



FINANCIAL DEEPENING AND HEALTH OUTCOME IN NIGERIA

George-Anokwuru, Chioma Chidinmaⁱ

Department of Economics,
Faculty of Social Sciences,
University of Port Harcourt,
Nigeria

Abstract:

This study examined the influence of financial deepening on health outcomes in Nigeria from 1981 to 2023. The data used in this study came from reports by Nigeria's central bank and the World Bank, and included information on broad money supply as a ratio of GDP in %, private sector credit as a ratio of GDP in %, life expectancy, total government expenditure on health and inflation rate. This study employed an Autoregressive Distributed Lag - ARDL method to explore how these factors are associated in both the long and the short term. The results revealed that in both the long and short terms, the amount of credit given to the private sector as a ratio of GDP in percentage and the inflation rate have a negative and significant relationship with life expectancy. However, broad money supply as a percentage of GDP and total government expenditure on health have a positive and significant association with life expectancy. The study recommended that policymakers should strengthen financial deepening by expanding financial inclusion and improving access to formal financial services to enhance households' ability to finance healthcare expenditures and improve life expectancy. The apex bank in Nigeria should sustain monetary policies that promote financial sector development while ensuring that increased liquidity translates into productive investments in the health sector. The study further suggested the need to redirect credit toward productive sectors, particularly healthcare, through targeted lending schemes and concessional financing for healthcare providers and health-related enterprises. In addition, the government should increase budgetary allocations to the health sector, improve the efficiency and accountability of health expenditure, and strengthen healthcare infrastructure and service delivery. Greater coordination between financial sector reforms and health sector policies is essential to ensure that financial deepening effectively supports healthcare financing and contributes to sustainable improvements in health outcomes - life expectancy in Nigeria.

JEL: E44, I10, I18, E31, O16, O55

ⁱ Correspondence: email chiomanwoga@yahoo.com

Keywords: financial deepening, health outcome, government expenditure on health, ARDL and Nigeria

1. Introduction

Health constitutes a fundamental element of human capital development, contributing significantly to economic growth, productivity, and overall societal well-being. When people are healthy, they can work better, learn more, and help the economy grow. George-Anokwuru (2023) argued that good health is really important because it helps increase productivity, economic growth, and the quality of life for people. She further argued that "*health is wealth*." On the other hand, poor health can lead to poverty and early death. Because of this, improving health outcomes has become one of the top goals for governments around the world, especially in developing countries like Nigeria, where health indicators are still not very good even with many policies in place. Health outcomes refer to the overall state of health of a population and are commonly measured by indicators such as life expectancy at birth, infant mortality rate, maternal mortality rate, and under-five mortality rate (World Health Organization [WHO], 2023). In Nigeria, healthcare delivery continues to face numerous challenges, including inadequate healthcare infrastructure, insufficient healthcare financing, shortage of medical personnel, and limited access to quality healthcare services, particularly in rural communities (Aregbeshola & Khan, 2018).

Financial deepening, on the other hand, refers to the expansion and increased efficiency of financial institutions, financial markets, and financial services within an economy (Shaw, 1973). It is often measured using indicators such as broad money supply as a percentage of Gross Domestic Product (M2/GDP), private sector credit as a percentage of GDP (CPS/GDP), stock market capitalization, and financial inclusion indicators (Levine, 2005). Financial deepening enhances economic development by mobilizing savings, facilitating investments, reducing transaction costs, and improving resource allocation efficiency (McKinnon, 1973).

Theoretically, financial deepening can improve health outcomes through several channels. First, enhanced access to financial services enables households to save and borrow for healthcare expenditures and invest in preventive healthcare measures. Second, financial sector development promotes economic growth and income generation, thereby increasing individuals' ability to afford quality healthcare services (Claessens & Feijen, 2007). Third, efficient financial systems facilitate investments in healthcare infrastructure and pharmaceutical industries, improving healthcare service delivery and accessibility.

Over the years, successive governments in Nigeria have implemented several financial sector reforms aimed at promoting financial deepening. These reforms include banking sector liberalization, bank consolidation exercises, financial inclusion policies, mobile banking initiatives, and the development of capital markets (Sanusi, 2012). These reforms have contributed significantly to the growth of financial assets and improved financial intermediation within the economy. Supporting this, a report by the Central

Bank of Nigeria in 2023 revealed that the financial sector has witnessed increased money supply, expansion of banking services, growth in private sector credit, and improved financial inclusion. These developments are expected to facilitate economic activities, increase household income, and improve access to healthcare financing.

