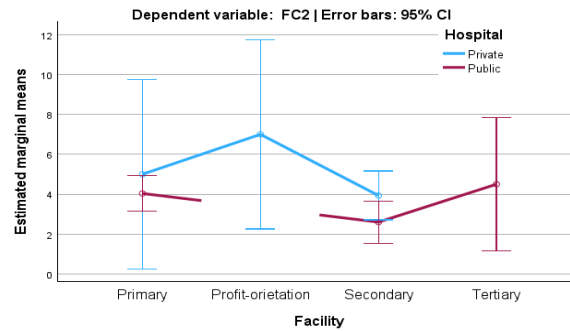
Hospital	Facility	Mean	Stand. Error of mean	N
Private	Primary	5,00	.	1
	Profit-orientation	7,00	.	1
	Secondary	3,93	2,520	15
	Total	4,18	2,481	17
Public	Primary	4,04	2,472	28

	Secondary	2,60	2,113	20
	Tertiary	4,50	2,121	2
	Total	3,48	2,393	50
Total	Primary	4,07	2,434	29
	Profit-orientation	7,00	.	1
	Secondary	3,17	2,358	35
	Tertiary	4,50	2,121	2
	Total	3,66	2,416	67

Dependent variable:FC2

Source	Sum Squares	df	Mean Squares	F	Sig.
Corrected model	41,907 <sup>a</sup>	5	8,381	1,490	,206
Hospital	6,154	1	6,154	1,094	,300
Facility	35,635	3	11,878	2,111	,108
Hospital * Facility	,118	1	,118	,021	,885
Residuals	343,198	61	5,626		
Corrected Total	385,104	66			

a. R Square = ,109 (R Adjusted Square= ,036)



Dependent variable:FC3

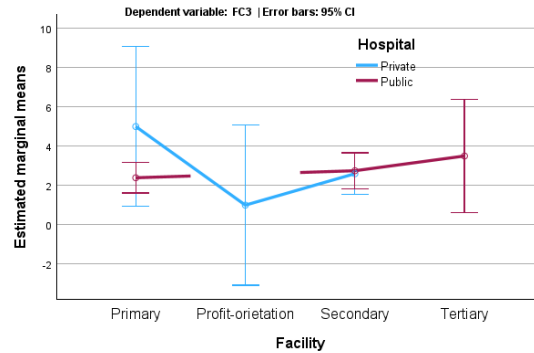
Hospital	Facility	Mean	Stand. Error of Mean	N
Private	Primary	5,00	.	1
	Profit-orientation	1,00	.	1
	Secondary	2,60	2,354	15
	Total	2,65	2,317	17
Public	Primary	2,39	2,043	28
	Secondary	2,75	1,803	20
	Tertiary	3,50	,707	2
	Total	2,58	1,907	50
Total	Primary	2,48	2,064	29
	Profit-orientation	1,00	.	1
	Secondary	2,69	2,026	35
	Tertiary	3,50	,707	2
	Total	2,60	2,000	67

Dependent variable:FC3

Source	Sum Squares	df	Mean Squares	F	Sig.
Corrected model	11,591 <sup>a</sup>	5	2,318	,560	,730

Hospital	,057	1	,057	,014	,907
Facility	4,937	3	1,646	,398	,755
Hospital *	6,597	1	6,597	1,593	,212
Facility					
Residuals	252,529	61	4,140		
Corrected Total	264,119	66			

a. R Square = ,044 (R Adjusted square= -,034)



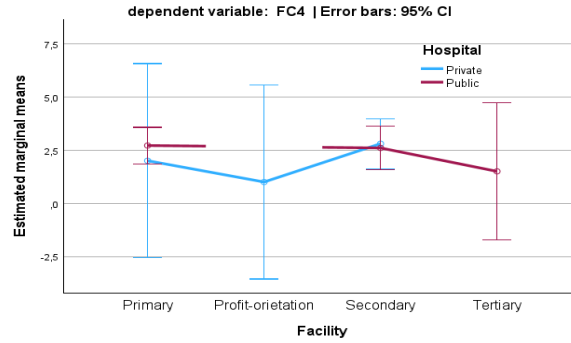
Dependent variable:FC4

Hospital	Facility	Mean	Stand. Error of Mean	N
Private	Primary	2,00	.	1
	Profit-orientation	1,00	.	1
	Secondary	2,80	2,597	15
	Total	2,65	2,473	17
Public	Primary	2,71	2,432	28
	Secondary	2,60	1,818	20
	Tertiary	1,50	,707	2
	Total	2,62	2,147	50
Total	Primary	2,69	2,392	29
	Profit-orientation	1,00	.	1
	Secondary	2,69	2,153	35
	Tertiary	1,50	,707	2
	Total	2,63	2,215	67

Dependent variable:FC4

Source	Sum Squares	df	Mean squares	F	Sig.
Corrected Model	6,257 <sup>a</sup>	5	1,251	,241	,943
Hospital	,009	1	,009	,002	,966
Facility	5,523	3	1,841	,354	,787
Hospital *	,725	1	,725	,139	,710
Facility					
Padrão	317,414	61	5,204		
Corrected Total	323,672	66			

a. R Square = ,019 (R Adjusted Square = -,061)



