

**Government Expenditure, Institutional Quality and Health Outcomes in
Nigeria**

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Certification

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Dedication

To my wife Halimat whose love, patience and support have been sustaining me throughout the program.

To my children Aminat, Hamzat and Ameerah, for being considerate for the fatherly love they were deprived of at the time they needed it most.

DO NOT COPY: Lead City University, Nigeria

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Abstract

Deteriorating health outcome in the face of high public health expenditure and weak institutional settings in Nigeria over the decades has prompted the need to work on the interrelationship among public health expenditure, institutions and health outcomes (measured by life expectancy and infant mortality) in Nigeria. The scope of the study covered a period of thirty seven years, 1984-2020. The objectives were formulated and evaluated using appropriate statistical methods ranging from charts, descriptive statistics, unit root, and Autoregressive Distributed Lag Estimator. The study found that government health expenditure negatively and significantly influenced life expectancy in the short run. However, the positive impact of public health spending on life expectancy in the long run is significant at 5% level. It shows that increasing government health spending increases life expectancy. This direct relationship, however, emphasizes the importance of improving value for money in health-care systems. It includes a greater emphasis on health promotion and other low-cost interventions, as well as a reduction in ineffective spending and waste. Also, institutions negatively influenced life expectancy both in short run and long run. It means that weak institutional settings do not have the impetus to improve life expectancy and curtail infant mortality. Finally, institutions do not have the impetus to drive government health expenditure towards influencing health outcomes positively. Thus, the effectiveness of health and the way to reduce infant mortality or improve life quality is conditioned by the status of good institutions. The study suggests the need for government to increase its expenditure on healthcare services and facilities so as to improve the health of the country's population. Further, proper governance and institutional handling must be maintained to ensure appropriate and efficient use of public sector health funds to improve health outcomes.

Keywords: Public health spending, governance, life expectancy, infant mortality, Nigeria.

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Chapter One

Introduction

1.1 Background to the Study

The health outcomes include modifications to an individual's, a population's, or a group's health¹. Health economist activists and the World Health Organization frequently advocate world leaders (both developed and underdeveloped) to designate health as one of the key priorities in national budgets due to the significance of high and excellent health in economic growth and development agendas. It denotes the prevention of diseases that can be prevented, the complete healing of diseases that can be cured, or the long-term care of diseases that cannot be prevented or cured. According to a professor, good health is crucial for economic development and progress because, in general, ill people are less or unproductive². According to the National Health Information Management Group, a specific intervention or set of interventions by the government, non-governmental organizations, cooperatives, individuals, and foreign assistance can fully or partially sustain good and high-quality health outcomes².

In addition, several studies noted that health interventions can be direct or indirect, but they added that in practice, indirect interventions are more common and also help to mobilize direct health initiatives or provide assistance with doing so³. For instance, the prevalence of smoking decreased in one demographic group while rising in another, the quality of nutrition improved in one group while declining in another, and the noise level at work may have decreased while increasing in other locations⁴. It is sufficient to mention that there are many indirect interventions in the health sector, but the study at hand concentrated on government health spending, one of the most prevalent in the global economy, and Nigeria is not an exception.

Health expenditure is defined by the World Health Organization as the sum of capital investments in healthcare infrastructure and the ultimate consumption of healthcare products and services that are intended to improve health outcomes⁵. Regardless of the principal function or activity of the entity delivering or paying for the associated health services, health expenditures are categorized according to their primary or predominant goal of improving health, according to a study⁶. They went on to say that one of the key contributors to the availability of healthcare facilities, necessities, and services - which in turn contributes to positive and high-quality health outcomes - is health expenditure.

In the twenty-first century, economists from all over the world have made great efforts to examine the role that public spending on health care has played in the expansion of human capital development and health services. This is due to the significance of health care in the growth and development agenda as well as the role that health expenditure plays in its support system. Public health expenditures have been acknowledged as a significant component of fiscal outlays in most developed nations of the world, particularly considering the various research arguments from economic literature⁵. They are accountable for the global standard in the health sectors. It's interesting to note that this reasoning does not apply to sub-Saharan African nations, notably Nigeria, which have regularly budgeted for the health sector over the past 20 years despite continuing to rank last in terms of health facilities and services⁴.

Looking specifically at Nigeria's 2017 authorized health budget, the health sector will get ₦380.46 billion (USD1.05 billion), or 13% of all non-debt recurrent expenditures⁷. According to the breakdown, Ministry of Health receives the largest portion - 79.7% - of all funds allocated to the health sector. The remaining 20.3% is split among the National Health Insurance Scheme (NHIS), the procurement of medical equipment, medical consulting, State House Medical Center,

and the National Agency for the Control of AIDS (NACA), among others⁷. The approved health sector computation yielded a total allocation of N380.46 billion for 2017 (health related expenditure, including the Federal Ministry of Health and its agencies), which represents a 7.54% increase in nominal terms above the ₦353.5 billion allocated in 2016. However, as stated in the 2017 budget, the nominal percentage of the total budget decreased from 5.7% to 5.1%. According to the Ministry of Health's (headquarters) allocation, the health sector received 81% of the entire allocation, with the remaining 19% being split among other agencies. According to a research paper⁹, Nigeria's health sector receives a significant amount of healthcare development assistance despite the country's large health budget allocation. This suggests that health care inflows and assistance should have reached Nigeria through official development assistance, but the physical evidence points to the contrary⁸. In reality, grants made up \$3.2 billion of the \$6 billion in official development aid that was given to the healthcare sector⁸.

Evidence shows that Nigerians travel widely for medical care overseas, resulting in significant exchange rate differences, notwithstanding the significant healthcare development aid and budgetary health allocation⁹. Despite the national health purpose of providing health care through an annual streaming expenditure plan for all categories of Nigerians¹⁰, this record shows the country's inadequate and inefficient manner of financing as well as weak organisational health delivery structure. In spite of the aforementioned amount, Nigeria, like other poor nations, continues to struggle with serious preventable health conditions, limited or inadequate access to quality healthcare, problems with water and sanitation, maternity and child health, and other issues⁹. It's interesting to note that the nation spends 3.7% of its GDP on health care, which is far less than the world average but on level with many of its neighboring nations¹¹. Given a slight increase in Nigeria's health spending, it is anticipated that health outcomes will significantly

improve. However, statistical data has demonstrated that focused preventative and curative health outcomes are dominating in Nigeria. The mortality rates for HIV/AIDS, tetanus among neonates, tuberculosis, diarrhea, malaria, measles, pneumonia, and maternal and child mortality rates are a few examples of such health outcomes¹².

One of the underlying causes of the acute conditions in developing countries has been attributed to poor institutional settings^{13,14}. In contrast to developing countries, industrialized countries' institutional arrangements have not only influenced their economic structure but also the rate at which public money are allocated to enhancing health care services and facilities as well as people's health status. As a result, the moral foundation of sustainable growth, sound macroeconomic policies, and overall economic development has been praised as being provided by institutions and governance quality¹⁴. It follows that institutions, public health spending, and health outcomes are all related. Additionally, it is crucial to look at the associations because whereas less developed countries with weak institutions struggle with limited government health spending, rich countries with effective institutional systems have enough of public funding available. Every responsible and responsive government's primary goal is to maintain and ensure that its citizens have livable and conducive conditions, and this may not be accomplished if institutions fail to carry out their mandated duties.

Even though Nigeria's revenue per capita has increased dramatically over the past several years, this has had less of an influence on government spending, which has a big negative impact on the country's low health status because of poor institutional quality. Considering the aforementioned, it is crucial to evaluate the contribution of public health spending to advancements in health outcomes (such as life expectancy and the human mortality rate) in Nigeria. The thesis of this study is that if public spending is crucial to enhancing individuals' access to healthcare, then it is

important to evaluate how government spending contributes to the improvement of health status within the context of the health production function. The study also aims to investigate how institutions in Nigeria mediate the link between public health spending and health outcomes. This study adds to previous research by considering two health outcomes: life expectancy at birth and adult mortality rates, with public health expenditure and institutions serving as the primary predictors, in addition to per capita income, urbanization, public health spending, and infant and under-five mortality rates.

1.2 Statement of the Problem

The development of health status, particularly in developing nations, is extremely difficult, and widespread large-scale health issues, like the high infant mortality rate and short life expectancy, are brought on by the lack of adequate infrastructure and resources for healthcare. Statistics show that, in addition to having healthcare budgets that are far lower than those of developed nations, the limited existing health infrastructures are not evenly distributed between urban and rural areas. Access to and availability of better healthcare services lowers mortality and financial risk while resolving poverty challenges. In this context, efficient and adequate health spending is still essential for enhancing health status. Health spending as a proportion of GDP averaged 0.32 percent between 1986 and 1990, and it barely changed from 1995 and 1999, when it averaged 0.33 percent. When comparing Nigeria's performance to that of other African nations, it was found that in 1990, public spending on health as a percentage of GDP was just 2.7%, compared to 3.5% in Ghana, 4.3% in Kenya, and 4% between 1995 and 1997 in Seychelles¹⁵. The inverted form of the health expenditure pyramid exacerbates the low level of spending on the health sector in most poor nations. A small proportion of people who live in metropolitan areas receive

expensive medical treatment, which accounts for around three-quarters of total public health spending. Hospitals account up a significant percentage of the health budget, 80 to 90 percent in some nations, and nearly all of them are in urban areas. Only around 60% of the population has access to primary healthcare, though. Additionally, a substantial section of the underprivileged and those residing in rural areas are left without access to the healthcare system and are left to rely on traditional and home treatments¹⁶.

In recent years, it has been clear that the impact of human capital formation, particularly health status, plays a significant role in predicting economic growth not only within individual nations but also between nations and over time¹⁷. As a result, health has been given a lot of attention at all levels due to its potential effects on people's well-being and economic progress¹⁸. A person's illness pattern, health status, and overall quality of life, which has an impact on their welfare, are largely determined by the accessibility of healthcare services and the physical, biological, epidemiological, and socioeconomic environment in which they reside. It is implied that investing a reasonable sum of money in healthcare is necessary for a nation to prosper economically. In this approach, encouraging government participation in basic roles of allocation, distribution, stabilization, and regulation, particularly when or when market shows inefficient. Despite economic progress in Nigeria, social and demographic indices paint a bleak image. When compared to other emerging nations, Nigeria still has one of the highest infant death rates and a short life expectancy. The allocation of financial and human resources in the health industry is also markedly unequal. Nevertheless, Nigerian health spending is less than 16% of GDP¹⁹.

Nigeria reportedly has one of the highest rates of maternal mortality in the world in 2015 at the national level. For instance, Nigeria was estimated to be responsible for 58,000 maternal deaths

(or roughly 19 percent) of the 303,000 maternal deaths recorded globally in that year alone, a statistic that presents significant difficulties for the country's policymakers²⁰. The overall appalling performance of Nigeria's health system over the years has been attributed to a number of causes. Among others, they include subpar medical facilities, insufficient management and human resources, and insufficient money for healthcare²¹. Poor health care financing has come to be recognized as one of the many elements that work against Nigeria's healthcare system's effectiveness. The high prevalence of child mortality and the short life expectancy observed over time have been partially attributed to this persistently inadequate status of health care financing. Considering the aforementioned, this study aims to empirically explore the relationship between public spending, institutions, and health outcomes in Nigeria, using child mortality and life expectancy as proxies for health outcomes for the years 1986 to 2020.

1.3 Research Questions

This research study provides answers to the following research questions:

- a) What is the effect government health expenditure on health outcomes in Nigeria?
- b) How have institutions impacted on human health outcomes in Nigeria?
- c) What is the interactive effect of institutions and government health expenditure on human health outcomes in Nigeria?

1.4 Objectives of the Study

The main objective of this research study is to investigate the interrelationship between public health expenditure, institutions, and health outcomes in Nigeria. The specific objectives are to:

- a) Investigate the effect of government health expenditure on health outcomes in Nigeria;
- b) Examine the impact of institutional quality on human health outcomes in Nigeria; and
- c) Determine the interactive effects of institutions and government health expenditure on human health outcomes in Nigeria.

1.5 Hypotheses

The following research null hypotheses tested in this study are stated as follows:

H₀₁: There is no significant relationship between government health expenditure and health outcomes in Nigeria.

H₀₂: Institutions have no significant impact on human health outcomes in Nigeria.

H₀₃: Government health expenditure and institutions have no significant impact on human health outcomes in Nigeria.

1.6 Significance of the Study

The Nigerian government uses a variety of fiscal tools, including the operation of the budget deficit, to have a bigger impact on the country's economic activity. But what impact does this have on indicators of human health, such as life expectancy, infant mortality, maternal mortality, etc., which act as conduits for the influence of public spending on economic growth¹⁸. For instance, anticipated government spending has climbed significantly in Nigeria over time,

despite the fact that this has not resulted in an improvement in the growth of human welfare. This study's timeframe might therefore investigate these consequences and offer policy alternatives to ensure better health outcomes (i.e. high life expectancy and low mortality rate).

Because human wellbeing is one of the top priorities on the development agenda, the government's responsibility in ensuring improvements in health outcomes cannot be overstated. Ensuring proper progress in human health is essential for a society's overall economic development as well as for the development of its human capital and national economy. Government spending is quite favorably correlated with both life expectancy and per capita income, which is crucial for nations to achieve sufficient economic potential for continued development. This vicious cycle of low per capita income, dwindling life expectancy, high death rates, and generally dismal economic consequences poses a severe development challenge. An economy must improve to increase production, promote economic growth and development, and lessen poverty. Because it tends to raise life expectancy and lower death rates, the provision of proper health facilities and services is anticipated to have a favorable impact on the future of people, societies, and countries. Therefore, an increase in government spending, life expectancy, and mortality rates are seen as prerequisites for a nation's long-term socioeconomic advancement and her key development indices.

Therefore, it is essential to comprehend how government institutions and spending affect life expectancy and mortality rates to develop public policies and social programmes to mitigate their effects on any economy, particularly in less developed nations since they are more vulnerable to increases in government spending. In fact, insufficient government funding has caused enormous hardship in many nations, particularly in Sub-Saharan Africa, Latin America, and Asia, with negative macroeconomic effects such as high child mortality and short life spans. At the national,

regional, and international levels, immediate and coordinated action is required, focusing on both comprehensive medium- to long-term solutions and urgent short-term actions. Furthermore, there is widespread agreement that the decline in government revenue is not a passing trend but rather a structural shift and a prolonged ascent to a new, higher plateau for food security. The supply of social infrastructure is essential for achieving rising life expectancy and low mortality rates, which are essential for accomplishing the sustainable development goals and economic development, making this study pertinent to policy makers and the government. The study will be significant for academics and researchers as it will update existing knowledge about the phenomena and provide a crucial body of literature for studies to come on government spending, institutions, and health outcomes in Nigeria.

1.7 Scope of the Study

The study's time frame spans from 1986 through 2020. The secondary data will come from the World Development Indicators (2020), International Country Risk Guide (ICRG), the Statistical Bulletin (2020), and the Central Bank of Nigeria (CBN). To precisely encompass the important structural economic phases that have occurred in Nigeria since a decade following independence, this research time frame was selected. The economic eras include the time of the National Economic Empowerment Development Strategy (NEEDS) as well as the Pre-Structural Adjustment Programme (SAP), Structural Adjustment Programme (SAP), and Post-Structural Adjustment Programme (SAP).

1.8 Operational Definition of Terms

Public Expenditure: This term refers to the acquisition of goods and services, including public consumption and investment, as well as transfer payments made up of capital transfers and income transfers (pension, social benefits).

Institutions: These are the written and unwritten laws and rules that govern how social, political, and economic relations are organized.

Health outcomes: These are modifications in health as a result of actions or particular investments in or interventions with regard to healthcare.

Life Expectancy: This term refers to the typical number of years that a person is anticipated to live in each economy after birth.

Child Mortality: The average number of children under the age of five who pass away each year in each nation.

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Chapter Two

Literature Review

This chapter presents the review of literature and theoretical framework. Specifically, the first section provides the explanation of key concepts such as public expenditure, institutions, and human health outcome. Section 2.2 reviews salient theories on public expenditure, institutions, and human health outcome. In section 2.3, review of empirical studies was presented. The last two sections i.e., sections 2.4 and 2.5 provide the gaps in literature and theoretical framework.

2.1 Conceptual Issues

2.1.1 Government and Health Expenditure

All government consumption, investment, and transfer payments are included in government spending or expenditure^{1,2}. The acquisition of goods and services for current use by governments to directly satisfy the individual or collective needs of the community is classified as government final consumption expenditure in national income accounting. Government investment includes the purchase of goods and services by the government that are intended to provide future benefits, such as infrastructure investment or research spending (government gross capital formation). These two types of government spending, on final consumption and on gross capital formation, together account for a sizable portion of GDP. Government spending can be funded by borrowing from the government, taxes, custom duties, the sale or lease of natural resources, and various fees such as national park entry fees or licensing fees³. When governments borrow money, they must pay interest on the borrowed funds⁴. Government spending changes are an important component of fiscal policy used to stabilize the macroeconomic business cycle.

Government spending refers to money spent by the government on goods and services such as education, healthcare, social protection, and defense.

a) In national income accounting, government final consumption spending occurs when the government acquires goods and services for current use in order to directly satisfy the individual or collective needs and requirements of the community.

b) Government investment occurs when the government acquires goods and services for future use. This includes public consumption and investment, as well as transfer payments such as income transfers.

Government spending enables governments to produce or purchase goods and services necessary to meet the government's social and economic objectives. The role and size of governments around the world have changed dramatically over the years. Public spending increased dramatically in the twentieth century, as governments around the world began to spend more money on education, healthcare, and social protection. At the moment, governments in developed countries spend more as a percentage of GDP than governments in developing countries. Furthermore, governments all over the world rely on the private sector to produce and manage a country's goods and services, as well as to finance, design, build, and operate infrastructure projects through public-private partnerships. The total value of public-private partnerships designed to increase spending on public infrastructure projects in low and middle-income countries more than doubled between 2005 and 2010.

2.1.1.1 Purposes of Government Spending

- a) To provide goods and services that the private sector does not provide, such as defense, roads, and bridges; merit goods such as hospitals and schools; and welfare payments and benefits, such as unemployment and disability benefits.
- b) To improve the macroeconomy's supply-side, such as spending on education and training to increase labor productivity.
- c) To provide subsidies to industries that may require financial assistance for operation or expansion. Because the private sector is unable to meet such financial requirements, the public sector plays a critical role in providing necessary assistance. Transport infrastructure projects, for example, do not attract private finance unless the money was invested in the industry.
- d) To aid in the redistribution of income and the promotion of social welfare.