Despite these developments, Nigeria continues to record poor health outcomes compared to many emerging economies. For instance, life expectancy at birth stood at 53 years from 2018 to 2021. It increased slightly in 2022 and 2023 to 54 years. In 2024, life expectancy stood at 55 years (World Bank, 2024). Life expectancy in Nigeria remains below the global average, while maternal and infant mortality rates remain among the highest in Sub-Saharan Africa (WHO, 2023; World Bank, 2023). This suggests that health indicators such as life expectancy, infant mortality rate, maternal mortality rate, and access to healthcare services remain unsatisfactory. This situation raises concerns regarding whether financial deepening has effectively translated into improved health outcomes. Existing empirical studies in Nigeria have largely focused on the relationship between financial deepening and economic growth, poverty reduction, investment, and human development (Nwakanma & Nnamdi, 2014). Limited attention has been given to the specific impact of financial deepening on health outcomes. Consequently, there is insufficient empirical evidence on whether financial deepening contributes significantly to improving health outcomes in Nigeria.

Given the importance of both financial sector development and healthcare outcomes in achieving sustainable development, it becomes imperative to investigate the extent to which financial deepening influences health outcomes in Nigeria. Such an investigation would provide valuable insights for policymakers seeking to promote inclusive growth and improve the welfare of citizens.

2. Literature Review

2.1 Conceptual Clarification

2.1.1 Financial Deepening

Financial deepening is a fundamental concept in development economics and financial sector analysis that describes the expansion, diversification, and increased efficiency of financial institutions, financial markets, and financial services within an economy. The concept reflects the extent to which financial assets and financial services are available, accessible, and utilized by individuals, businesses, and governments. Financial deepening is generally associated with the growth of financial intermediaries, increased monetization of the economy, improved credit allocation, and greater participation in formal financial systems (Shaw, 1973; McKinnon, 1973; George-Anokwuru, 2026).

The concept emerged prominently from the pioneering works of McKinnon (1973) and Shaw (1973), who argued that financial sector development plays a crucial role in mobilizing savings, facilitating investment, and promoting economic growth. According to these scholars, financial repression characterized by interest rate controls, high reserve requirements, and government intervention in credit allocation limits financial sector efficiency and constrains economic development. They maintained that policies aimed at

liberalizing and deepening financial systems would enhance the availability of financial resources and stimulate economic activities.

Financial deepening is often viewed as a process through which the financial sector becomes more sophisticated and capable of performing its intermediation functions effectively. These functions include mobilizing savings from surplus economic units, channeling funds to productive investments, facilitating transactions, managing risks, and providing liquidity to economic agents (Levine, 2005; George-Anokwuru, 2026). A deep financial system is therefore one in which financial institutions and markets efficiently allocate resources to productive sectors of the economy, thereby supporting sustainable economic development.

One important dimension of financial deepening is the expansion of financial assets relative to economic output. This is commonly measured using indicators such as broad money supply as a percentage of Gross Domestic Product (M2/GDP), private sector credit as a percentage of GDP (CPS/GDP), stock market capitalization, and total financial assets relative to GDP (King & Levine, 1993; George-Anokwuru, 2026). These indicators provide evidence of the extent to which financial resources are available within an economy and the degree of financial sector development. A higher ratio generally indicates a deeper financial system capable of supporting economic activities.

Another important aspect of financial deepening is financial inclusion. Financial inclusion refers to the ability of individuals and businesses to access and use affordable financial services such as savings accounts, credit facilities, insurance products, and payment systems (Demirgüç-Kunt *et al.*, 2018; George-Anokwuru, 2026). A financially deepened economy is characterized by widespread access to formal financial services, which reduces financial exclusion and promotes inclusive economic growth. In recent years, financial inclusion has become an essential component of financial deepening, particularly in developing countries where a significant proportion of the population remains outside the formal financial system.

Financial deepening also encompasses the development of capital markets, including stock and bond markets. Well-developed capital markets provide alternative sources of financing for businesses and governments, thereby reducing dependence on traditional bank lending (Levine & Zervos, 1998). Through stock market activities, firms can raise long-term capital for investment and expansion, while investors gain opportunities to diversify their portfolios and manage risks. Consequently, capital market development contributes significantly to the overall depth and efficiency of the financial system.

From a macroeconomic perspective, financial deepening promotes economic growth by increasing savings mobilization and improving resource allocation efficiency. Levine (2005) argued that developed financial systems facilitate capital accumulation, technological innovation, and productivity growth. By reducing information asymmetries and transaction costs, financial institutions enable funds to flow from savers to productive investors more efficiently. This process stimulates investment, employment creation, and income generation, which ultimately contribute to economic development.