Dependent variable: FC5

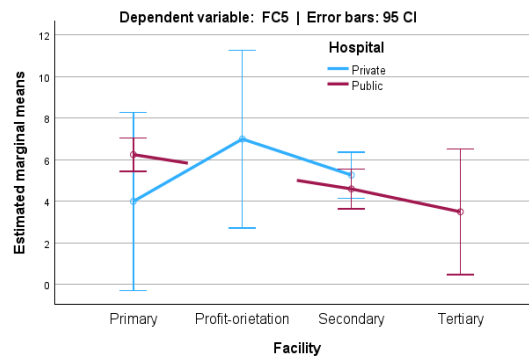
Hospital	Facility	Mean	Stand. Error of Mean	N
Private	Primary	4,00	.	1
	Profit-orientation	7,00	.	1
	Secondary	5,27	2,314	15
	Total	5,29	2,229	17
Public	Primary	6,25	1,430	28
	Secondary	4,60	2,761	20
	Tertiary	3,50	2,121	2
	Total	5,48	2,234	50
Total	Primary	6,17	1,466	29
	Profit-orientation	7,00	.	1
	Secondary	4,89	2,564	35
	Tertiary	3,50	2,121	2
	Total	5,43	2,217	67

Dependent variable: FC5

Source	Sum Squares	df	Mean Square	F	Sig.
Corrected Model	44,964 <sup>a</sup>	5	8,993	1,963	,097
Hospital	,438	1	,438	,096	,758
Facility	37,144	3	12,381	2,702	,053
Hospital * Facility	7,382	1	7,382	1,611	,209
Residuals	279,483	61	4,582		
Corrected Total	324,448	66			

a. R Square = ,139 (R Adjusted Square = ,068)

Figure: Estimated Marginal Means of variable FC5



## Method: Principal Components Analysis

Table : Descriptive Statistics

	Mean	Stand. Deviation	N
HPO3	1,73	1,783	142
HPO4	4,30	2,772	142
HPO5	5,73	2,197	142
HPO6	5,55	2,224	142
HPO7	6,68	1,158	142
HPO8	6,48	1,428	142
HPO9	6,61	1,409	142
HPO10	6,77	1,022	142
HPO11	6,76	1,024	142

Table: Correlation matrix

		HPO3	HPO4	HPO5	HPO6	HPO7	HPO8	HPO9	HPO10	HPO11
Correlation	HPO3	1,000								
	HPO4	-,087	1,000							
	HPO5	-,354***	,053	1,000						
	HPO6	-,158*	,297** *	,226** *	1,000					
	HPO7	-,208***	,028	,338** *	,279** *	1,000				
	HPO8	-,115	,172**	,185**	,249** *	,360***	1,000			
	HPO9	-,233***	,010	,393** *	,201**	,473***	,518***	1,000		
	HPO10	-,265***	-,028	,360** *	,275** *	,625***	,514***	,670** *	1,000	
	HPO11	-,207***	,023	,242** *	,286** *	,586***	,627***	,553** *	,753***	1,000

\*\*\*, \*\*, \* statistical significance at the 1%, 5%, 10% level;

### KMO e Bartlett Tests

Kaiser-Meyer-Olkin measure of sampling adequacy.	,817
Bartlett's test of sphericity	Aprox. Qui-quadrado
	445,234
	gl
	36
	Sig.
	<,001

Table: Total Variance Explained

Component	Initial Eigenvalues			Rotated Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,750	41,671	41,671	3,271	36,346	36,346
2	1,248	13,863	55,534	1,492	16,581	52,927
3	1,101	12,238	67,772	1,336	14,845	67,772
4	,727	8,080	75,852			
5	,649	7,213	83,065			
6	,564	6,268	89,334			
7	,428	4,759	94,093			
8	,332	3,694	97,787			

9	,199	2,213	100,000		
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Extraction Method: Principal Components Analysis.

Table: Rotating component matrix

	Component		
	1	2	3
HPO3	-,078	-,804	-,097
HPO4	-,064	-,001	,877
HPO5	,248	,765	,062
HPO6	,261	,191	,684
HPO7	,700	,266	,051
HPO8	,752	-,100	,276
HPO9	,752	,274	-,009
HPO10	,860	,251	-,009
HPO11	,878	,067	,087

## Results of regression analysis

### Model 1: Private Hospitals

Table: Descriptive Statistics of variables on model 1

	Mean	Stand. deviation	N
HPO1	1,87	1,971	142
Principal Component 1	,00	1,00	142
Principal Component 2	,00	1,00	142
Principal Component 3	,00	1,00	142

Table: Estimated regression coefficients of model 1

Variable	Coefficient	Standard Error	t-stat	Sig.
Constant	1,873	,145	12,879	<,001
Principal Component 1	-,321	,146	-2,197	,030
Principal Component 2	-,917	,146	-6,282	<,001
Principal Component 3	-,025	,146	-,168	,866
$\hat{\sigma}_\varepsilon$			1.733	
F-Statistics			14.774 (sig. <,001)	
R (multiple correlation coefficient)			0.493	
$R^2$			0.243	
$R^2$ adjusted			0.227	

Dependent variable: HPO1

### Model 2: Government Hospitals

Table: Descriptive Statistics of variables on model 2

	Mean	Stand. Deviation	N
HPO2	6,37	1,674	142
Principal Component 1	,00	1,00	142
Principal Component 2	,00	1,00	142
Principal Component 3	,00	1,00	142

Table: Estimated regression coefficients of model 2

Variable	Coefficient	Standard Error	t-stat	Sig.
Constant	6,366	,112	57,046	<,001
Principal Component 1	,420	,112	3,755	<,001
Principal Component 2	,873	,112	7,795	<,001
Principal Component 3	,362	,112	3,237	,002
$\hat{\sigma}_\varepsilon$			1.330	
F-Statistics		28.444 (sig. <,001)		
R (multiple correlation coefficient)		0.618		
$R^2$		0.382		
$R^2$ adjusted		0.369		

Dependent variable: HPO2