In a nutshell, health expenditures are defined by their primary or predominant purpose of improving health, regardless of the entity providing or paying for the associated health services. According to the World Bank, health expenditure includes the provision of health services (both preventive and curative), family planning activities, nutrition activities, and health-related emergency aid, but excludes the provision of water and sanitation⁵. The World Health Organization, on the other hand, defines health expenditure as the sum of final consumption of health goods and services plus capital investment in healthcare infrastructure⁶. In this context, health is an important factor in determining a country's or region's standard of living. Health is visualized as an input into and outcome of the growth process, integrated socio-economic upliftment based on health status improvements, which depicts a reflection and cause of ongoing

development efforts towards human welfare⁷. It is a well-known fact that improvements in population health have a positive impact by generating social returns to individuals and communities. On the one hand, this explains why improved human capital is better able to participate in economic activities, improved productivity at the individual level, and, as a result, higher living standards. Better health, on the other hand, will result in fewer absences from work and a lower disease burden, which translates into lower economic costs in terms of providing health services and thus better coverage and management of available resources⁷. While healthcare consumption represents an individual's investment in health, healthcare infrastructure provision and improvement, including healthcare personnel, represent a state's investment in health. As a result, the state provides healthcare facilities and personnel, and individuals use these facilities to improve their health.

Individuals' investments in health through medical care consumption are thus dependent on the availability and accessibility of healthcare services. Healthcare is one of several inputs in the health production function, according to the production function framework. As a result, healthcare is viewed as an input in the production of good health outcomes such as lower mortality and higher life expectancy. Thus, healthcare is viewed as an input in producing outcomes such as zero or low mortality and higher life expectancy, implying the presence of health expenditure in health production. Healthcare, regardless of approach, is one of the means by which individuals can improve their health status. Individuals' ability to engage in such investment or production activity, however, is dependent on the availability and accessibility of health resources, whether public or private. Because of the externality that health presents, as well as issues of income poverty, welfare, and inequity, government provision of healthcare (including public health services) is required⁷.

2.1.2 Institutions

The term “institutions” refers to a broad concept that encompasses the rule of law, individual rights, and high-quality government regulation and services. Much of the pioneering work on institutional quality was done by North⁸. He defines institutions as human-created constraints that shape human interaction. Essentially, in North's framework, institutional quality improves as executive power is limited. Such constraints can be formal rules or informal constraints, and their strength is determined by the characteristics of those who enforce them. The idea is that limiting executive power reduces a country's executives' de jure position of being above the law. And this ensures that individuals, entrepreneurs, and critics of the current economic system are legally protected in their ventures and investments in human and physical capital, as well as new technological endeavors. According to Bruinshoofd, such efforts are critical to accelerating i) the widespread adoption of frontier technology available elsewhere and ii) pushing out the technological frontier by investing in R&D, particularly in disruptive technologies. Such endeavors are inherently risky, and their disruptive nature makes them a challenge to those in positions of formal and informal power, whether political or economic⁹. As a result, adequate high-quality institutions are required to ensure that both protesters and incumbents receive equal legal protection.

Three notable scholars examine de jure executive power from a broader perspective that includes both de jure and de facto power¹⁰. There is also a distinction between formal and informal power, as well as political and economic power. In such a more complex institutional setting, a proper balance of power, whether formal or informal, is sufficient to ensure that individuals, entrepreneurs, and challengers to the current economic system are protected de facto in their ventures and investments in human and physical capital, as well as new technological endeavors.

These authors employ empirically the perceived risk of expropriation as a key indicator of institutional quality¹¹. The difference between this institutional view and North¹⁹ may appear minor, but it is critical in settings where de jure political power is concentrated in different groups than de facto economic power, limiting the exercise of de jure political power.

Furthermore, a scholar²³ emphasized the individual's rights and opportunities¹². Easterly makes the case, with an explicit reference to Hayek's line of thought, that any type of long-term economic progress should be based on respect for individual rights^{12,13}. His focus is on the very poor in developing countries, but the line of inquiry applies to both the poor and the rich. The key message is as straightforward as it is critical: long-term progress is always and everywhere the result of investment. Investments, whether in education, physical capital, or new technology, are almost always sunk. An investment is made with the expectation of reaping the benefits under certain conditions. This could be the right to practice a profession for which someone has been studying for several years, the right to operate a plant into which several physical investments have been made, or the right to develop and market new products and services derived from technology into which someone has been funding research. If these individual rights are (expected to be) easily violated, investments will not be made, and progress will not be made as a result.

There is an intimate link here with the research strand focusing on 'trust societies,' in which trust amongst individuals in economic transactions and trust of individuals in their legal rights is critical in determining the institutional setting that generates economic progress¹⁴. In this sense, legal rights can be interpreted as forms of formalized trust. According to one line of inquiry, such legal rights generate 'inclusive institutions,' institutions whose rights and protection include all,

regardless of position in society or origin¹⁰. This is in contrast to 'extractive institutions,' which serve to extract resources from the masses for the benefit of the ruling elite.

Furthermore, a scholar considers effective public services to be an essential component of high-quality institutions¹². Easterly contends that legal and political rights are counterproductive in developing countries where public services are inadequate. Consider machines that are not running due to chronic power outages caused by a lack of public investment in and maintenance of electricity supply infrastructure. The significance of such public services is easily extended to high(er) income nations, where infrastructure shortages or cumbersome and ineffective bureaucracy, for example, impede full exploitation of business opportunities (e.g., some authors for an application to Italy)¹⁵.

The World Bank measures institutional quality using seven variables, all of which are available on its website: the six World Bank Governance Indicators and the Ease of Doing Business indicator. The indicators chosen are consistent with the relevant literature. The World Bank Global Governance Indicators (WGI) are used in studies¹⁶. The World Bank constructs institutional quality on an annual basis, allowing us to track institutional improvements or deterioration over time. In addition, a study includes the Ease of Doing Business indicator²⁸, which captures the quality of processes and administrative work in addition to the WGI's 'regulatory quality'. Thus, institutional quality consists of the following seven key dimensions:

Voice and Accountability: the extent to which a country's citizens can choose and challenge its government, thereby limiting executive power.

Political Stability and the Absence of Violence: The lower the likelihood of political instability and/or politically motivated violence, the more incentivized citizens are to invest in their own prosperous future¹⁷.

Government Effectiveness: measuring the quality of public services and their independence from political pressures, thereby creating a favorable environment for private investment.

Regulatory Quality: the government's ability to develop and implement sound policies and regulations that allow and promote private sector development, thereby establishing uniform rules of economic engagement.

Rule of Law: the quality of contract enforcement, property rights, the police, and the courts, i.e., the enforcement of society's rules.

Control of Corruption: the stronger the control of corruption, the more economic success is determined by hard work and competence rather than connections and bribery; and

Ease of Doing Business: encompasses a wide range of factors that determine how conducive the regulatory environment is to business operation.

A scholar transformed the Ease of Doing Business Indicator into a z-score using its absolute distance to frontier component⁹. The simple average of this normalized Ease of Doing Business Indicator and the six WGI's is then computed (which are already expressed as normalized values). The operationalized institutional quality indicator must be interpreted as a relative score; it expresses institutional quality relative to the global average, normalized by global variation around this average.

2.1.3 Health Outcomes

According to the World Health Organization, a health outcome is a measure of change in an individual's, group's, or population's health that is attributable to an intervention or series of interventions. Outcome measures (mortality, readmission, patient experience, and so on) are the quality and cost goals that healthcare organizations strive to meet. Health outcomes are defined as changes in an individual's, group's, or population's health status that are attributable to a planned intervention or series of interventions, regardless of whether such an intervention was intended to change health status¹⁸. Health outcomes reflect a county's current state of health¹⁹. They reflect the physical and mental well-being of residents in a community by using measures that represent not only the length of life but also the quality of life. The many factors that influence health, from the quality of medical care received to the availability of good jobs, clean water, and affordable housing, all have an impact on health outcomes. Local, state, and federal programmes and policies all have an impact on these health factors. A glance at data on health outcomes reveals whether or not health improvement programmes in a county are effective¹⁹. A non-smoking ordinance in restaurants, for example, could reduce smoking rates and, as a result, lead to longer lives.

An intervention or series of interventions that results in a change in the health of an individual, a group of people, or a population. Mortality, readmission, patient experience, and other outcomes are examples of outcome measures. Health outcomes are events that occur as a result of an intervention. These can be clinically measured (physical examination, laboratory testing, imaging), self-reported, or observed (such as gait or movement fluctuations seen by a healthcare provider or caregiver). Health outcomes differ significantly depending on where we live, how much money we make, our race and ethnicity, and other factors. It is critical to delve into the

data to understand where and why health outcomes vary across a county, how a variety of health factors interact to influence these outcomes, and how our policies and programmes support or limit opportunities for health for all. This research study takes into account two health outcomes:

a) Life expectancy and premature death are measured by length of life. It examines how long people in a community live and determines whether or not people die prematurely. It also prompts consideration of what causes premature deaths.

b) Mortality rate is the number of deaths (in general or due to a specific cause) in a specific population per unit of time, scaled to the size of that population. It is represented by the child mortality rate, which is the probability of a child dying between birth and the age of five, expressed per 1,000 live births.

2.2 Theoretical Review

2.2.1 Modernization Theory of Development

This theory is based on the ideas of German sociologist Max Weber and was expanded upon by Talcott Parsons. Modernization theory both attempts to identify the social variables that contribute to social progress and development of societies and human health outcomes. Critics of modernization theory include socialist and free-market ideologies, world-systems theorists, globalization theorists, and dependency theorists, among others. Modernization theory emphasizes both the process of change and the responses to that change. It also considers internal dynamics, as well as social and cultural structures, as well as the adoption of new technologies²⁰.

Modernization is a model of a gradual transition from a "pre-modern" or "traditional" society to a "modern" society. According to modernization theory, traditional societies will evolve as they adopt more modern practices. Modernization theory proponents argue that modern states are

wealthier and more powerful, and that their citizens have more freedom to enjoy a higher standard of living and human welfare. Modernization is required or preferable to the status quo due to developments such as new data technology and the need to update traditional methods of transportation, communication, and production. This point of view makes critique difficult because it implies that such developments control the limits of human interaction rather than the other way around. However, it appears to imply that human agency controls the speed and severity of modernization. Instead of being dominated by tradition, societies undergoing modernization are said to arrive at forms of governance dictated by abstract principles. According to the theory, as modernization takes hold, traditional religious beliefs and cultural traits become less important²¹.

Modernization is understood in three ways today: a) as the internal development of Western Europe and North America in relation to the European New era; b) as a process by which countries that do not belong to the first group of countries aim to catch up with them; and c) as processes of evolutionary development of the most modernized societies (Western Europe and North America), i.e., modernization as a continuous process. Historians associate modernization with urbanization, industrialization, and the spread of education. According to one scholar, "urbanization was accompanied by modernization and the rapid process of industrialization"²³. Modernization is linked to an overarching process of rationalization in sociological critical theory. When a society's modernization progresses, the individual becomes increasingly important, eventually supplanting the family or community as the fundamental unit of society. It is also covered in traditional Advanced Placement World History courses.

2.2.2 Linear Stages of Growth and Development Model

The linear stage of growth and development model is an economic model heavily influenced by the Marshall Plan, which was used to revitalize Europe's economy following WWII, and it assumes that economic growth and development can only be achieved through industrialization. Local institutions and social attitudes can stifle growth and development, especially if they influence savings and investment rates. This model considers the constraints impeding economic growth to be internal to society²⁴. According to the linear stages of growth and development model, a properly designed massive injection of capital combined with public sector intervention would eventually lead to a developing nation's industrialization and economic development²⁵.

The most well-known example of the linear stages of growth model is the Rostow's stage of growth and development model²⁵. Rostow identified five stages that developing countries must pass through in order to achieve advanced economy status: (a) traditional society, (b) preconditions for take-off, (c) take-off, (d) drive to maturity, and (e) age of high mass consumption. In contrast to Marxism, which holds that sectors should develop equally, the scholar argued that certain strong sectors could lead economic development. To achieve take-off, a country must follow some development rules, according to Rostow's model: (a) a country's investment rate must be increased to at least 10% of its GDP, (b) one or two manufacturing sectors with a high rate of growth must be established, and (c) an institutional, political, and social framework must exist or be created to promote the expansion of those sectors²⁶.

The Rostow model has serious flaws, the most serious of which are: (a) the model assumes that development can be achieved through a basic sequence of stages that is the same for all countries, a dubious assumption; (b) the model measures development solely by the increase in GDP per capita; and (c) the model focuses on development characteristics but does not identify the causal

factors that lead to development. As a result, it overlooks the social structures that are required to foster development²⁶.

Economic modernization theories such as Rostow's stages model were heavily influenced by the Harrod-Domar model, which mathematically explains a country's growth rate in terms of savings rate and capital productivity. In economic modernization theory, heavy state involvement has frequently been considered necessary for successful development. Scholars believe that a large push model in infrastructure investment and planning is required to stimulate industrialization, and that the private sector will not be able to provide the resources on its own²⁷.

2.2.3 Dependency Theory

Dependency theory, proposed by Paul A. Baran in 1957 from a Marxian perspective, holds that resources flow from a "periphery" of poor and underdeveloped states to a "core" of wealthy states, enriching the latter at the expense of the former. The way poor states are integrated into the "world system" impoverishes poor states while enriches rich ones, according to dependency theory. This theory was officially developed in the late 1960s, following World War II, as scholars looked for the root cause of Latin America's lack of development²⁸. According to dependency theory, poor nations provide natural resources and cheap labour for developed nations, without which developed nations would not be able to maintain their current standard of living. When developing countries attempt to reduce the Core's influence, developed countries obstruct their efforts. This means that poverty in developing countries is caused not by their disintegration in the global system, but by the manner in which they are integrated into it.

The theory arose as a reaction to modernization theory, an earlier development theory that held that all societies progress through similar stages of development, that today's underdeveloped areas are thus in a similar situation to that of today's developed areas at some point in the past,

and that the task of helping the underdeveloped areas out of poverty is thus to accelerate them along this supposed common path of development, through various means such as investment. Dependency theory disagreed, arguing that underdeveloped countries are not simply primitive versions of developed countries, but have distinct features and structures of their own, and, more importantly, are the weaker members of a global market economy²⁹. Some authors have argued that it is still relevant as a conceptual orientation to the global distribution of wealth³⁰. Liberal reformists and neo-Marxists are the two main types of dependency theorists. Liberal reformists usually advocate for targeted policy interventions, whereas neo-Marxists advocate for a command-centered economy³¹.

2.2.4 Human Development Theory

The most well-known human development theorists are Amartya Sen and Mahbub ulHaq. Human development theory is a theory that draws on ideas from various fields, including ecology, sustainable development, feminism, and welfare economics. It seeks to avoid normative politics by focusing on how social and instructional capital can be used to maximize the overall value of human capital in an economy. Sen's work focuses on capabilities: what people can do and be. These abilities, not the income or goods they receive (as in the Basic Needs approach), determine their well-being. This central concept also underpins the development of the Human Development Index, a human-focused measure of development pioneered by the UNDP in its Human Development Reports; this approach has gained popularity around the world, with indexes and reports published by individual countries, including the American Human Development Index and Report in the United States. Sen's economic work is best classified as welfare economics, which assesses the effects of economic policies on people's well-being³².

2.2.5 Grossman Theory on Health Expenditure and Outcomes

Grossman developed a model for good health in 1972, and health has been treated as a durable capital stock^{33,34}. According to Grossman, healthy days are said to have been born out of health stock, where utility is said to have been gained both directly because it allows for the enjoyment of good health (via consumption commodity) and indirectly because it allows for time to be expended on other market as well as non-market activities (via individual commodity)³⁴. As Grossman enforces two constraints, it is assumed that individuals maximize the utility they derive from consumption. First, such time constraints that establish time in a specified period has to be allotted to investment, consumption, or wage generation. An increase in sick days reduces the amount of time available for actions. Second, income constraints should represent the real cost of time spent on consumption or some levels of investment rather than wage generation, which is a maximization issue. There is an unwavering assumption that individuals are born with some level of health stock that deteriorates with age. The reduction could be offset by investment activities, but when the stock reaches the critical level, it dies. Grossman develops a pure model of consumption as well as a pure investment model on the assumption that the marginal cost is constant³⁵, based on the marginal benefit being increased with consumption and investment activities taken as additive.

The marginal benefit of consumption and that of investment are separated and then equated to the health shadow price as an additive function of interest rate and rate of health depreciation (given). As a result, the empirical evaluation of the investment model's three key predictions is possible. First, a higher depreciation rate with a positive correlation with wage would lead to a decrease in demand for health care. This is due to the fact that as the cost of producing healthy days rises, the marginal cost of investment tends to be higher than the marginal benefits of

investment. Second, an increase in wages will have an indeterminate effect on the quantity of health demand. When wages rise, marginal productivity rises because more health days are available to earn higher wages, resulting in more incentives for health investment and higher health stock demand³⁵.

2.3 Empirical Review

2.3.1 Health Expenditure and Health Outcomes

A study empirically analyses the relationship between public health expenditure and health outcomes among EU developing countries³⁶. The study found that public health expenditure and health outcomes have a long-run equilibrium relationship, and that the status of health expenditure can improve life expectancy and reduce infant mortality. They investigated how the status of good governance, health-care system performance, and socioeconomic vulnerabilities affect public health outcomes in the countries studied. The study discovered that the effectiveness of health and the way to reduce infant mortality or improve life quality is conditioned by the status of good governance. Furthermore, improving the performance of health-care systems directly improves the quality of life in EU developing countries, implying that public policymakers should intervene and provide political and financial support through policy combinations.

Three scholars investigate the relationship between total health expenditure (as a percentage of GDP) and health outcomes in the South Asian Association for Regional Cooperation (SAARC) and Association of South East Asian Nations (ASEAN) regions due to their low rates compared to the OECD region and the world³⁷. The World Bank data set was used to regress health status outcomes (life expectancy at birth, crude death rate, and infant mortality rate) on different types

of healthcare expenditures (public, private, and total) for 15 countries over a 20-year period (1995–2014). Using panel fixed and random effect estimators, the results revealed that total health expenditure, public health expenditure, and private health expenditure all significantly reduced infant mortality rates, with private health expenditure having a larger effect than public health expenditure. Private health spending also played an important role in lowering the crude death rate. Increased per capita income and improved sanitation facilities also played important roles in improving population health in the region.

A research study explores the association of public health expenditure with economic performance across the United States³⁸. Healthcare spending can lead to better health-care provision, which can strengthen human capital and boost productivity, thereby contributing to economic performance. As a result, it is critical to assess a country's healthcare spending phenomenon. The authors used visual analytics to collect economic and health data from the Bureau of Economic Analysis and the Bureau of Labor Statistics from 2003 to 2014. Overall, the findings strongly suggest a positive relationship between healthcare spending and economic indicators such as income, GDP, and labor productivity. While healthcare spending is negatively related to multi-factor productivity, it is positively related to labor productivity, personal spending, and GDP. According to the study, an increase in healthcare spending has a positive relationship with economic performance.

A scholar investigates the effect of public health expenditure on health outcomes (captured by life expectancy at birth and infant mortality rates) in Nigeria⁷. The findings indicate that public health spending and health outcomes have a long-run equilibrium relationship. Furthermore, the findings revealed that increasing public health spending increases life expectancy and lowers infant mortality rates. Furthermore, urban population and HIV prevalence rate have a significant

impact on health outcomes, whereas per capita income has no effect on health outcomes in Nigeria. The findings indicate that public health spending is still an important component of improving health outcomes in Nigeria.