The relationship between financial deepening and social welfare has also attracted considerable attention in the literature. Beyond promoting economic growth, financial deepening can improve living standards by increasing access to financial resources needed for education, healthcare, housing, and entrepreneurship (Beck, Demirgüç-Kunt, & Levine, 2007). Access to financial services enables households to smooth consumption, manage risks, and cope with unexpected shocks, thereby enhancing overall welfare. Consequently, financial deepening is increasingly recognized as an important instrument for achieving sustainable development and poverty reduction.

In the context of health outcomes, financial deepening can influence healthcare utilization and health status through multiple transmission channels. First, access to savings and credit facilities enables households to finance healthcare expenditures and respond effectively to health emergencies. Second, financial institutions can provide financing for healthcare infrastructure, pharmaceutical industries, and medical service providers. Third, financial deepening promotes economic growth and income generation, which increase individuals' ability to afford quality healthcare services (Claessens & Feijen, 2007). Through these channels, financial deepening can contribute significantly to improvements in life expectancy, reductions in infant mortality, and overall health outcomes.

In Nigeria, financial deepening has become a major policy objective due to its potential to stimulate economic growth and improve welfare. Since the implementation of the Structural Adjustment Programme (SAP) in 1986, the country has undertaken several financial sector reforms aimed at strengthening financial institutions, liberalizing financial markets, and promoting financial inclusion (Sanusi, 2012). These reforms include banking sector consolidation, financial liberalization, cashless policy initiatives, mobile banking innovations, and financial inclusion strategies. As a result, indicators such as broad money supply and financial access have improved considerably over time. Despite these developments, the level of financial deepening in Nigeria remains relatively low compared to many emerging economies. Challenges such as financial exclusion, limited access to credit, weak financial infrastructure, and regional disparities continue to constrain the effectiveness of the financial sector (Central Bank of Nigeria [CBN], 2023). Consequently, understanding the role of financial deepening in promoting socio-economic outcomes, including health outcomes, remains an important area of empirical investigation.

In the present study, financial deepening is conceptualized as the expansion and increased efficiency of Nigeria's financial system, measured through indicators such as broad money supply as a ratio of GDP ($M2/GDP$), private sector credit as a ratio of GDP (CPS/GDP), stock market development, and financial inclusion. These indicators are expected to facilitate access to financial resources, support healthcare financing, and ultimately improve health outcomes in Nigeria.

2.1.2 Health Outcome

Health outcome is a fundamental concept in health economics, public health, and development studies. It refers to the measurable changes in the health status of

individuals, groups, or populations that result from healthcare interventions, health policies, socio-economic conditions, environmental factors, and lifestyle behaviors (Kindig & Stoddart, 2003). Health outcomes serve as important indicators for evaluating the effectiveness of healthcare systems and the overall well-being of a population. They provide evidence on the extent to which healthcare resources and interventions contribute to improvements in human health and quality of life.

In addition, the Constitution of the World Health Organization (WHO) defines health as a condition of complete physical, mental, and social well-being, rather than merely the absence of disease or disability (WHO, 1948). Consequently, health outcomes encompass a broad range of indicators that capture various dimensions of health status, including longevity, mortality, morbidity, functional capacity, and quality of life. This broader perspective recognizes that health is influenced by numerous social, economic, environmental, and institutional factors.

In health economics literature, health outcomes are often viewed as the final products of healthcare systems and public health interventions. They represent the ultimate objective of healthcare expenditure and policy initiatives aimed at improving population health (Mushkin, 1962). Health outcomes therefore provide a basis for assessing whether investments in healthcare infrastructure, medical services, public health programs, and social welfare policies have achieved their intended goals. Improvements in health outcomes are generally associated with enhanced productivity, increased life expectancy, and improved standards of living.

Health outcomes are commonly measured using indicators such as life expectancy at birth, infant mortality rate, maternal mortality rate, under-five mortality rate, morbidity rates, and disability-adjusted life years (WHO, 2023). Among these indicators, life expectancy at birth is one of the most widely used measures because it captures the average number of years a newborn is expected to live under prevailing mortality conditions. Higher life expectancy generally reflects better healthcare services, improved nutrition, enhanced sanitation, and favourable socio-economic conditions.

Infant mortality rate is another important measure of health outcome and refers to the number of deaths of infants under one year of age per 1,000 live births within a given year (World Bank, 2023). This indicator is widely used because it reflects the quality of maternal healthcare services, child healthcare systems, nutritional conditions, and overall public health infrastructure. A decline in infant mortality rates is generally interpreted as evidence of improvements in healthcare accessibility and population health.