A study looks at the relationship between public health spending and health outcomes (using maternal mortality as a proxy for the latter) in Nigeria from 1981 to 2014³⁹. Using the cointegration and error correction modelling procedure, the results show that as both public and private health spending increase, maternal mortality rates decrease, indicating that public health spending does not crowd out private health financing in the Nigerian context. However, the poverty rate was discovered to play a significant role in the rising rate of maternal mortality. Finally, official development assistance focused on health had a negative but insignificant impact on Nigeria's maternal mortality rate.

A scholar filled this research gap by introducing governance to the relationship between health care financing and health outcomes in the case of Nigeria³⁵. Using time series data spanning 1985 to 2018, the study examined the relationship between public health spending, governance, and health outcomes. For the short run analysis, an error correction model (ECM) was used, while an autoregressive distributed lagged (ARDL) model was used to examine the long run relationships between the variables in the study. The findings revealed that public health spending has a significant positive impact on life expectancy in Nigeria. The findings also show that increasing public health spending leads to a decrease in infant mortality.

A paper examines the impact of health care spending on health outcomes in 45 countries in Sub-Saharan Africa (SSA) from 1995 to 2018⁴⁰. For the analysis, it employs fixed effects and generalized methods of moments estimation approaches. The paper uses three proxies to measure health care expenditure: total health care expenditure per capita, public health care expenditure to

GDP, and private health care expenditure to total health expenditure. Health outcomes are measured by child health outcomes (under-5 mortality rate) and life expectancy. The results show that increase in health care expenditure as measured by total health care expenditure per capita and public health care expenditure to GDP leads to decline in under-5 mortality rates. The results also show that total health care expenditure per capita leads to an increase in life expectancy.

A study looked at the impact of government health spending on child and infant mortality rates in ten SSA countries from 2000 to 2008⁴¹. The study found that government spending has a positive impact on child and infant mortality rates. However, the study suffers from a relatively short time span and a relatively small number of SSA countries for the results to provide a clear picture of the entire SSA region.

From 1981 to 2018, a study looked at the relationship between public health spending and health outcomes in Nigeria⁴². The results empirically obtained from economic and statistical criteria using the error correction model (ECM) indicate that public health spending, private health expenses, foreign assistance on health, and health education had a positive impact on newborns protected against tetanus, tuberculosis treatment success rate, and measles prevention via immunization in Nigeria. However, whereas public health spending, private health expenses, and foreign aid on health had an inelastic positive impact on newborns protected against tetanus, tuberculosis treatment success rate, and measles prevention via immunization in Nigeria, health education had an elastic positive impact on newborns protected against tetanus, tuberculosis treatment success rate, and measles prevention via immunization. In conclusion, the observed results indicate that health education has a greater potential to promote quality health in Nigeria.

Second, it was discovered that spending (from public, private, and foreign stakeholders) did not

play as large a role as expected but had a positive impact on the health outcomes of the study's interest. Finally, the findings revealed that public health spending, private health expenses, foreign health assistance, and health education all had a positive impact on health outcomes in Nigeria, which is consistent with the theoretical perspectives adopted for the study.

Three researchers investigated the effect of government health spending on health outcomes in Africa⁴³. The study used government health expenditure per capita as a proxy for government spending and neonatal mortality, child mortality, and infant mortality rates as proxies for health outcomes. Other control variables used in the study include per capita private health spending, per capita income, the number of physicians, and life expectancy. The findings indicate that government health expenditure per capita in Nigeria has a positive relationship with neonatal mortality rate, child mortality rate, and infant mortality rate. In Nigeria, private health expenditure, physician numbers, and life expectancy all have a negative relationship with neonatal mortality, child, and infant mortality rates. This finding implies that the private sector has a greater influence on health outcomes than the public sector, implying that health services will be expensive in Nigeria.

Some researchers investigated the relationship between government health expenditures and health outcomes in order to determine whether government intervention in the health sector improves outcomes⁴⁴. The study used annual data from Ghana from 1980 to 2014. Using the ordinary least squares (OLS) and two-stage least squares (2SLS) estimators, researchers discovered that, in addition to income, public health expenditure contributed to improvements in health outcomes in Ghana over the period. That increasing public health spending saves one infant and one under-five child life for every 1000 live births while increasing life expectancy at

birth, even though the health effect of income outweighs the health effect of public health spending.

In addition, three researchers investigated the relationship between various types of healthcare expenditures (public, private, and total) and three major health status outcomes in the region⁴⁵: life expectancy at birth, crude death rate, and infant mortality rate. A panel data analysis was conducted using the World Bank data set for 15 countries over a 20-year period (1995-2014), and relevant fixed and random effect models established that total health expenditure, public health expenditure, and private health expenditure significantly reduced infant mortality rates, with the extent of effect of private health expenditure being greater than that of public health expenditure. Private health spending was also important in lowering the crude death rate, but per capita income growth and improved sanitation facilities were also important in improving population health in the region.

A study calculates the impact of health spending on health status⁴⁶. A study of 25 countries found a significant relationship between health expenditures and health indicators using both random and fixed effects models based on the Hausman test. Furthermore, the effect of private health expenditures on health outcomes was greater than that of public expenditures in countries with a mixed health financing system and traditional sickness fund insurance. Furthermore, when the results of different health care systems were compared, it was discovered that the effect of health expenditure on health outcome was greater in countries with national health systems (NHS) than in other health care systems.

A study looked at the impact of public health spending on health outcomes in Nigeria, specifically life expectancy at birth and infant mortality rates⁴⁷. The findings indicate that public health spending and health outcomes have a long-run equilibrium relationship. Furthermore, the

findings revealed that increasing public health spending increases life expectancy and lowers infant mortality rates. While urban population and HIV prevalence rate have a significant impact on health outcomes, per capita income has no effect in Nigeria.

2.3.2 Institutions and Health Outcomes

Using data from 1984 to 2009, two researchers assessed the impact of public health spending and governance on health outcomes in Malaysia⁴⁸. The study discovered a stable long-term relationship between health outcomes and income levels, public health expenditures, corruption, and government stability using an autoregressive distributed lag (ARDL) model. The findings also show that public health spending and corruption influence health outcomes in both the short and long term. The study emphasizes the importance of health programmes in improving the country's quality of life while reducing or eliminating the country's corruption rate.

A study looked at the impact of healthcare spending on specific health outcomes in 19 Middle Eastern and North African countries⁴⁹. The study estimated the impact of both government and private healthcare expenditures on infant, under-five, and maternal mortality rates using panel data from 1990 to 2010. After controlling for co-explanatory variables, the results show that government and private healthcare spending significantly improve infant and maternal mortality in the region, though the impact is not statistically significant. A 1% increase in per capita government spending reduces infant mortality by 8.6-9.5%, under-five mortality by 10.3-12%, and under-five deaths and maternal mortality by 26.0-26.3%. Similarly, a percentage increase in log per capita private expenditures lowers infant mortality by 7.2-8.1%, under-five mortality by 9.5-9.8%, and maternal mortality by 25.8-25.9%.

In addition, a study looked at the relationship between public health spending and health status in Ghana⁵⁰. The study looked at the impact of public health spending on health status from 1990

to 2002, using standard OLS and the Newey-White estimation technique. After controlling for real per capita income, literacy level, and female labor-force participation, the study discovered evidence that public health spending, among other things, explains Ghana's declining infant mortality rate. As a result, they concluded that public healthcare spending is associated with improved health status as measured by lower infant mortality.

From 1984 to 2009, a study looked at the impact of public health spending and governance on health outcomes in Malaysia⁵¹. The results of the Autoregressive Distributed Lag (ARDL) cointegration framework show that there is a stable, long-run relationship between health outcomes and their determinants, namely income level, public health expenditure, corruption, and government stability. The findings show that public health spending and corruption have an impact on long- and short-term health outcomes in Malaysia.

In SSA, a research paper investigates whether the quality of governance modifies the impact of public health spending on health outcomes, as measured by under-five mortality and life expectancy at birth⁵². Using a two-staged least squares regression technique on panel data from 43 SSA countries from 1996 to 2011, public health spending had a statistically significant impact on improving health outcomes. It has a direct elasticity of 0.09 to 0.11 in terms of under-five mortality, and a semi-elasticity of 0.35 to 0.60 in terms of life expectancy. Allowing for the indirect effect of public health spending on governance quality, the study discovers that an improvement in governance quality improves the overall impact of public health spending. The overall elasticity of public health spending with respect to under-five mortality is between 0.17 and 0.19 in countries with higher governance, while it is around 0.09 in countries with lower governance. The corresponding semi elasticities in terms of life expectancy are around 6 in countries with better governance and around 3 in countries with poorer governance. Public health

spending improves health outcomes. Its impact is mediated by governance quality, with higher impact on health outcomes in countries with higher governance and lower impact in countries with lower governance. As governance quality improves, this may be due to increased efficiency in the use of available resources and better allocation of those resources.

A study uses a panel of 151 developing and developed countries from 2000 to 2015 and four measures of democracy to examine how political institutions influence health expenditure⁵³. The results of the pooled OLS estimator show that democracies have 20-30% higher government health expenditure relative to GDP than autocracies. An instrumental variable approach that takes advantage of the regional diffusion of democracy confirms democracy's positive effect on government health spending. Panel fixed effects and event study models both suggest that democratization has a positive within-country effect on government health expenditures within a short period of time after regime transition. In comparison to autocracies, democratic rule does not appear to have a significant influence on private health expenditure. We conclude that democracies may care more about their citizens and strive to reduce health-care disparities.

Using the instrumental variable (two staged least squares) approach on data from developing countries in the early 1990s, the study discovered that public health spending is statistically insignificant and contributes less than 0.2% when accounting for differences in child mortality across countries once income per capita and other covariates are controlled for⁵⁴. These findings are consistent with previous research, including those of Wagstaff and Claeson, who discovered no statistically significant relationship between public health spending and health outcomes when treating public health spending as endogenous⁵⁵.

On the contrary, some studies using methods similar to those of Filmer and Pritchett produce statistically and economically significant results. A study of developed and developing countries

found that the mean elasticity of public health spending for under five mortality and maternal mortality was 0.33 and 0.50, respectively⁵⁶. A study that looked only at SSA countries found that the elasticities of PSH with respect to infant mortality (IMR) and U5M ranged from 0.17 to 0.22 and 0.17 to 0.25, respectively⁵⁷. In addition, a study discovered that PSH is a good predictor of good health in developing and transitional countries⁵⁸. Furthermore, after controlling for the composition of health expenditure, the study discovers that the elasticity of PSH in relation to under 5 mortality is 0.29.

2.4 Gaps in Literature

There is evidence of divergent conclusions on the actual impact of public health expenditure on human health outcomes in developed and developing economies based on reviews of existing literature. As a result, their findings are best described as inconclusive. It is also worth noting that their findings and conclusions differ depending on the models and data used to achieve them. The majority of studies, however, confirm the existence of a nexus, albeit a negative one. Furthermore, while the a priori expectations are consistent with the majority of the reviewed literature, the results may differ due to scope and methodology differences. Regardless of these findings and given the current economic situation of dwindling government revenues brought on by the COVID - 19 pandemic, the government seeks to improve rapid human health outcomes by ensuring access to quality health care facilities and services.

Meanwhile, because most available studies focused on links between institutions and human health outcomes, the role of institutional quality in the relationship between public health spending and human health outcomes is largely absent from the body of literature. It is also important to note that the available research focuses on how public spending on health and

education affects economic growth rather than on broad human health outcomes. This study will be unique in that it will investigate the three-way relationship between public health expenditure, institutional quality, and human health outcomes in developing countries such as Nigeria.

2.5 Theoretical Framework

This research study's theoretical framework is based on Grossman's theory of health investment and outcomes. The hypothesis emphasizes health as a fundamental commodity, implying that healthcare demand is derived. In the theoretical model, individuals are both consumers and producers of health. The model predicts that an individual will invest in health until the marginal benefit of health equals the marginal cost of health; this equilibrium demand for health implies that an individual's life span will be determined endogenously. Following the theoretical work of Grossman developed by Rajkumar and Swaroop who modelled outcome of a public programme, for instance public health expenditure as:

$$hout = incp^\alpha \times \left(\frac{phexp}{gdp} \right)^\beta \text{ where } \alpha > 0, \text{ and } \beta \geq 0 \quad (2.1)$$

Per capita income is denoted by *incp*, public expenditure on health is represented by *phexp*, gross domestic product is *GDP*, and outcome could for example, be indicators of health status such as life expectancy, infant mortality or under-5 mortality rates. Equation (2.1) implies that outcome (for example life expectancy) does the followings: (a) improves with an increase in per capita income; (b) improves (or does not worsen) if an increased proportion of the country's resources are spent on health care.

Taking the logs of equation (2.1), we have the linear form of (2.1) as equation (2.2) as:

$$\ln hout = \alpha \ln incp + \beta \ln \left(\frac{ph \exp}{gdp} \right) \quad (2.2)$$

In modeling the relationship between public spending and outcome as specified in equation (2.2), a researcher would usually take the information on spending from public budget documents. But it is known that only a fraction of the expenditure is actually undertaken while the remainder disappears as a result of corruption (in most African countries). To integrate this line of reasoning, we assume that only a fraction $\pi(\cdot)$ of public resources are actually spent for productive purposes. Following Pritchett, β , the coefficient of public spending on programme p in equation (2.2) can be written as:

$$\beta = \pi(\cdot) \times \beta_p \quad (2.3)$$

Where: β_p represents the productivity of public capital that is created from the spending on programme p . Assuming $\pi(\cdot)$ which measures the efficacy of public spending is a function of the state of governance. Therefore:

$$\pi = \phi_0 + \phi_1 iq \quad (2.4)$$

Where: iq stands for the level of institutional quality at each time in a country.

Substituting (2.3) and (2.4) into (2.2), we have:

$$\ln hout = \alpha \ln incp + \beta_p (\phi_0 + \phi_1 iq) \ln \left(\frac{ph \exp}{gdp} \right) \quad (2.5)$$

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Chapter Three

Methodology

3.1 Model Specification

3.1.1 Model Estimating the Effects of Government Health Expenditure on Health

Outcomes

Following the theoretical framework development in the last section of chapter two, the study adapts and modifies the model of previous studies to investigate the impact of public health spending measure by government expenditure on health as a ratio of GDP on human health outcome measured by life expectancy and child mortality in Nigeria^{1,2,3,4,5,6}. The model specifies health outcomes (*hout*) as a function of public health spending (*phexp*), gross fixed capital formation (*gfcf*), financial sector development measured by domestic credit to private sectors by banks (*fsd*), trade openness (*topen*) and inflation (*inf*). Consequently, the model is stated functionally as:

$$hout_t = f(ph\ exp_t, gfcf_t, fsd_t, topen_t, inf_t) \quad (3.1)$$

In mathematical form, it becomes:

$$hout_t = \theta_0 + \theta_1 ph\ exp_t + \theta_2 gfcf_t + \theta_3 fsd_t + \theta_4 topen_t + \theta_5 inf_t + e_t \quad (3.2)$$

Where: *hout* is a vector of health outcomes measured by life expectancy and child mortality; *phexp* represents public health expenditure to GDP; *gfcf* is gross fixed capital formation to GDP; *fsd* measures financial sector development proxy by domestic credit to private sector by banks to GDP; *topen* represents trade openness measured by total trade to GDP; *inf* denotes inflation; θ_0, θ_{1-5} are parameters; *t* is time; *e* is stochastic term.

3.1.2 Model Estimating the Role of Institutions in Health Outcomes

This study adapts and modifies the model of previous studies to examine the role of institutions in human health outcomes in Nigeria^{7,8,9}. The model specifies human health outcomes measured by life expectancy and child mortality (*hout*) as a function of institutional quality (*iq*), gross fixed capital formation (*gfcf*), financial sector development measured by domestic credit to private sectors by banks (*fsd*), trade openness (*topen*), and inflation (*inf*). Thus, the equation is stated functionally as:

$$hout_t = f(iq_t, gfcf_t, fsd_t, topen_t, inf_t) \quad (3.3)$$

In mathematical form, it becomes:

$$hout_t = \vartheta_0 + \vartheta_1 iq_t + \vartheta_2 gfcf_t + \vartheta_3 fsd_t + \vartheta_4 topen_t + \vartheta_5 inf_t + v_t \quad (3.4)$$

The variables remain as defined; whereas α_0, ϕ_{1-5} are parameters; t is time; v is error term.

3.1.3 Model Estimating the Interactive Effect of Institutions and Public Health Expenditure on Human Health Outcomes

Following the empirical models of past studies, this study adapts and modifies the model to investigate the interactive effect of institutions and public health expenditure on human health outcomes measured by life expectancy and child mortality in Nigeria^{7,8}. The model specifies health outcomes (*hout*) as a function of institutional quality (*iq*), public health spending (*phexp*), gross fixed capital formation (*gfcf*), financial sector development measured by domestic credit to private sectors by banks (*fsd*), trade openness (*topen*) and inflation (*inf*). As a result the model is stated functionally as:

$$hout_t = f(iq_t, ph\ exp_t, (iq \times ph\ exp)_t, gfcf_t, fsd_t, topen_t, inf_t) \quad (3.5)$$

In econometrics form, it becomes:

$$\begin{aligned} hout_t = & \varpi_0 + \varpi_1 iq_t + \varpi_2 ph\ exp_t + \varpi_3 (iq \times ph\ exp)_t + \varpi_4 gfcf_t + \varpi_5 fsd_t \\ & + \varpi_6 topen_t + \varpi_7 inf_t + \mu_t \end{aligned} \quad (3.6)$$

Where: *hout* is a vector of health outcomes measured by life expectancy and child mortality; *iq* denotes institutional quality, *phexp* represents public health expenditure to GDP; (*iq*×*phexp*) is the interaction of institution and public health spending; *gfcf* is gross fixed capital formation; *fsd* measures financial sector development proxy by domestic credit to private sector by banks to GDP; *to pen* represents trade openness; *inf* denotes inflation; $\varpi_0, \varpi_1, \dots, \varpi_7$ are parameters; *t* is time; μ is error term.

3.2 Theoretical Expectation

For human health outcome measured by life expectancy and child mortality model, a direct relationship is expected between institutional quality and life expectancy but negatively related with child mortality. Similarly, an increase in public health expenditure is expected to have a positive relationship with life expectancy while negative with child mortality. This is so as public health expenses used to provide adequate health services and facilities support human capital development in a way that it improves life expectancy and deteriorates child mortality. The interaction of institutions and public health expenditure is expected to have a direct link with human health outcomes. More so, gross fixed capital formation and financial sector development are expected to have positive relationship with life expectancy and negative with child mortality.

As gross fixed capital formation increases, there are high chances of more healthcare facilities available to people living in an economy thus improving human longevity and reduces child mortality. Thus, financial sector development ensures that an excess fund that will be available

for domestic use by the credit providers will increase human longevity and decrease child mortality. As well, trade openness is expected to have a direct relationship with life expectancy and an indirect relationship with child mortality. This is because as the trade between countries improves, more income is expected to improve human welfare development in that country. Concerning inflation, it has a negative relationship with human health longevity. Country experiencing price instability has higher chances of low human health outcomes.

3.3 Data Requirements and Sources

This research work uses annual time series data for the period of 37 years (1984-2020). The study uses secondary data of public debt to GDP published by the Central Bank of Nigeria (CBN) statistical bulletin, volume 32, 2021, life expectancy, child mortality, financial sector development, trade openness, inflation, and gross fixed capital formation data were sourced from World Development Indicators (WDI), 2021, and institutional quality data obtained from International Country Risk Guide (ICRG), 2021. Table 3.1 presents the source and measurement of the variables.

Table 3.1: Definition and source of data and variable measurements

| Variables | Description | Measurement | Data source |
|------------------|--|--|---|
| <i>hout</i> | Health outcomes is the treatment results that affect health status as measured by the length or quality of a person's life and child mortality in a country for a specific period of time. | It is measured in number of years and mortality per 1,000 births | World Development Indicators (2021) |
| <i>phexp</i> | Public health expenditure measures the total amount of government spending on healthcare services and facilities in a country. | It is measure a percentage of GDP | Central Bank of Nigeria Bulletin (2021) |
| <i>fsd</i> | Financial sector development measures the total amount of domestic credit to private sector by banks to gross domestic product. | It is measured as domestic credit to private sector by banks as % of GDP | World Development Indicators (2021) |
| <i>topen</i> | Trade openness captures the total trade as a percentage of gross domestic product in a country. | It is measured as total trade as a percentage of GDP | World Development Indicators (2021) |
| <i>inf</i> | Inflation is measured by annual rate of consumer price index of a country. | Annual growth | World Development Indicators (2021) |
| <i>gfcf</i> | Gross fixed capital formation includes the total domestic investment of private and public sector to the size of GDP in a country | It is measured as a percentage of GDP | World Development Indicators (2021) |
| <i>iq</i> | Institutional quality is the average of political risk factor of government stability, control of corruption, law and order and bureaucracy quality. | Average of their index from 0 to 10 | International Country Risk Guide (2020) |

Source: Author's compilation (2022).

3.4 Estimation Techniques

The specification and estimation of the models requires that we test the time series properties of the data in order to determine whether the variables contain integrated components, hence, this study adopt time series estimation techniques. Before estimating the parameters, the study examines the stationarity (presence of a unit root) of the variables using the Augmented Dickey Fuller (ADF) test. Afterwards, the study tests for the cointegration of the variables depending on the results of the stationarity of the variables. In addition, the appropriate estimator was also employed to evaluate the coefficients of the empirical models.

3.4.1 Unit root test

This study used the unit root test to test for the stationarity of the times series data collected for the research to avoid the danger of bias that stationarity of data may pose to the study if they are not checked. The unit root test was employed because in the literature most time series variables are non-stationary and using non-stationary variables in the model might lead to a spurious regression. In order to ascertain whether time series data were stationary or non-stationary and to determine the number of times (the level) at which the variables must be differenced before becoming stationary, unit root tests were conducted. The Dickey – Fuller regression is estimated as follows for unit root.

$$\Delta Y_t = \lambda Y_{t-1} + V_t \quad (3.7)$$

If λ equals 0, Y_t is non-stationary, as a result Y_t and X_t are not co-integrated. In order words, if λ is significantly different from 0 Y_t and X_t are found integrated individually. Given the inherent weakness of the unit root to distinguish between null and the alternative hypotheses, it is desirable that the Augmented Dickey Fuller (ADF) test be applied. To be co-integrated; both Y_t and X_t must have the same order of integration^{10,11}. The ADF regression is specified as follows:

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \gamma_i \sum_{t=1}^m \Delta Y_{t-1} + \varepsilon_t \quad (3.8)$$

Δ is the first difference operator, ε_t is the new random error term, M is the optimum number of lags needed to obtain “white noise”. The null hypothesis of non-stationarity is rejected if the estimated ADF statistic is found to be larger in absolute term or more negative than its critical values at 1 or 5 percent level of significance.

3.4.2 Co-integration Test

The purpose of the co-integration test is to determine whether a group of non-stationary time series is co-integrated to reduce bias. The concept of co-integration creates the link between integrated processes and the concept of steady state equilibrium¹². Thus, in this study, autoregressive distributed lag (ARDL) tests for co-integration analysis was employed to investigate the long-term relationship between the variables of interest.

3.4.3 ARDL Estimation Test

In this study, the autoregressive distributed lag (ARDL) was used to estimate the short-run and long-run estimates of the existing relationship between institutions, government health spending and health outcomes. Three advantages¹³ for using this method are stated as: (a) small sample data (b) variables with mixed stationarity level either I(0) or I(1) and (c) both long- and short-run estimates can be derived simultaneously. The lag length is selected using the Akaike information criteria (AIC). The calculated F-statistic value is used to make the decision about the cointegration. The significance of our calculated value is compared with the two tabulated values (upper bound and lower bound) computed by a scholar¹⁴. The decision criteria support cointegration if the calculated value is greater than the upper bound value; no cointegration if the

value is lesser than the lower bound value; and inconclusive if the value lies between the two bounds values.

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Endnotes

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Chapter Four

Results and Discussion of Findings

This study entails data presentation, estimation and the results of the empirical investigation of the links among public health expenditure, institutions and health outcomes in Nigeria. Also, it addresses the long-run and short-run relationship between public health expenditure, institutions and health outcomes in Nigeria. This is divided into descriptive analysis which include the mean, median as well measures of variation, it also takes into consideration the trend analysis which shows the trend of the time series data used from 1984 to 2020 and econometric analysis which focuses on unit root tests, co-integration test and autoregressive distributed lagged model.

4.1 Data Presentation

The data used for analyzing the relationship between public health expenditure, institutions and health outcomes in Nigeria is presented in Appendix.

4.2 Presentation of Results

4.2.1 Summary Statistics

Table 4.2 provides a summary of the preliminary study that details the mean, standard deviation, skewness, and peaking of the variables used to examine the connection between public health spending, institutions, and health outcomes in Nigeria. According to the table, the average life expectancy and infant mortality rate were 48.66 years and 102.35 per 1,000 live births, respectively. The table showed that their maximum values were 55.02 years and 124.8 live births, while their minimum values were 45.84 years and 72.2/1,000 live births. This suggests that

Nigeria's health outcomes are low. The average institutional quality was 2.933, which indicates that there are not many strong institutions in place to maintain peace and order, a stable government, the ability to combat corruption, and bureaucracy quality. The maximum and minimum institutional quality indices are 3.94 and 1.77, respectively. The average rate of government health spending as a percentage of GDP was 0.19%, with highest and minimum values of 0.36% and 0.02%, respectively. Additionally, the average figures for total trade, financial sector development as defined by domestic bank lending to the private sector, and gross fixed capital formation are 31.8%, 9.45%, and 33.86% respectively in terms of GDP. Additionally, their maximum rates are 58.96%, 19.6%, and 53.28%, respectively, while their minimum rates are 14.17%, 4.95%, and 9.14%. The average rate of inflation is 19.14%, with highest and minimum values of 72.84% and 5.39%, respectively.

Table 4.2: Descriptive statistics

| | LEXP | IMOR | PHEXP | IQ | TOPEN | INF | GFCF | FSD |
|--------------|----------|-----------|-----------|-----------|-----------|----------|----------|----------|
| Mean | 48.65673 | 102.3459 | 0.187947 | 2.932693 | 33.85964 | 19.14149 | 31.80169 | 9.447661 |
| Median | 46.83500 | 103.8000 | 0.207540 | 2.949561 | 34.45783 | 12.55496 | 28.37090 | 8.218357 |
| Maximum | 55.01800 | 124.8000 | 0.363817 | 3.937500 | 53.27796 | 72.83550 | 58.95629 | 19.60353 |
| Minimum | 45.84300 | 72.20000 | 0.016573 | 1.770833 | 9.135846 | 5.388008 | 14.16873 | 4.948032 |
| Std. Dev. | 3.205812 | 19.32322 | 0.092465 | 0.474355 | 11.45837 | 17.43859 | 13.75767 | 3.537013 |
| Skewness | 0.721678 | -0.134112 | -0.112876 | -0.396235 | -0.531914 | 1.772200 | 0.285025 | 1.085589 |
| Kurtosis | 1.966401 | 1.381807 | 2.086022 | 3.417112 | 2.779206 | 4.839039 | 1.815202 | 3.882405 |
| Jarque-Bera | 4.858720 | 4.147844 | 1.366410 | 1.236401 | 1.819906 | 24.58162 | 2.665081 | 8.467840 |
| Probability | 0.088093 | 0.125692 | 0.504996 | 0.538913 | 0.402543 | 0.000005 | 0.263806 | 0.014495 |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 |

Source: Author's computation (2022).

Furthermore, a normal distribution always exists at 0 for the skewness, which quantifies the asymmetry of the distribution of the series around its mean. A distribution is said to have a long right tail if the skewness is positive, and a long left tail if the skewness is negative. Table 4.2's findings revealed that all the variables are positively skewed, with the exception of infant mortality, public health spending, institutional quality, and trade openness (which are negatively skewed), suggesting that the right tails of the distributions are long. Kurtosis gauges the series' distribution's peaking or flattening as well. The distribution is peaked or leptokurtic in relation to the normal if the kurtosis is greater than three, and flat or platykurtic in relation to the normal if it is less than three. According to the table's outcome, only the values for inflation rate and financial sector development are greater than three, which suggests that they have peaked or are leptokurtic. The values of the other variables are below three, indicating flatness or platykurtic

behavior. According to their Jarque-Bera statistics, this suggests that the variables are not normally distributed.

Figures 4.1, 4.2, and 4.3 show the trend analysis of the variables used to analyze how public health spending, institutions, and health outcomes interact in Nigeria. The trend series for Nigeria's public health spending, life expectancy, and infant mortality rates are shown in Figure 4.1. In the chart, the ratio of public health expenditure to GDP fluctuates in a hierarchical manner for the periods. The series witnessed high spikes for the following periods, 0.14% in 1989, 0.31% in 1993, 0.3% in 1999, 0.35% in 2002, 0.36% in 2011, 0.27% in 2015, and 0.27% in 2020. In spite of the low ratio of public health spending to GDP, life expectancy trends upward through the periods starting from 46.11 years in 1984 to 55.02 years in 2020. In contrast, infant mortality slopes downwardly through the periods from 123.1 deaths per 1,000 live births in 1984 to 72.2 deaths per live births.

Figure 4.2 shows the series movement for institutions, life expectancy, and infant mortality. The institutional quality series experienced upward slopes from the beginning of the period at 1.77 to 3.42 in 1992, which dropped slightly to 2.94 in 1993, then rose for few years to 3.94 in 1997. Subsequently, the index shows a decrease through the periods of 1997-2002. For the remaining periods, the series slopes in a zigzag manner throughout. The trend movement of institutional quality could be linked to upward and downward slopes of life expectancy and infant mortality respectively.

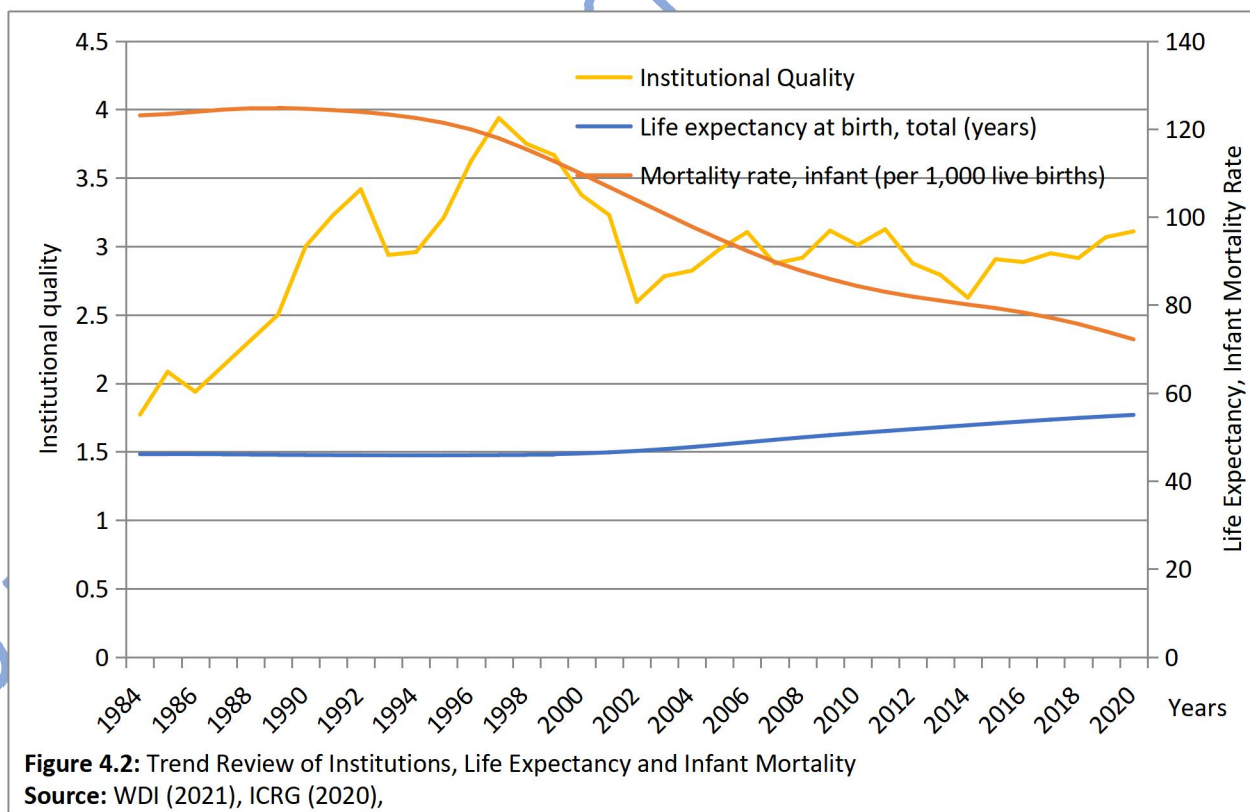
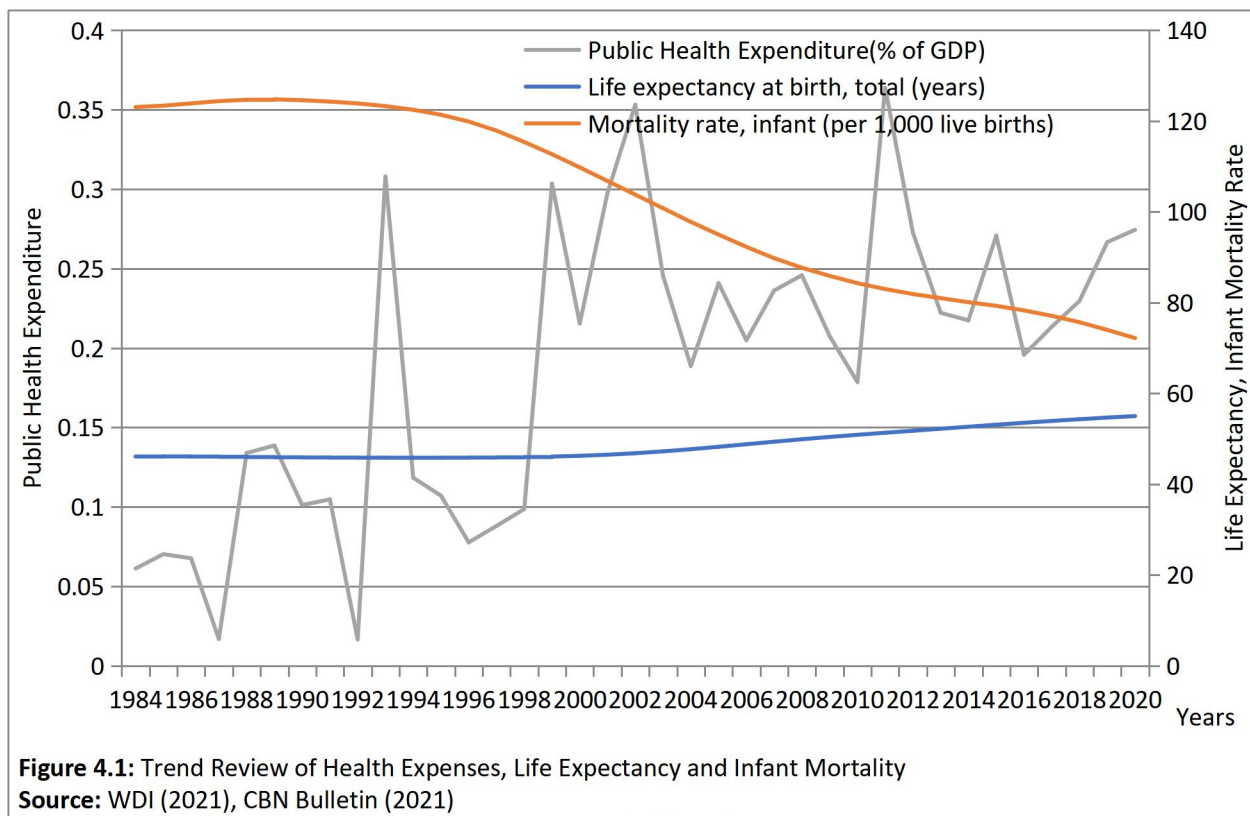


Figure 4.3 shows the patterns in trade openness, inflation, investment, and financial sector development as the additional factors that influence health outcomes. As to gross fixed capital formation as a ratio of GDP, a downward slope is evident from 58.96% in 1984 to 14.72% in 2017, then, rises to 19.02%, 24.63% and 26.74% in 2018, 2019 and 2020 respectively. The series of inflation and total trade as a ratio of GDP move in an opposite direction for the periods understudied. This depicts that trading activities with other countries declines when the country experienced an increase in price instability, and otherwise with low inflation. Concerning domestic credit to private sector by banks as a ratio of GDP, the trend movement follows a steep wavelike way within the periods 1984-2006. Afterward, the series rose from 13.39% in 2006 to 19.6% in 2009, then deeps to 10.59% in 2012, thereafter flows in a crisscross manner for the remaining periods.

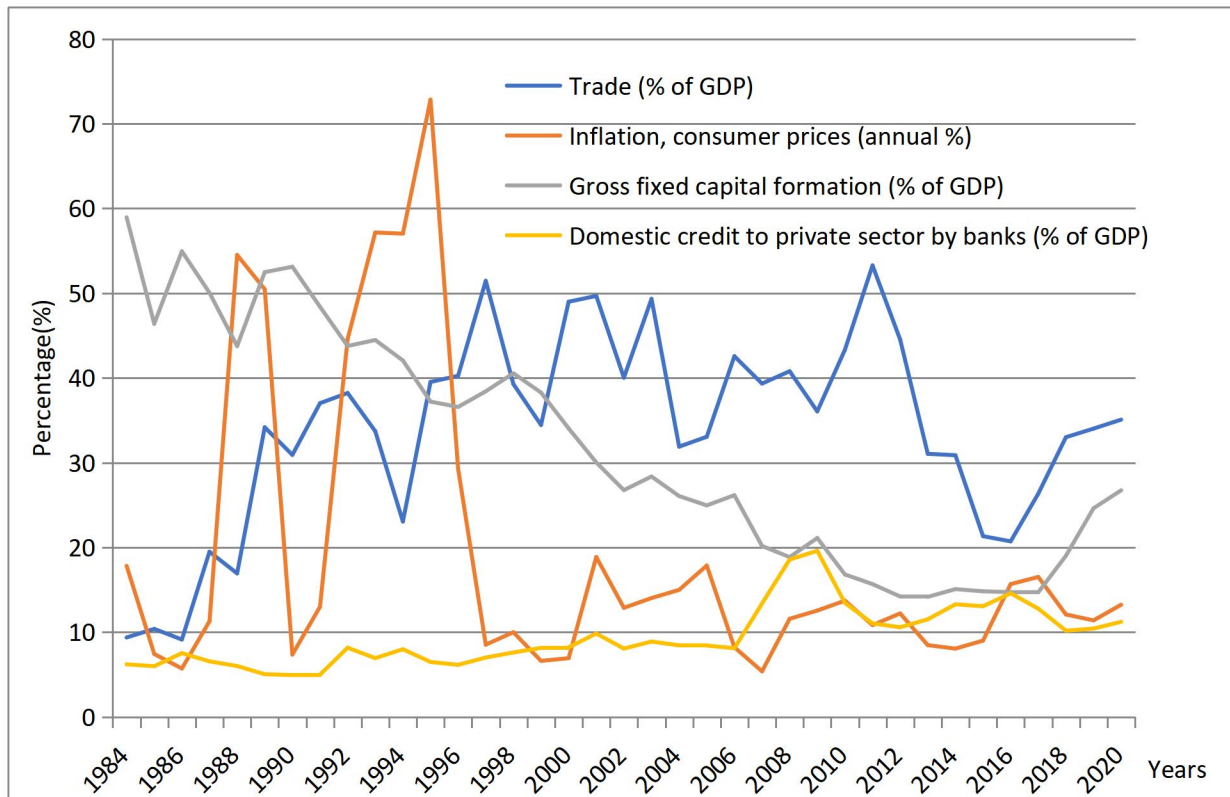


Figure 4.3: Trend Plot of Trade, Inflation, Investment and Domestic Private Credits

Source: WDI (2021), CBN (2021)

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4.2.2 Correlation Analysis

Table 4.3 presents the correlation analysis of the variables. The coefficients demonstrate the degree to which the variables are related and help to understand the relationship among public health spending, institutions, and health outcomes in Nigeria. Following Table 4.3, institutional quality and public health spending are positively correlated with life expectancy but negatively correlated with infant mortality rate. Furthermore, the correlation matrix revealed that life expectancy is inversely related to inflation and gross fixed capital formation and directly correlated with trade openness and the development of the financial sector. Additionally, the results show that infant mortality rate is positively correlated to gross fixed capital formation and inflation, however, indirectly related to trade openness and financial sector development. Additionally, public health spending is positively correlated with institutional quality. The financial sector development and trade openness are positively correlated with public health spending, while the inflation rate and gross fixed capital formation are negatively correlated with health spending. The development of the financial sector and trade openness are directly correlated with institutional quality, whereas the inflation rate and gross fixed capital formation are inversely correlated with institutions. Table 4.2 also provides the correlation coefficients for other controlling variables. The low correlation coefficients show no evidence of a multicollinearity issue. The signs and magnitudes of the variables are subject to confirmation using appropriate estimators as the correlation coefficients are just preliminary analysis.

Table 4.3: Correlation Matrix

| | lexp | imor | phexp | iq | topen | inf | gfcf | fsd |
|-------|------|--------|--------|--------|--------|--------|--------|--------|
| lexp | 1 | -0.947 | 0.507 | 0.009 | 0.025 | -0.367 | -0.602 | 0.689 |
| imor | | 1 | -0.648 | -0.107 | -0.219 | 0.456 | 0.721 | -0.672 |
| phexp | | | 1 | 0.178 | 0.433 | -0.226 | -0.672 | 0.457 |
| iq | | | | 1 | 0.720 | -0.005 | -0.245 | 0.088 |
| topen | | | | | 1 | -0.079 | -0.377 | 0.151 |
| inf | | | | | | 1 | 0.341 | -0.333 |
| gfcf | | | | | | | 1 | -0.675 |
| fsd | | | | | | | | 1 |

Source: Author's computation (2022).

4.3 Pre-Estimation Tests (Unit Root Test)

This section evaluates the stationarity level of the variables and also presents the results of the unit root test. It is used to determine whether a unit root exists, that is, whether the variables are not stationary at levels. The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests are employed in conducting the unit root tests. The pre-estimation test is the initial test conducted before the co-integration analysis. The E-views statistical package is used to conduct the ADF and PP, and Table 4.4 shows the test's outcomes.

When applying the ADF and PP tests, the a priori expectation is that a variable is stationary when the ADF and PP test statistics are greater than the critical values at 5%. From the test result reported in Table 4.4, public health expenditure, financial sector development and inflation rate were found not to accept the null hypothesis "they have unit root test" at 5% level. This suggests that the series (i.e., public health expenditure, financial sector development and inflation rate) are stationary at levels. Thus, these three series are integrated at order 0. Life expectancy, infant mortality rate, institutional quality, public debt, gross fixed capital formation and trade openness, however, are not stationary at levels but they are integrated of order one i.e. $I(1)$. As a result, they were discovered not to reject the null hypothesis "no stationary" at level, but after multiple rounds depending on the quantity of lag length and differencing, the series were discovered to reject the null hypothesis at first difference. This suggests that these series' first-difference was stationary.

Table 4.4: ADF and PP Test Results [Trend and Intercept]

| Variables | Augmented Dickey Fuller Test | | Phillip-Perron Test | | Remarks |
|--------------|------------------------------|----------------------|----------------------|------------------------|---------|
| | Stat at level | Stat at first diff. | Stat at level | Stat at first diff. | |
| <i>lexp</i> | -2.513(6)[-3.568] | -8.281***(1)[-4.244] | -1.707(4)[-3.540] | -5.019***(4)[-4.234] | I(1) |
| <i>imor</i> | -2.534(3)[-3.553] | -5.265***(2)[-4.263] | -2.556(5)[-3.540] | -5.060(1)[-4.244] | I(1) |
| <i>phexp</i> | -4.878***(0)[-4.235] | - | -4.870***(1)[-4.235] | - | I(0) |
| <i>iq</i> | -3.169(2) [-3.545] | -5.139***(0)[-3.544] | -2.346(6)[-3.540] | -5.116***(7)[-3.544] | I(1) |
| <i>gfcf</i> | -1.497(0)[-3.540] | -7.828***(0)[-3.544] | -1.486(3)[-3.540] | -7.685***(1)[-3.544] | I(1) |
| <i>fsd</i> | -3.874**(1)[-3.544] | - | -2.523(0)[-3.540] | -6.873***(3)[-3.544] | I(1) |
| <i>topen</i> | -2.809(0)[-3.540] | -7.422***(0)[-3.544] | -2.686(2)[-3.540] | -11.034***(10)[-3.544] | I(1) |
| <i>inf</i> | -4.235**(1)[-3.544] | - | -4.256***(1)[-3.540] | - | I(0) |

Note: ***, ** and * signify significance level at 1%, 5% and 10% respectively.

Sources: Author's computation (2022).

4.4 Presentation of Results

4.4.1 Empirical Results of the Impact of Government Health Expenditure on Health Outcomes

A) Cointegration Test Result

Before estimating the short-run and long-run parameters, the study uses the autoregressive distributed lag (ARDL) bound cointegration tests to examine the long-run relationships among public health expenditure, health outcomes and other controllable variables in the context of the proposed hypotheses. The ARDL bound test is used for the model illustrating the relationship among public health expenditure, health outcomes, and other controllable variables since it is appropriate for variables at various orders of integration. Table 4.5 provides the F-statistics estimate for examining the possibility of a long-term relationship among public health expenditure, health outcomes, and other confounding factors in Nigeria

According to the table, the normalized estimated F-statistics ($F_{arb} = 19.905$ and 5.3662) of the equations exceed both the lower and upper critical bounds at a 5% level of significance. This suggests that at a 5% significance level, the null hypothesis that there is no long-term association is rejected. In accordance with the estimation above, public health expenditure, control variables (including gross fixed capital creation, financial sector development, trade openness, and inflation rate), and health outcomes all have equilibrium conditions that maintain them together throughout time. As a result, in Nigeria, there is a long-term connection between public health expenditure and health outcomes.

Table 4.5: Existence of long-run between public health expenditure and health outcomes

| Test Statistics | Value | K |
|--|-------------------|-------------------|
| F-statistics (lexp phexp, gfcf, fsd, topen, inf) (3, 3, 3, 1, 3, 3) | 19.905 | 5 |
| F-statistics (imor phexp, gfcf, fsd, topen, inf) (4, 0, 2, 0, 2, 1) | 5.3662 | 5 |
| Critical Value Bounds | | |
| Significance | I(0) Bound | I(1) Bound |
| 10% | 2.08 | 3.00 |
| 5% | 2.39 | 3.38 |
| 2.5% | 2.70 | 3.73 |
| 1% | 3.06 | 4.15 |

Source: Author's computation (2022).

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B) Short-run and Long-run Estimates of Public Health Expenditure and Life Expectancy

The null hypothesis, that public health spending has no significant impact on life expectancy in Nigeria, is addressed in this section. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, it evaluates both the short-run and long-run relationship estimates of public health expenditure and other controllable factors in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.6 provides conclusive evidence for our empirical estimations based on data on public health spending, gross fixed capital creation, financial sector development, trade openness, and inflation rate.

The findings of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.6 shows the short-term estimates of the correlation between public health spending and life expectancy. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1157) implied that the model corrects its short-run disequilibrium by 11.57% speed of adjustment in order to return to the long run equilibrium.

Table 4.6: Results of Estimated ARDL Model of Life Expectancy**Dependent Variable:** Life Expectancy (lexp)**Selected Model:** ARDL(3, 3, 3, 1, 3, 3)**Sample:** 1984 2020**Included observations:** 33

| <i>Short-Run Estimates</i> | | | | |
|----------------------------|--------------------|-------------------|--------------------|--------------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| DLOG(LEXP(-1)) | 1.404216 | 0.039234 | 35.79057 | 0.0000 |
| DLOG(LEXP(-2)) | -0.539756 | 0.032152 | -16.78764 | 0.0000 |
| D(PHEXP) | 0.000895 | 0.000179 | 5.008858 | 0.0003 |
| D(PHEXP(-1)) | -0.002662 | 0.000359 | -7.414871 | 0.0000 |
| D(PHEXP(-2)) | -0.000957 | 0.000250 | -3.822442 | 0.0024 |
| D(GFCF) | 8.70E-06 | 4.37E-06 | 1.991722 | 0.0697 |
| D(GFCF(-1)) | 5.13E-05 | 6.51E-06 | 7.886535 | 0.0000 |
| D(GFCF(-2)) | 2.56E-05 | 4.50E-06 | 5.688226 | 0.0001 |
| D(FSD) | -6.99E-06 | 7.23E-06 | -0.966787 | 0.3527 |
| D(TOPEN) | 4.71E-06 | 1.67E-06 | 2.815388 | 0.0156 |
| D(TOPEN(-1)) | 8.60E-06 | 1.68E-06 | 5.121625 | 0.0003 |
| D(TOPEN(-2)) | 2.63E-06 | 1.68E-06 | 1.563772 | 0.1438 |
| D(INF) | 2.78E-07 | 1.20E-06 | 0.231748 | 0.8206 |
| D(INF(-1)) | 8.97E-06 | 1.41E-06 | 6.343545 | 0.0000 |
| D(INF(-2)) | 2.41E-06 | 1.10E-06 | 2.197018 | 0.0484 |
| ECT(-1) | -0.115671 | 0.008001 | -14.45698 | 0.0000 |
| <i>Long-Run Estimates</i> | | | | |
| PHEXP | 0.453274 | 0.082441 | 5.498151 | 0.0001 |
| GFCF | -0.004721 | 0.000505 | -9.340795 | 0.0000 |
| FSD | -0.002517 | 0.000948 | -2.655094 | 0.0210 |
| TOPEN | -0.000399 | 0.000372 | -1.072513 | 0.3046 |
| INF | -0.001149 | 0.000286 | -4.017106 | 0.0017 |
| C | 4.074181 | 0.029725 | 137.0615 | 0.0000 |
| R-squared | 0.8723 | F-stat | 94.236 (0.0000) | |
| Adj. R-squared | 0.7231 | D-Watson | 1.9145 | |

Source: Author's computation (2022).

At the 5% level, the short-run coefficients of the change in life expectancy at lags one and two are significant and positive, respectively. While its first and second lags are statistically significant and negative, the short-run parameter estimates of current public health expenditure was determined to be positive and statistically significant at 5%. It follows that public health spending at lags one and two had a short-term negative influence on life expectancy. This shows that public health spending does not guarantee an improvement in the anticipated mean years of an individual's life after birth. The current, first, and second lags of gross fixed capital creation have a direct and significant impact on life expectancy. Life expectancy was adversely and insignificantly impacted by the rise of the financial sector development in the short run. With the exception of its second lag, which is statistically insignificant at 5%, all the parameters relating to trade openness are positive and statistically significant. It was also discovered that, except for the current level, which was not significant at 5%, inflation at the current level, first and second lags significantly impacted life expectancy.

According to the long-term projections in Table 4.6, public health spending increases life expectancy in Nigeria. The indicator's parameter was in line with theoretic assumptions, and the result is statistically significant at 5%. It implies that, if well managed, public health spending has the potential to increase life expectancy. According to a scale of magnitude, a 10% increase in public health spending will result in a 4.53% increase in life expectancy. Low inflation has also been demonstrated to have a favorable and considerable impact on life expectancy. Thus, a 100% decline in inflation rate results in a 0.12% change in life expectancy. However, for the research years, trade openness, financial sector growth, and gross fixed capital formation have indirect effects on life expectancy in Nigeria. The only factors that significantly impacted life expectancy were investments and domestic bank loans to the private sector. As a result, life

expectancy decreases by 0.47%, 0.25%, and 0.04% with every 100% rise in gross fixed capital formation, financial sector development, and trade openness, respectively.

The adjusted R^2 (coefficient of determination) is high (72.31%), meaning that the variables in the model accounted for around 72.31% of all variations in life expectancy. It only said that variations in public health spending and other influencing factors accounted for 72.31% of the range in changes in life expectancy. The model is properly described and statistically significant as shown by the overall test using the F-statistic (94.236), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 1.9145.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.7 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.4a and 4.4b are steady.

Table 4.7: Diagnostic Tests of Selected ARDL Model

| Results | |
|--|---|
| Serial Correlation: 1.5995 [0.2496] | Normality Test: 2.3212 [0.3133] |
| Functional Form: 1.3753 [0.1964] | Heteroskedasticity Test: 0.9501 [0.5579] |

Source: Author's computation (2022).

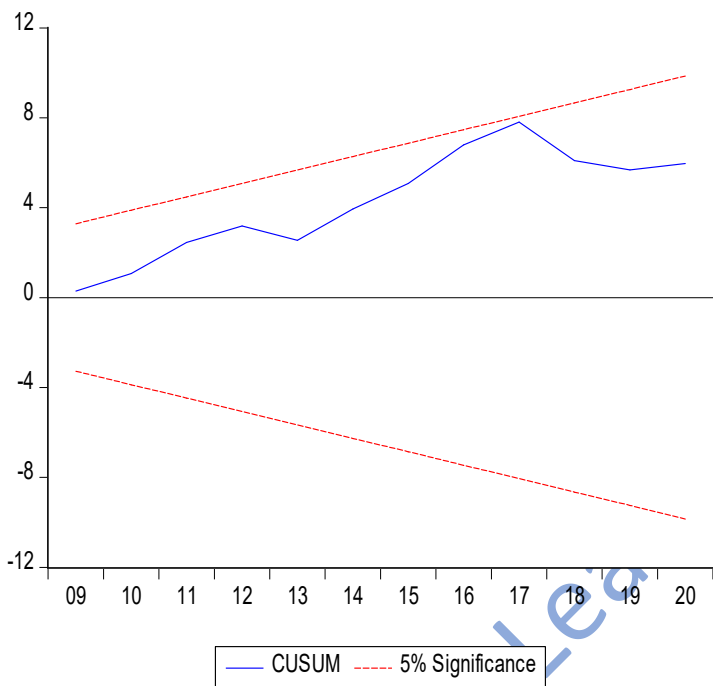


Figure 4.4a: Cumulative Sum (CUSUM)

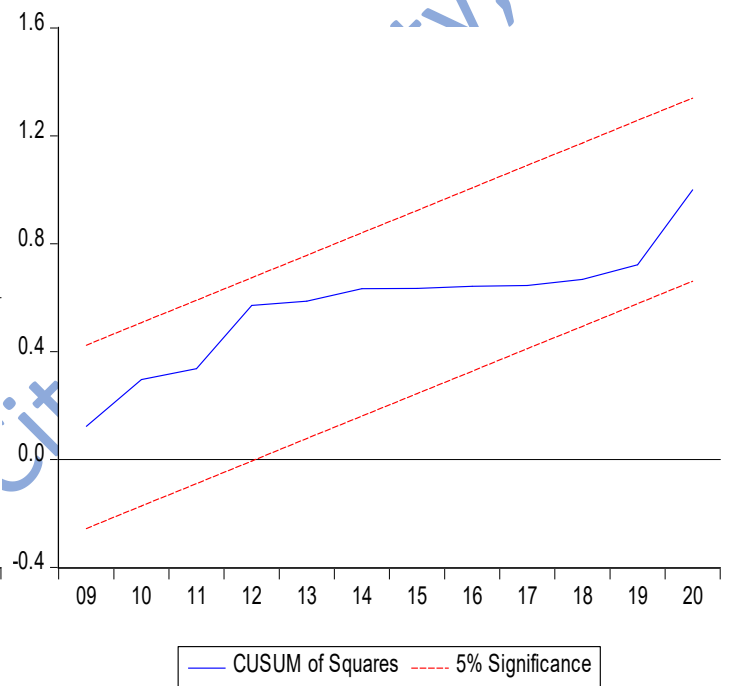


Figure 4.4b: Cumulative Sum of Square (CUSUMQ)

C) Short-run and Long-run Estimates of Public Health Expenditure and Infant Mortality

In this section, this study addressed the null hypothesis that public health spending has no significant effect on infant mortality in Nigeria. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, this study evaluates both the short-run and long-run relationship estimates of public health expenditure and other controllable factors on infant mortality in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.8 provides conclusive evidence for our empirical estimations based on data on public health spending, gross fixed capital creation, financial sector development, trade openness, and inflation rate.

The results of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.8 shows the short-term estimates of the correlation between public health spending and infant mortality. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1653) implied that the model corrects its short-run disequilibrium by 16.53% speed of adjustment in order to return to the long run equilibrium.

Table 4.8: Results of Estimated ARDL Model of Infant Mortality**Dependent Variable:** Infant Mortality (imor)**Selected Model:** ARDL(4, 0, 2, 0, 2, 1)**Sample:** 1984 2020**Included observations:** 33

| <i>Short-Run Estimates</i> | | | | |
|----------------------------|--------------------|-------------------|--------------------|--------------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| DLOG(IMOR(-1)) | 1.303341 | 0.127381 | 10.23186 | 0.0000 |
| DLOG(IMOR(-2)) | 0.182747 | 0.246181 | 0.742327 | 0.4675 |
| DLOG(IMOR(-3)) | -0.569399 | 0.133863 | -4.253593 | 0.0005 |
| D(PHEXP) | 0.001269 | 0.003100 | 0.409500 | 0.6870 |
| D(GFCF) | 1.23E-05 | 5.03E-05 | 0.245498 | 0.8088 |
| D(GFCF(-1)) | -0.000297 | 6.33E-05 | -4.686196 | 0.0002 |
| D(FSD) | 0.000105 | 8.78E-05 | 1.195618 | 0.2474 |
| D(TOPEN) | -1.05E-05 | 1.92E-05 | -0.547207 | 0.5910 |
| D(TOPEN(-1)) | -6.44E-05 | 1.88E-05 | -3.423351 | 0.0030 |
| D(INF) | -3.66E-05 | 1.22E-05 | -3.005434 | 0.0076 |
| ECT(-1) | -0.165251 | 0.023351 | -7.077043 | 0.0000 |
| <i>Long-Run Estimates</i> | | | | |
| PHEXP | 0.076814 | 0.198853 | 0.386285 | 0.7038 |
| GFCF | 0.018977 | 0.002658 | 7.138591 | 0.0000 |
| FSD | 0.006354 | 0.006017 | 1.056122 | 0.3049 |
| TOPEN | 0.003826 | 0.002131 | 1.795767 | 0.0893 |
| INF | -0.000430 | 0.001047 | -0.410744 | 0.6861 |
| C | 3.722162 | 0.188210 | 19.77663 | 0.0000 |
| R-squared | 0.7944 | F-stat | 87.650 (0.0000) | |
| Adj. R-squared | 0.6725 | D-Watson | 2.0708 | |

Source: Author's computation (2022).

At the conventional level, the short-run coefficients of the change in infant mortality at lags one and two are positive but negative at lag three. While its first and third lags are statistically significant, the overall short-run parameter estimates of previous infant mortality contribute to the current infant mortality in Nigeria. More so, the current public health expenditure was determined to be positive and statistically significant at 5%. It implies that public health spending had a short-term positive influence on infant mortality. The current and first lag of gross fixed capital formation had direct and indirect significant impact on infant mortality respectively. Further, infant mortality was directly and insignificantly impacted by an increase in financial sector development in the short run. With the exception of the first lag that was statistically insignificant at 5%, the parameters of trade openness are negative and significantly related to infant mortality. Also, the table indicated that the current level of inflation rate significantly and negatively impacted infant mortality.

In accordance to the long-term estimated reported in Table 4.8, public health spending increases infant mortality in Nigeria. The series was not consistent with the theoretic expectation, and the result is statistically insignificant at 5%. It implies that, public health spending does not have the potentials to curtail infant mortality for the periods understudy. As to the magnitude scale, a 10% increase in public health spending result to a 0.77% increase in infant mortality. In addition, for the research years, gross fixed capital formation, financial sector development, and trade openness have direct effects on infant mortality in Nigeria. The only factors that significantly impacted infant mortality were investment at 5% level and trade openness at 10% level. As a result, infant mortality increases by 0.19%, 0.064%, and 0.038% with every 10% rises in gross fixed capital formation, financial sector development, and trade openness, respectively. Low

inflation has also been shown to have a direct impact on infant mortality. Thus, a 100% rise in inflation rate results in a 0.04% changes in infant mortality.

The adjusted R^2 (coefficient of determination) is high (67.25%), meaning that the variables in the model accounted for around 67.25% of all variations in infant mortality. It only said that variations in public health spending and other influencing factors accounted for 67.25% of the range in changes in infant mortality. The model is properly described and statistically significant as shown by the overall test using the F-statistic (87.650), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 2.0708.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.9 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.5a and 4.5b are steady.

Table 4.9: Diagnostic Tests of Selected ARDL Model

| Results | |
|--|---|
| Serial Correlation: 0.0134 [0.9867] | Normality Test: 0.9735 [0.6146] |
| Functional Form: 2.0503 [0.0561] | Heteroskedasticity Test: 1.3054 [0.2933] |

Source: Author's computation (2022).

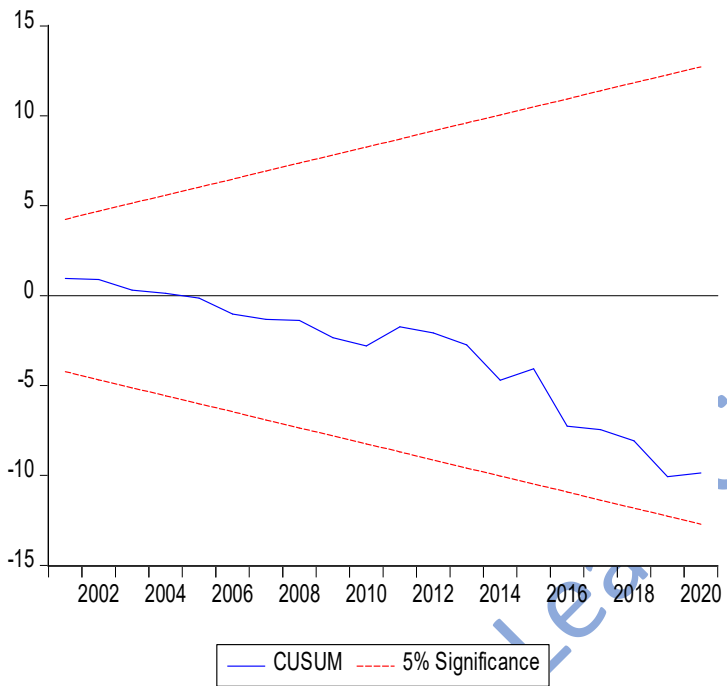


Figure 4.5a: Cumulative Sum (CUSUM)

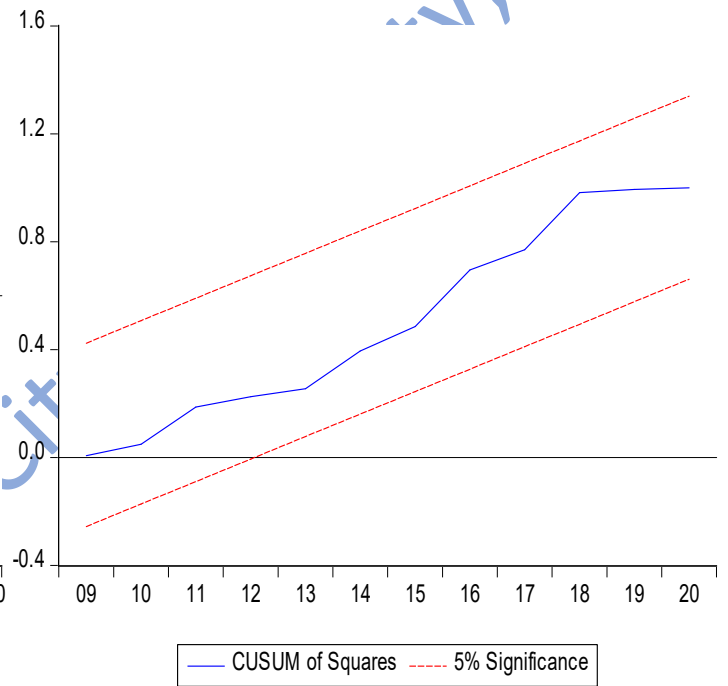


Figure 4.5b: Cumulative Sum of Square (CUSUMQ)

4.4.2 Empirical Results of the Effects of Institutional Quality on Health Outcomes

A) Cointegration Test Result

Before estimating the short-run and long-run parameters, the study uses the autoregressive distributed lag (ARDL) bound cointegration tests to examine the long-run relationships among institutional quality, health outcomes and other controllable variables in the context of the proposed hypotheses. The ARDL bound test is used for the model illustrating the relationship among institutional quality, health outcomes, and other controllable variables since it is appropriate for variables at various orders of integration. Table 4.10 provides the F-statistics estimate for examining the possibility of a long-term relationship among institutional quality, health outcomes, and other confounding factors in Nigeria.

According to the table, the normalized estimated F-statistics ($F_{arb} = 17.692$ and 5.9102) of the equations exceed both the lower and upper critical bounds at a 5% level of significance. This suggests that at a 5% significance level, the null hypothesis that there is no long-term association is rejected. In accordance with the estimation above, institutional quality, control variables (including gross fixed capital creation, financial sector development, trade openness, and inflation rate), and health outcomes all have equilibrium conditions that maintain them together throughout time. As a result, in Nigeria, there is a long-term connection between institutional quality and health outcomes.

Table 4.10: Existence of long-run between institutional quality and health outcomes

| Test Statistics | Value | K |
|---|-------------------|-------------------|
| F-statistics (lexp iq, gfcf, fsd, topen, inf) (3, 3, 3, 0, 1, 3) | 17.692 | 5 |
| F-statistics (imor iq, gfcf, fsd, topen, inf) (4, 1, 2, 0, 2, 1) | 5.9102 | 5 |
| Critical Value Bounds | | |
| Significance | I(0) Bound | I(1) Bound |
| 10% | 2.08 | 3.00 |
| 5% | 2.39 | 3.38 |
| 2.5% | 2.70 | 3.73 |
| 1% | 3.06 | 4.15 |

Source: Author's computation (2022).

B) Short-run and Long-run Estimates of Institutional Quality and Life Expectancy

This section addresses the null hypothesis, which holds that institutional quality has no substantial impact on life expectancy in Nigeria. Using the estimated ARDL approach that was fully discussed in the preceding chapter, it evaluates both the short-run and long-run relationship estimates of institutional quality and other controllable factors in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Based on data on institutional quality, gross fixed capital creation, financial sector development, trade openness, and inflation rate, Table 4.11 provides conclusive evidence for our empirical estimates.

The short-run estimation results show the error correction mechanism, which measures the rate or intensity of adjustment. It quantifies the rate at which the outcome variable responds to changes in the explanatory variables. The dynamic pattern of the model is revealed in the short run analysis, which also checks to determine if the dynamics of the model have not been confined by incorrect lag length constraints. Based on the automatic selection of the Akaike Information Criterion, the model's lag length was set at three to ensure a sufficient degree of freedom, and the ARDL test automatically selected the lag duration on all variables. The short-run estimates of the association between institutional quality and life expectancy are shown in Table 4.11. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1047) implied that the model corrects its short-run disequilibrium by 10.47% speed of adjustment in order to return to the long run equilibrium.

Table 4.11: Results of Estimated ARDL Model of Life Expectancy**Dependent Variable:** Life Expectancy (lexp)**Selected Model:** ARDL(3, 3, 3, 0, 1, 3)**Sample:** 1984 2020**Included observations:** 33

| <i>Short-Run Estimates</i> | | | | |
|----------------------------|--------------------|-------------------|--------------------|--------------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| DLOG(LEXP(-1)) | 1.657750 | 0.031537 | 52.56485 | 0.0000 |
| DLOG(LEXP(-2)) | -0.775114 | 0.028087 | -27.59724 | 0.0000 |
| D(IQ) | 5.75E-06 | 7.78E-05 | 0.073868 | 0.9421 |
| D(IQ(-1)) | -0.000150 | 7.48E-05 | -2.001103 | 0.0638 |
| D(IQ(-2)) | -0.000189 | 7.69E-05 | -2.461036 | 0.0265 |
| D(GFCF) | -7.66E-06 | 5.58E-06 | -1.372090 | 0.1902 |
| D(GFCF(-1)) | 2.91E-05 | 6.44E-06 | 4.508630 | 0.0004 |
| D(GFCF(-2)) | 1.55E-05 | 5.33E-06 | 2.899641 | 0.0110 |
| D(TOPEN) | 8.36E-06 | 2.20E-06 | 3.795325 | 0.0018 |
| D(INF) | -2.02E-06 | 1.54E-06 | -1.312275 | 0.2092 |
| D(INF(-1)) | 8.34E-06 | 1.56E-06 | 5.358543 | 0.0001 |
| D(INF(-2)) | 3.08E-06 | 1.42E-06 | 2.161959 | 0.0472 |
| ECT(-1) | -0.104693 | 0.010356 | -10.10941 | 0.0000 |
| <i>Long-Run Estimates</i> | | | | |
| IQ | -0.035469 | 0.029866 | -1.187577 | 0.2535 |
| GFCF | -0.008503 | 0.001643 | -5.176299 | 0.0001 |
| FSD | -0.003990 | 0.004106 | -0.971702 | 0.3466 |
| TOPEN | 0.003023 | 0.001388 | 2.178601 | 0.0457 |
| INF | -0.002783 | 0.001297 | -2.146032 | 0.0486 |
| C | 4.380754 | 0.117063 | 37.42232 | 0.0000 |
| R-squared | 0.7447 | F-stat | 61.5131 (0.0000) | |
| Adj. R-squared | 0.6756 | D-Watson | 2.0962 | |

Source: Author's computation (2022).

The short-run coefficients of the change in life expectancy at lags one and two are significantly positive and negative at the 5% level, respectively. While the first and second lags are statistically significant and negative, the short-run parameter estimates of current institutional quality were found to be positive and statistically insignificant at 5%. As a result, institutional quality had a short-run negative impact on life expectancy at lags one and two. This demonstrates that institutions do not guarantee an increase in the expected mean years of a person's life after birth. Life expectancy is directly and significantly affected by the first and second lags of gross fixed capital formation. The rise in trade openness had a beneficial and considerable impact on life expectancy. Except for its second lag, which is statistically insignificant at 5%, all trade openness parameters are positive and statistically significant. Apart from the current level, which was negative and insignificant at 5%, it was also revealed that inflation at the first and second lags significantly and positively impacted life expectancy.

The long-term estimates in Table 4.11 show that poor institutional settings reduce life expectancy in Nigeria. The parameter of the indicator was consistent with theoretical assumptions, but the result is not statistically significant at 5%. It implies that institutional quality has no long-term association with life expectancy. Similarly, the rise of the financial industry has no major impact on life expectancy. Meanwhile, gross fixed capital formation has had a long-term negative and considerable impact on life expectancy. As a result, a 100% change in investment results in a 0.85% drop in life expectancy. Low inflation, on the other hand, has been shown to have a positive and significant impact on life expectancy. As a result, a 100% decrease in inflation results in a 0.28% change in life expectancy. Furthermore, during the study period, trade openness had a direct and significant effect on life expectancy in Nigeria. As a result, for every 100% increase in trade openness, life expectancy rises by 0.3%.

The adjusted R^2 (coefficient of determination) is high (67.56%), indicating that the model variables accounted for approximately 67.56% of all differences in life expectancy. It merely stated that the changes in institutional quality and other contributing factors accounted for 67.56% of the variations in life expectancy. The overall test using the F-statistic (61.513), which is statistically significant at the 5% level of significance, demonstrates that the model is accurately specified and statistically significant. The model lacks serial autocorrelation, as demonstrated by the Durbin-Watson score of 2.0962.

Diagnostic Test

The estimated ARDL model examines heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality testing. The results of these tests are shown in Table 4.12. The calculated ARDL model passed the serial correlation, normality, and heteroskedasticity tests. It shows that the error terms are not serially related and have the same variances as their normal distribution. Furthermore, the ARDL model passes the Ramsey RESET test, indicating that it is evenly specified. Furthermore, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), as shown in Figures 4.6a and 4.6b, are stable.

Table 4.12: Diagnostic Tests of Selected ARDL Model

| Results | |
|--|---|
| Serial Correlation: 0.9986 [0.3950] | Normality Test: 3.3320 [0.1890] |
| Functional Form: 0.5075 [0.6197] | Heteroskedasticity Test: 0.6819 [0.7823] |

Source: Author's computation (2022).

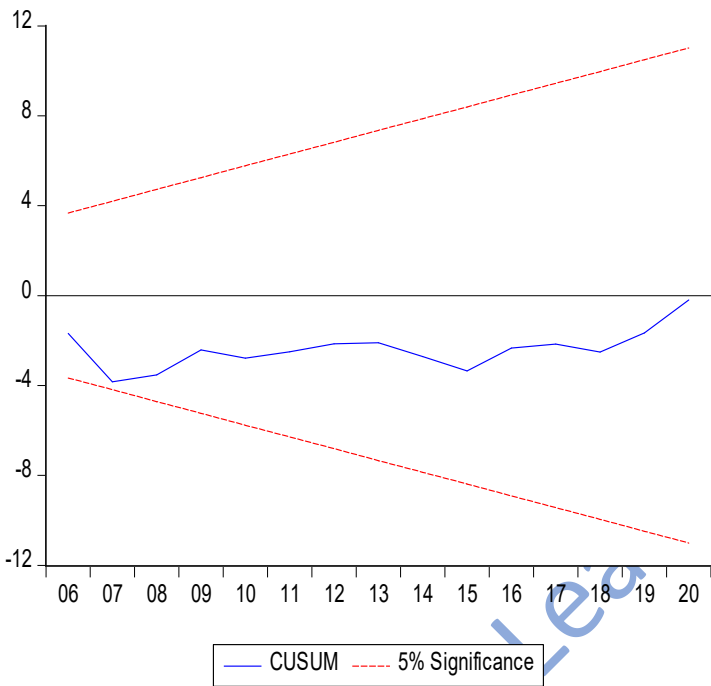


Figure 4.6a: Cumulative Sum (CUSUM)

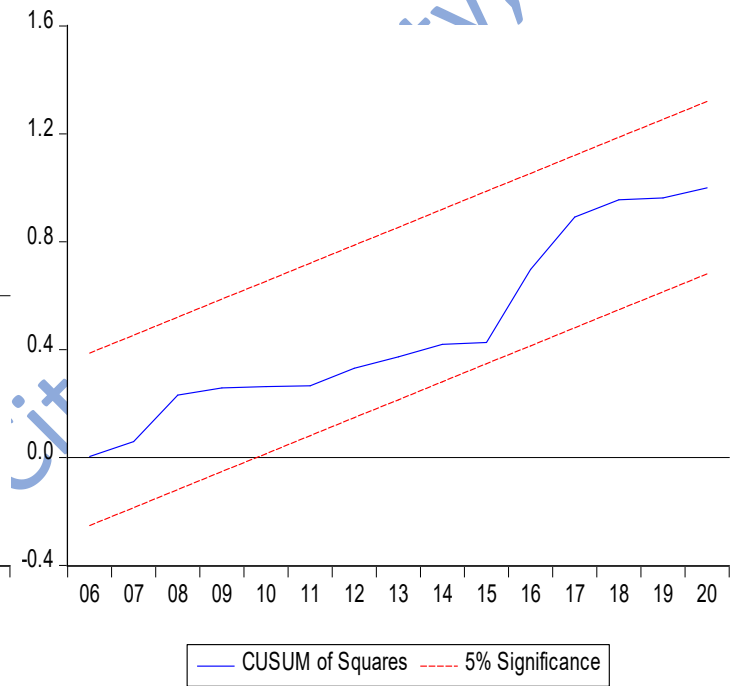


Figure 4.6b: Cumulative Sum of Square (CUSUMQ)

C) Short-run and Long-run Estimates of Institutional Quality and Infant Mortality

In this section, this study examined the null hypothesis that institutional quality has no significant effect on infant mortality in Nigeria. It assesses the short-run and long-run relationship estimates of institutional quality and other controllable factors on infant mortality in Nigeria using the estimated ARDL approach, which was completely addressed in the preceding chapter. The calculated ARDL model is a combination of short-run and long-run estimates of the relationships among the series considered in this study. Based on statistics on institutional quality, gross fixed capital creation, financial sector development, trade openness, and inflation rate, Table 4.13 provides conclusive evidence for our empirical estimates.

The short-run estimation results show the error correction mechanism, which measures the rate or intensity of adjustment. It quantifies the rate at which the outcome variable responds to changes in the explanatory variables. The dynamic pattern of the model is revealed in the short run analysis, which also checks to determine if the dynamics of the model have not been confined by incorrect lag length constraints. Based on the automatic selection of the Akaike Information Criterion, the model's lag length was set at three to ensure a sufficient degree of freedom, and the ARDL test automatically selected the lag duration on all variables. The short-term estimates of the connection between institutional quality and newborn mortality are shown in Table 4.13. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1755) implied that the model corrects its short-run disequilibrium by 17.55% speed of adjustment in order to return to the long run equilibrium.

Table 4.13: Results of Estimated ARDL Model of Infant Mortality**Dependent Variable:** Infant Mortality (imor)**Selected Model:** ARDL(4, 1, 2, 0, 2, 1)**Sample:** 1984 2020**Included observations:** 33

| <i>Short-Run Estimates</i> | | | | |
|----------------------------|--------------------|-------------------|--------------------|--------------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| DLOG(IMOR(-1)) | 1.278051 | 0.125578 | 10.17732 | 0.0000 |
| DLOG(IMOR(-2)) | 0.163397 | 0.239863 | 0.681212 | 0.5049 |
| DLOG(IMOR(-3)) | -0.521263 | 0.128300 | -4.062852 | 0.0008 |
| D(IQ) | 0.001076 | 0.000696 | 1.546360 | 0.1404 |
| D(GFCF) | -5.68E-06 | 4.82E-05 | -0.117950 | 0.9075 |
| D(GFCF(-1)) | -0.000323 | 6.33E-05 | -5.095983 | 0.0001 |
| D(TOPEN) | -1.21E-05 | 1.99E-05 | -0.607670 | 0.5514 |
| D(TOPEN(-1)) | -7.64E-05 | 1.89E-05 | -4.036542 | 0.0009 |
| D(INF) | -3.26E-05 | 1.17E-05 | -2.789723 | 0.0126 |
| ECT(-1) | -0.175501 | 0.023461 | -7.481528 | 0.0000 |
| <i>Long-Run Estimates</i> | | | | |
| IQ | -0.019506 | 0.056186 | -0.347158 | 0.7327 |
| GFCF | 0.017792 | 0.002072 | 8.586360 | 0.0000 |
| FSD | 0.005650 | 0.006014 | 0.939454 | 0.3607 |
| TOPEN | 0.005203 | 0.003033 | 1.715568 | 0.1044 |
| INF | -0.000362 | 0.000958 | -0.378217 | 0.7100 |
| C | 3.790938 | 0.150535 | 25.18306 | 0.0000 |
| R-squared | 0.7510 | F-stat | 86.054 (0.0000) | |
| Adj. R-squared | 0.6302 | D-Watson | 2.0361 | |

Source: Author's computation (2022).

The short-run coefficients of change in infant mortality at lags one and two are positive at the conventional level, but negative at lag three. While the first and third lags are statistically significant, the total short-run parameter estimates of previous infant mortality in Nigeria contribute to the current infant mortality. Furthermore, at 5%, the existing short run institutional quality was assessed to be negative but statistically insignificant. It means that, while not statistically significant, institutional quality had a short-term favorable benefit on infant mortality reduction. Although both the current and first lags of gross fixed capital formation have an indirect impact on infant mortality, only its first lag is statistically significant. The measure of trade openness at first lag is also negatively but significantly connected to infant mortality, with the exception of the current level, which was negative and statistically insignificant at 5%. In addition, the findings showed that the current level of inflation had a considerable and unfavorable impact on infant mortality.

According to the long-term estimates presented in Table 4.13, institutional quality has a negative impact on infant mortality in Nigeria. The series did not follow the theoretical prediction, and the outcome is statistically insignificant at 5%. It implies that institutional quality has a detrimental impact on infant mortality, however the effect is not significant statistically. In terms of magnitude, a 10% increase in institutional settings results in a 0.2% reduction in infant mortality. Low inflation has also been linked to an increase in newborn mortality. As a result, a 100% decrease in inflation resulted in a 0.036% decrease in infant mortality. Furthermore, during the study period, gross fixed capital formation, financial sector development, and trade openness all had a direct impact on infant mortality in Nigeria. The only factors that had a substantial impact on infant mortality were investment at 5% and trade openness at 10%. As a result, for every 10%

increase in gross fixed capital formation, financial sector growth, and trade openness, infant mortality rises by 0.18%, 0.057%, and 0.05%, respectively.

The adjusted R^2 (coefficient of determination) is high (63.02%), indicating that the model variables accounted for approximately 63.02% of all variations in infant mortality. It merely stated that changes in institutional quality and other contributing factors were responsible for 63.02% of the total variations in infant mortality. The overall test using the F-statistic (86.054), which is statistically significant at the 5% level of significance, demonstrates that the model is accurately specified and statistically significant. The model lacks serial autocorrelation, as demonstrated by the Durbin-Watson score of 2.0361.

Diagnostic Test

The estimated ARDL model examines heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality testing. The results of these tests are shown in Table 4.14. The calculated ARDL model passed the serial correlation, normality, and heteroskedasticity tests. It shows that the error terms are not serially related and have the same variances as well as the normality distribution test. Furthermore, the ARDL model passes the Ramsey RESET test, indicating that it is evenly specified. In addition, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), as shown in Figures 4.7a and 4.7b, are stable.

Table 4.14: Diagnostic Tests of Selected ARDL Model

| Results | |
|--|---|
| Serial Correlation: 1.1392 [0.3524] | Normality Test: 0.4429 [0.8014] |
| Functional Form: 1.6495 [0.1230] | Heteroskedasticity Test: 1.6794 [0.1517] |

Source: Author's computation (2022).

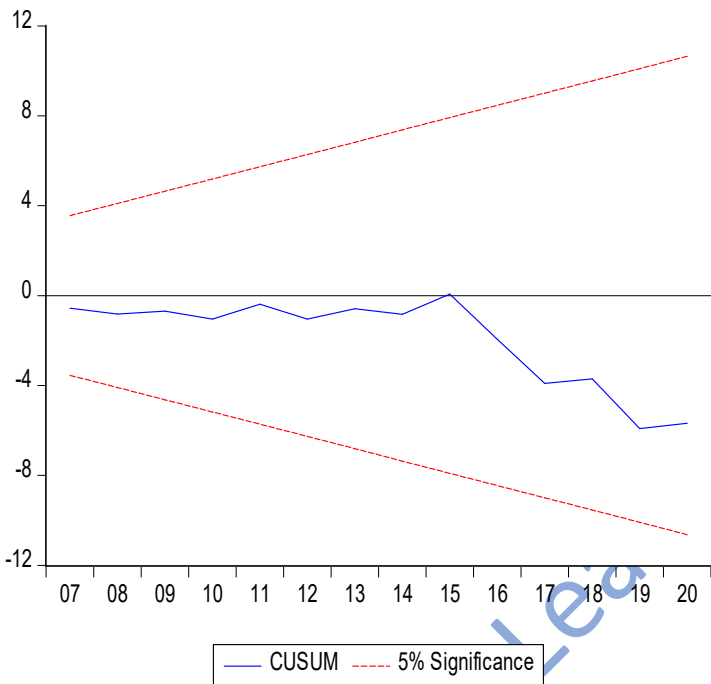


Figure 4.7a: Cumulative Sum (CUSUM)

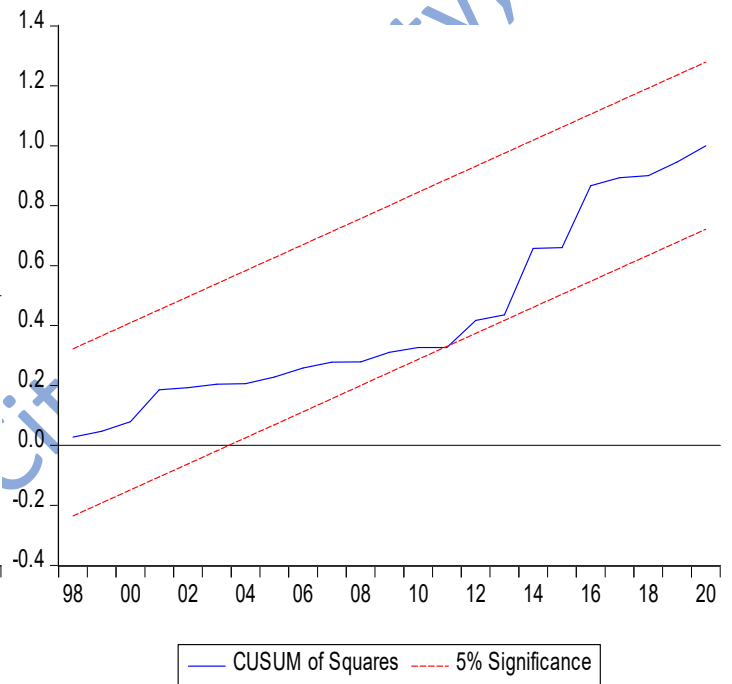


Figure 4.7b: Cumulative Sum of Square (CUSUMQ)

4.4.3 Empirical Results of the Links among Public Health Expenditure, Institutions and Health Outcomes

A) Cointegration Test Result

Before estimating the short-run and long-run parameters, the study uses the autoregressive distributed lag (ARDL) bound cointegration tests to examine the long-run relationships among public health expenditure, institutional quality, health outcomes and other controllable variables in the context of the proposed hypotheses. The ARDL bound test is used for the model illustrating the relationship among public health expenditure, institutional quality, health outcomes, and other controllable variables since it is appropriate for variables at various orders of integration. Table 4.15 provides the F-statistics estimate for examining the possibility of a long-term relationship among public health expenditure, institutional quality, health outcomes, and other confounding factors in Nigeria.

According to the table, the normalized estimated F-statistics ($F_{arb} = 5.0703$ and 11.855) of the equations exceed both the lower and upper critical bounds at a 5% level of significance. This suggests that at a 5% significance level, the null hypothesis that there is no long-term association is rejected. In accordance with the estimation above, public health expenditure, institutional quality, control variables (including gross fixed capital creation, financial sector development, trade openness, and inflation rate), and health outcomes all have equilibrium conditions that maintain them together throughout time. As a result, in Nigeria, there is a long-term connection among public health expenditure, institutional quality and health outcomes.

Table 4.15: Existence of long-run among health expenditure, institutions and health outcomes

| Test Statistics | Value | K |
|---|-------------------|-------------------|
| F-statistics (lexp phexp iq phexp×iq gfcf, fsd topen inf) (2, 2, 1, 1, 2, 1, 2, 2) | 5.0703 | 7 |
| F-statistics (imor phexp iq phexp×iq gfcf, fsd topen inf) (2, 1, 1, 2, 2, 2, 2, 1) | 11.855 | 7 |
| Critical Value Bounds | | |
| Significance | I(0) Bound | I(1) Bound |
| 10% | 1.92 | 2.89 |
| 5% | 2.17 | 3.21 |
| 2.5% | 2.43 | 3.51 |
| 1% | 2.73 | 3.90 |

Source: Author's computation (2022).

B) Short-run and Long-run Estimates of Public Health Expenditure, Institutional Quality and Life Expectancy

The null hypothesis, that public health spending and institutional quality have no significant interactive effect on life expectancy in Nigeria, is addressed in this section. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, it evaluates both the short-run and long-run relationship estimates of public health expenditure, institutional quality and other controllable factors in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.16 provides conclusive evidence for our empirical estimations based on data on public health spending, institutional quality, gross fixed capital creation, financial sector development, trade openness, and inflation rate.

The findings of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.16 shows the short-term estimates of the relationship among public health spending, institutional quality and life expectancy. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1800) implied that the model corrects its short-run disequilibrium by 18.0% speed of adjustment in order to return to the long run equilibrium.

Table 4.16: Results of Estimated ARDL Model of Life Expectancy**Dependent Variable:** Life Expectancy (lexp)**Selected Model:** ARDL(2, 2, 1, 1, 2, 1, 2, 2)**Sample:** 1984 2020**Included observations:** 33

| <i>Short-Run Estimates</i> | | | | |
|----------------------------|--------------------|-------------------|--------------------|--------------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| DLOG(LEXP(-1)) | 0.931956 | 0.004549 | 204.8595 | 0.0000 |
| D(PHEXP) | 0.021675 | 0.000877 | 24.70354 | 0.0000 |
| D(PHEXP(-1)) | -0.003820 | 0.000369 | -10.34043 | 0.0000 |
| D(IQ) | 0.001669 | 0.000247 | 6.759439 | 0.0000 |
| D(PHEXP×IQ) | -0.005971 | 0.001202 | -4.966620 | 0.0001 |
| D(GFCF) | 1.11E-05 | 8.63E-06 | 1.284885 | 0.2171 |
| D(GFCF(-1)) | 4.80E-05 | 7.75E-06 | 6.191819 | 0.0000 |
| D(FSD) | -5.79E-05 | 1.41E-05 | -4.110865 | 0.0008 |
| D(TOPEN) | -1.44E-05 | 3.18E-06 | -4.538759 | 0.0003 |
| D(TOPEN(-1)) | 8.83E-06 | 3.21E-06 | 2.745460 | 0.0144 |
| D(INF) | -3.12E-06 | 2.02E-06 | -1.545235 | 0.1418 |
| D(INF(-1)) | 1.38E-05 | 1.93E-06 | 7.151533 | 0.0000 |
| ECT(-1) | -0.179961 | 0.006881 | -26.16264 | 0.0000 |
| <i>Long-Run Estimates</i> | | | | |
| PHEXP | 1.621843 | 0.260473 | 6.226533 | 0.0000 |
| IQ | 0.092716 | 0.016031 | 5.783473 | 0.0000 |
| PHEXP×IQ | -0.331767 | 0.071881 | -4.615498 | 0.0003 |
| GFCF | -0.002495 | 0.000559 | -4.462722 | 0.0004 |
| FSD | -0.006049 | 0.001271 | -4.760472 | 0.0002 |
| TOPEN | -0.002516 | 0.000426 | -5.908999 | 0.0000 |
| INF | -0.001318 | 0.000255 | -5.162101 | 0.0001 |
| C | 3.763168 | 0.061268 | 61.42104 | 0.0000 |
| R-squared | 0.8925 | F-stat | 24.4658 (0.0000) | |
| Adj. R-squared | 0.7809 | D-Watson | 2.1209 | |

Source: Author's computation (2022).

At the 5% level, the short-run coefficients of the change in life expectancy at lag one is significant and positive. While the first lag is statistically significant and negative, the short-run parameter estimates of current public health expenditure was determined to be positive and statistically significant at 5%. It follows that the public health spending had a short-term positive influence on life expectancy. Also, institutional quality has a direct impact on life expectancy in the short run. However, the interactive effect of institutional quality and public health spending negatively impacted life expectancy. It means that institutional quality failed to moderate a positive influence between public health expenditure and life expectancy in the short run. The current and first lag of gross fixed capital creation had a direct impact on life expectancy. Life expectancy was adversely and significantly impacted by the rise of the financial sector development in the short run. With the exception of the current level which is negative and statistically significant at 5%, the first lag of trade openness is positive and statistically significant. It was also discovered that, except for the current level, which was not significant at 5%, inflation at the first lag positively and significantly impacted life expectancy.

According to the long-run results in Table 4.16, public health spending positively impacted life expectancy in Nigeria. The indicator's parameter was in line with theoretic assumptions, and the result is statistically significant at 5%. It implies that, if well managed, public health spending has the potential to increase life expectancy. Likewise, the study discovered that institutional quality has a direct impact on life expectancy in the long run. In magnitude terms, a 1% rise in public health expenditure and institutional quality lead to about 1.62% and 0.09% increase in life expectancy. As regards the interaction of public health expenditure and institutional quality, it negatively influenced life expectancy in the long run. According to a scale of magnitude, a 10% increase in the interaction of public health spending and institutional quality will result in a

3.32% decrease in life expectancy. Also, low inflation has demonstrated to have a favorable and considerable impact on life expectancy. Thus, a 100% decline in inflation rate results in a 0.13% change in life expectancy. However, for the research years, trade openness, financial sector growth, and gross fixed capital formation have indirect and significant effects on life expectancy in Nigeria. As a result, life expectancy decreases by 0.25%, 0.61%, and 0.25% with every 100% rise in gross fixed capital formation, financial sector development, and trade openness, respectively.

The adjusted R^2 (coefficient of determination) is high (78.09%), meaning that the variables in the model accounted for around 78.09% of all variations in life expectancy. It only said that variations in public health spending, institutional quality and other influencing factors accounted for 78.09% of the range in changes in life expectancy. The model is properly described and statistically significant as shown by the overall test using the F-statistic (24.466), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 2.1209.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.17 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.8a and 4.8b are steady.

Table 4.17: Diagnostic Tests of Selected ARDL Model

| Results | |
|--|---|
| Serial Correlation: 4.8549 [0.1708] | Normality Test: 1.3223 [0.5163] |
| Functional Form: 1.5320 [0.1463] | Heteroskedasticity Test: 2.0522 [0.0773] |

Source: Author's computation (2022).

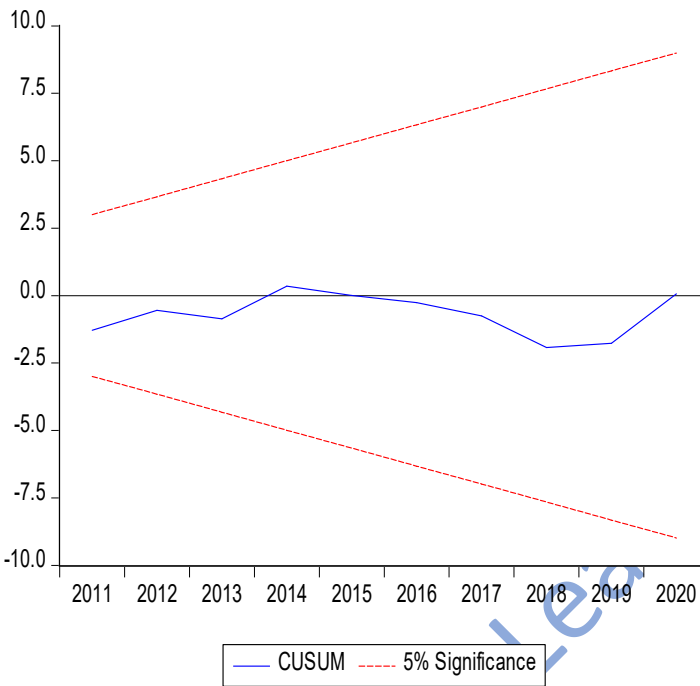


Figure 4.8a: Cumulative Sum (CUSUM)

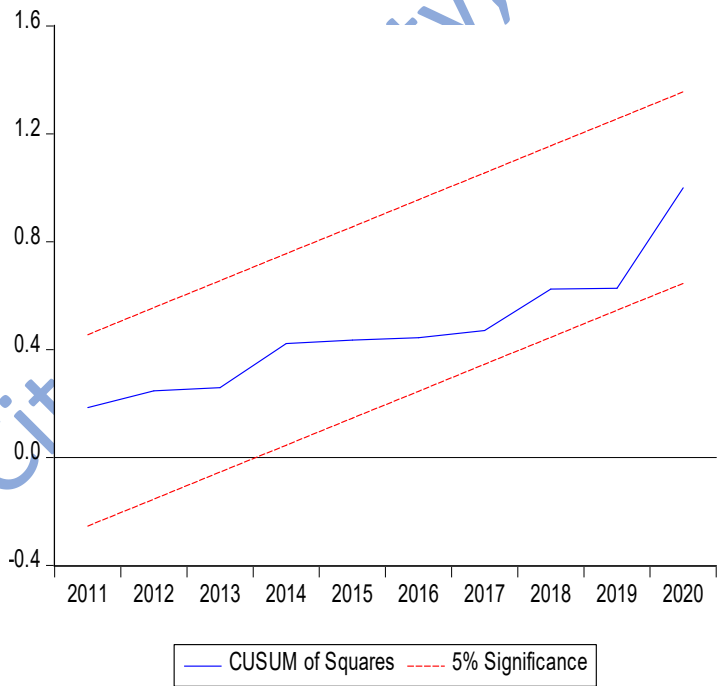


Figure 4.8b: Cumulative Sum of Square (CUSUMQ)

C) Short-run and Long-run Estimates of Public Health Expenditure, Institutional Quality and Infant Mortality

In this section, this study addressed the null hypothesis that public health spending and institutional quality have no significant effect on infant mortality in Nigeria. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, this study evaluates both the short-run and long-run relationship estimates of public health expenditure, institutional quality and other controllable factors on infant mortality in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.18 provides conclusive evidence for our empirical estimations based on data on public health spending, institutional quality, gross fixed capital creation, financial sector development, trade openness, and inflation rate.

The results of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.18 shows the short-term estimates of the correlation among public health spending, institutional quality and infant mortality. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1646) implied that the model corrects its short-run disequilibrium by 16.46% speed of adjustment in order to return to the long run equilibrium.

Table 4.18: Results of Estimated ARDL Model of Infant Mortality**Dependent Variable:** Infant Mortality (imor)**Selected Model:** ARDL(2, 1, 1, 2, 2, 2, 2, 1)**Sample:** 1984 2020**Included observations:** 33

| <i>Short-Run Estimates</i> | | | | |
|----------------------------|--------------------|-------------------|--------------------|--------------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| DLOG(IMOR(-1)) | 1.015823 | 0.009387 | 108.2106 | 0.0000 |
| D(PHEXP) | -0.072054 | 0.026804 | -2.688162 | 0.0169 |
| D(IQ) | -0.004662 | 0.000859 | -5.428364 | 0.0001 |
| D(PHEXP×IQ) | 0.021695 | 0.001875 | 11.56779 | 0.0000 |
| D(PHEXP×IQ(-1)) | 0.003096 | 0.000763 | 4.056181 | 0.0010 |
| D(GFCF) | -0.000262 | 5.14E-05 | -5.086748 | 0.0001 |
| D(GFCF(-1)) | -0.000351 | 4.62E-05 | -7.598439 | 0.0000 |
| D(FSD) | 6.61E-05 | 8.56E-05 | 0.771800 | 0.4522 |
| D(FSD(-1)) | 0.000192 | 8.65E-05 | 2.223928 | 0.0419 |
| D(TOPEN) | 7.77E-05 | 2.41E-05 | 3.227279 | 0.0056 |
| D(TOPEN(-1)) | -0.000121 | 2.09E-05 | -5.775889 | 0.0000 |
| D(INF) | -4.02E-05 | 1.29E-05 | -3.122509 | 0.0070 |
| ECT(-1) | -0.164591 | 0.012871 | -12.79040 | 0.0000 |
| <i>Long-Run Estimates</i> | | | | |
| PHEXP | -4.377892 | 2.004492 | -2.184040 | 0.0453 |
| IQ | -0.509936 | 0.190868 | -2.671664 | 0.0174 |
| PHEXP×IQ | 1.002609 | 0.582985 | 1.719786 | 0.1060 |
| GFCF | 0.007323 | 0.003708 | 1.974630 | 0.0670 |
| FSD | 0.009294 | 0.012062 | 0.770525 | 0.4530 |
| TOPEN | 0.019329 | 0.006300 | 3.068360 | 0.0078 |
| INF | 0.000765 | 0.001144 | 0.668706 | 0.9466 |
| C | 5.342466 | 0.514569 | 10.38242 | 0.0000 |
| R-squared | 0.7492 | F-stat | 51.3699 (0.0000) | |
| Adj. R-squared | 0.6245 | D-Watson | 1.9449 | |

Source: Author's computation (2022).

At the conventional level, the short-run coefficient of the change in infant mortality at lag one is positive and significant statistically. More so, the current public health expenditure was determined to be negative and statistically significant at 5%. It implies that public health spending had a short-term negative influence on infant mortality. Also, institutional quality negatively influenced infant mortality in the short run. However, the interactive effects of public health expenditure and institutional quality positively impacted infant mortality. The current and first lag of gross fixed capital creation had indirect significant impact on infant mortality. Further, infant mortality was directly impacted by an increase in financial sector development in the short run. With the exception of the first lag which is negative, the parameter of trade openness at the current level is positive and significantly related to infant mortality. Also, the table indicated that the current level of inflation rate significantly and negatively impacted infant mortality.

In accordance to the long-term estimated reported in Table 4.18, public health spending and institutional decreases infant mortality in Nigeria. The series were consistent with the theoretic expectation, and the result is statistically insignificant at 5%. It implies that, public health spending and good institutional settings do have the potentials to curtail infant mortality for the periods understudy. As to the magnitude scale, a 10% increase in public health spending and institutional quality result to a 4.38% and 0.51% decrease in infant mortality. Meanwhile, the interactive effects of public health expenditure and institutional quality have positive impact on infant mortality. It therefore implies that weak institutional framework contributes to the unfavorable effects of public health expenditure on high infant mortality. The marginal effects of the interaction of institutions and public health expenditure on infant mortality is positive and statistically significant at 10% levels. In addition, for the research years, gross fixed capital formation, financial sector development, trade openness and inflation rate have direct effects on

infant mortality in Nigeria. The only cofounding factor that significantly impacted infant mortality were trade openness at 5% level and investment at 10% level. As a result, infant mortality increases by 0.073%, 0.093%, 0.19% and 0.008% with every 10% rises in gross fixed capital formation, financial sector development, trade openness, and inflation rate respectively.

The adjusted R^2 (coefficient of determination) is high (62.45%), meaning that the variables in the model accounted for around 62.45% of all variations in infant mortality. It only said that variations in public health spending, institutional quality and other influencing factors accounted for 62.45% of the range in changes in infant mortality. The model is properly described and statistically significant as shown by the overall test using the F-statistic (51.370), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 1.9449.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.19 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.9a and 4.9b are steady.

Table 4.19: Diagnostic Tests of Selected ARDL Model

| Results | |
|--|---|
| Serial Correlation: 0.1346 [0.8752] | Normality Test: 0.5135 [0.7736] |
| Functional Form: 0.3467 [0.7875] | Heteroskedasticity Test: 1.4190 [0.2482] |

Source: Author's computation (2022).

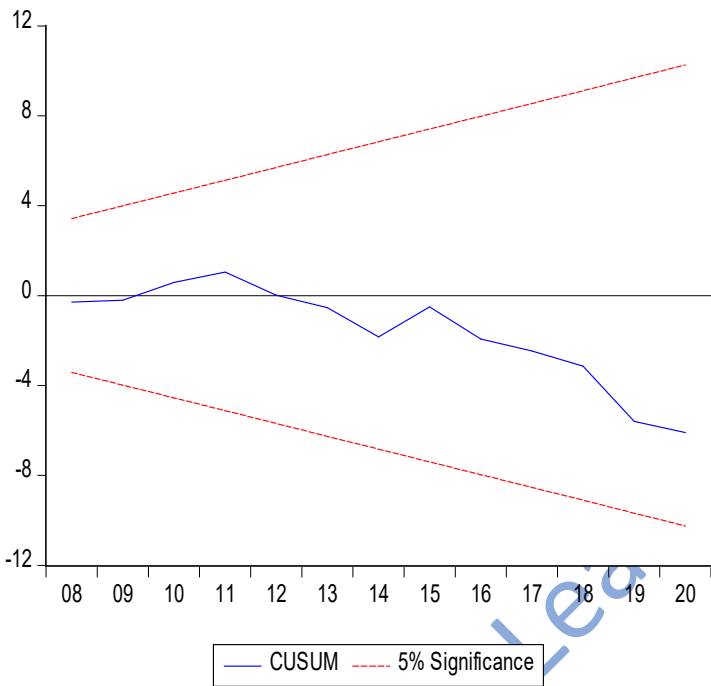


Figure 4.9a: Cumulative Sum (CUSUM)

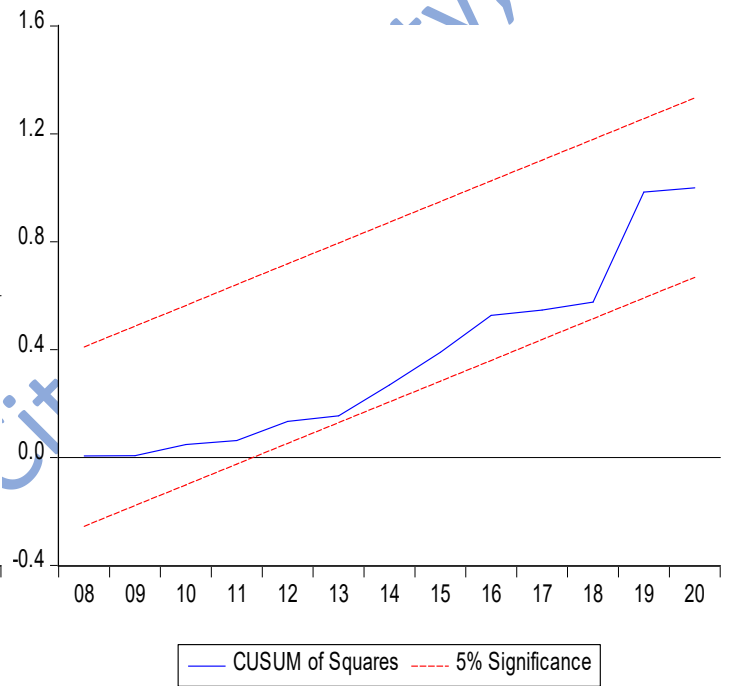


Figure 4.9b: Cumulative Sum of Square (CUSUMQ)

4.5 Discussion of Findings

Concerning the first objective, the study found that a long run relationship exist between government health expenditure and health outcomes in Nigeria. Government health expenditure negatively influenced life expectancy in the short run but the impact was positive in the long run. In the short run, public health spending does not have the stimulus to improve life expectancy in the short run. However, in the long run, government spending on healthcare facilities and services has the chances of improving the average number of years an individual lives after birth. Thus, it shows that increasing government health spending increases life expectancy. It aligns with the research outcomes of previous studies that status of health expenditure can improve life expectancy^{1,2,3,4,5}. Thus, public health capital spending are key ingredients towards improving life expectancy in the long run. The long run positive links between public health expenditure and life expectancy across countries in the region over time mean that healthy lifestyles and the broader social determinants of health are vital in improving life expectancy. This direct relationship, however, emphasizes the importance of improving value for money in health-care systems. It includes a greater emphasis on health promotion and other low-cost interventions, as well as a reduction in ineffective spending and waste. Meanwhile, it was discovered that government health spending do not have a significant impact on infant mortality during the periods understudy. This is related to a study conducted for a small number of countries in Sub Saharan Africa that found a positive and significant relationship between public health spending and infant mortality⁶. Also, it is similar to a Nigerian study that argued a direct link between public health expenditure and infant mortality⁷. It negates the results of previous studies that public health expenditure significantly reduced infant mortality rates^{2,4,5,8,9}.

Regarding the second objective, institutions negatively influenced life expectancy both in short run and long run. The negative influence was only significant statistically in the short run. It means that weak institutional settings do not have the impetus to improve the expected average number of years an individual lives after birth. Also, institutional framework has no significant effect on infant mortality both in short run and long run. This negates the result of previous that found institutions significantly influencing health outcomes^{5,11,12,13}.

As to the third objective, the interactive effect of public health spending and institutional quality has negative effect on life expectancy but positively influenced infant mortality in short run and long run. It means that the marginal effects of institutions and government health expenditure negatively and positively influenced life expectancy and infant mortality within the period understudy. It implies that the country's institutional settings do not have the impetus to drive government health expenditure towards influencing health outcomes positively. As institutional settings weaken, this may be due to deteriorating efficiency in the use of available resources and better allocation of those resources. This align with the results of previous studies that the effectiveness of health and the way to reduce infant mortality or improve life quality is conditioned by the status of good institutions³. Thus, this study emphasizes the importance of health programmes in improving the country's quality of life while reducing or eliminating the country's bottlenecks towards ensuring quality institutions.

Endnotes

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Chapter Five

Conclusion

5.1 Summary

In this study, the existing relationship between public health expenditure, institutional quality and health outcomes in Nigeria is investigated in order to understand the impact of institutions on health outcomes in Nigeria; the effect of public health expenditure on health outcomes in Nigeria; and the interactive effects of public health expenditure and institutions on health outcomes in Nigeria. Understudying this research study became necessary because it makes enquiries on the findings of past studies which can best be described as inconclusive. The study is conducted for developing countries in Sub-Saharan countries such as Nigeria. The datasets employed were obtained from the World Development Indicators (2020), CBN Statistical Bulletin (2020) and International Country Risk Guide(2020) which spans from 1984 to 2020. The autoregressive distributed lag (ARDL) estimator was used to evaluate the parameters based on the characteristics of the datasets.

For the first objective, a long-run relationship was found between government health expenditure and health outcomes measured by life expectancy and infant mortality in Nigeria. Public health spending at lags one and two had a short-term negative influence on life expectancy. This shows that public health spending does not guarantee an improvement in the anticipated mean years of an individual's life after birth. In the long run, public health spending increases life expectancy in Nigeria. It implies that, if well managed, public health spending has the potential to increase life expectancy. Also, as the first and third lags are statistically significant, the overall short-run parameter estimates of previous infant mortality contribute to the current infant mortality in Nigeria. More so, the current public health expenditure was determined to be positive and

statistically significant at 5%. It implies that public health spending had a short-term positive influence on infant mortality. In the long run, public health spending increases infant mortality in Nigeria. It implies that, public health spending does not have the potentials to curtail infant mortality for the periods understudy.

Regarding the second objective, the results show that there exists a long-run relationship between institutions and health outcomes in Nigeria. While the first and second lags are statistically significant and negative, the short-run parameter estimates of current institutional quality were found to be positive and statistically insignificant at the conventional level. As a result, institutional quality at lags one and two had short-run negative impact on life expectancy. This demonstrates that institutions do not guarantee an increase in the expected mean years of a person's life after birth. However, weak institutional settings reduce life expectancy in Nigeria, albeit not significant at 5% level. It implies that institutional quality has no long-term association with life expectancy. Also, the existing short run institutional quality has negative impact on infant mortality but statistically insignificant. It means that, while not statistically significant, institutional quality had a short-term favorable benefit on infant mortality reduction. According to the long-term estimates, institutional quality has a negative and insignificant impact on infant mortality in Nigeria. It thus implies that institutional quality has a detrimental impact on infant mortality, however, the effect is not significant statistically.

Concerning the third objective, the study found that there is a long run relationship among institutions, public health expenditure and health outcomes in Nigeria. In the short-run, the interactive effect of institutional quality and public health spending negatively impacted life expectancy. It means that institutional quality failed to moderate a positive influence between public health expenditure and life expectancy in the short run. As regards the interaction of

public health expenditure and institutional quality in the long run, it negatively influenced life expectancy for the periods under study. This means that institutional settings do not moderate the positive impact of public health expenditure on life expectancy in Nigeria. On the second hand, the short run interactive effects of public health expenditure and institutional quality positively impacted infant mortality. Meanwhile, the interactive effects of public health expenditure and institutional quality have positive impact on infant mortality. It therefore implies that weak institutional framework contributes to the unfavorable effects of public health expenditure on high infant mortality in Nigeria.

5.2 Conclusion

This study investigates the interrelationship between public health expenditure, institutions and health outcomes in Nigeria over the periods of 1984 to 2020 using the ARDL bound testing approach. The study found that short run government health expenditure negatively and significantly influenced life expectancy. However, the impact of public health spending on life expectancy in the long run is significant at 5% level. In the short run, public health spending does not have the stimulus to improve life expectancy in the short run. However, in the long run, government spending on healthcare facilities and services has the chances of improving the average number of years an individual lives after birth. Thus, it shows that increasing government health spending increases life expectancy. Thus, public health capital spending are key ingredients towards improving life expectancy in the long run. The long run positive links between public health expenditure and life expectancy across countries in the region over time mean that healthy lifestyles and the broader social determinants of health are vital in improving life expectancy. This direct relationship, however, emphasizes the importance of improving

value for money in health-care systems. It includes a greater emphasis on health promotion and other low-cost interventions, as well as a reduction in ineffective spending and waste. Meanwhile, it was discovered that government health spending do not have a significant impact on infant mortality during the periods understudy. Also, institutions negatively influenced life expectancy both in short run and long run. The negative influence was only significant statistically in the short run. It means that weak institutional settings do not have the impetus to improve the expected average number of years an individual lives after birth. Also, institutional framework has no significant effect on infant mortality both in short run and long run. Finally, institutions do not have the impetus to drive government health expenditure towards influencing health outcomes positively. Thus, the effectiveness of health and the way to reduce infant mortality or improve life quality is conditioned by the status of good institutions. This study emphasized the importance of health programmes in improving the country's quality of life while reducing or eliminating the country's bottlenecks towards ensuring quality institutions.

5.3 Recommendations

Following the reported findings discussed in the subsequent parts of the chapter in this research study, the following policy recommendations are discussed below:

- a) To begin, it is imperative for government to increase its expenditure on healthcare services and facilities so as to improve the health of the country's population. Thus, the amount of public spending is expected to be comparable to that of developed countries;
- b) Second, proper governance and institutional handling must be maintained to ensure appropriate and efficient use of public sector health funds, as well as accountability and transparency to ensure improve life expectancy and curtail infant mortality; and

- c) Third, efforts should be made, and appropriate policies should be adopted and implemented, to increase the government's revenue source, allowing them to spend more on health goods and services.

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