Similarly, maternal mortality rate measures the number of women who die from pregnancy-related complications per 100,000 live births within a specified period. Put differently, maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. Maternal mortality is often used to assess the quality of reproductive healthcare services and the effectiveness of health systems in protecting women's health (WHO, 2023). High maternal mortality rates are usually associated with

inadequate healthcare facilities, poor access to skilled birth attendants, and limited healthcare financing.

The concept of health outcomes is closely linked to socio-economic development because a healthier population contributes significantly to economic productivity and growth. According to the Human Capital Theory, health constitutes an important component of human capital that enhances labor productivity and economic performance (Becker, 1964). Individuals who enjoy better health are more likely to participate actively in economic activities, achieve higher educational outcomes, and contribute positively to national development. Consequently, improvements in health outcomes are often regarded as both a means and an end of economic development.

Health outcomes are influenced by a wide range of determinants beyond healthcare services alone. These determinants include income levels, education, employment opportunities, environmental quality, nutrition, housing conditions, sanitation, and access to healthcare facilities (Grossman, 1972). Financial factors are particularly important because they determine the ability of households and governments to finance healthcare expenditures. As a result, access to financial resources can significantly influence healthcare utilization and health status.

In the context of financial deepening, health outcomes may improve through enhanced access to financial services and healthcare financing. Financial deepening increases the availability of savings instruments, credit facilities, insurance products, and other financial services that enable individuals and households to invest in healthcare (Levine, 2005). Through improved access to finance, households can afford medical treatment, preventive healthcare services, and health insurance, thereby reducing the incidence of preventable diseases and mortality. Financial deepening may also facilitate investments in healthcare infrastructure and medical technologies, further contributing to improved health outcomes.

Within the Nigerian context, health outcomes remain a major development concern despite various healthcare reforms and increased public expenditure on health. Indicators such as life expectancy remain relatively low, while infant and maternal mortality rates remain among the highest in Sub-Saharan Africa (WHO, 2023). These challenges have been attributed to inadequate healthcare financing, poor healthcare infrastructure, widespread poverty, and limited access to quality healthcare services. Consequently, improving health outcomes remains a critical policy objective for achieving sustainable development and enhancing the welfare of the Nigerian population.

For the purpose of this study, health outcome is conceptualized as the overall health status of the Nigerian population measured primarily by life expectancy at birth. Life expectancy is adopted because it is a comprehensive indicator that captures the cumulative effects of healthcare services, healthcare financing, socio-economic conditions, and public health interventions. The study therefore examines how financial deepening influences life expectancy and contributes to improvements in health outcomes in Nigeria.

2.2 Theoretical Review

2.2.1 Human Capital Theory

The human capital theory, pioneered by Becker (1964) and Schultz (1961), provides a useful framework for understanding the relationship between financial deepening and health outcomes. The theory posits that investments in human beings through education, healthcare, training, and skill acquisition enhance their productive capacities and contribute to economic growth. Health is regarded as a form of human capital because it improves an individual's ability to work, earn income, and participate effectively in economic activities. Consequently, expenditures on healthcare are considered investments that generate future economic returns rather than mere consumption expenditures.

The theory argues that individuals derive long-term benefits from investing in their health status. Healthy individuals are generally more productive, experience fewer work absences, and enjoy longer working lives than unhealthy individuals. Improved health also enhances cognitive abilities, learning capacity, and labor efficiency, which collectively contribute to higher productivity and income generation (Grossman, 1972). Therefore, healthcare expenditures that improve life expectancy and reduce mortality rates are viewed as investments that increase the stock of human capital within an economy.

A fundamental proposition of human capital theory is that the ability of individuals to invest in health depends largely on the availability of financial resources. Healthcare services often require substantial financial commitments, and households with limited access to financial resources may be unable to obtain adequate medical care, preventive health services, or health insurance coverage. As a result, financial constraints can limit health investments and adversely affect health outcomes. The theory therefore recognizes financial accessibility as an important determinant of human capital accumulation through improved health.

Financial deepening complements the assumptions of human capital theory by increasing the availability and accessibility of financial services within an economy. Financial deepening enhances the capacity of financial institutions to mobilize savings and allocate credit efficiently to households and businesses (Shaw, 1973; McKinnon, 1973). Through expanded access to banking services, credit facilities, and other financial products, households are better positioned to finance healthcare expenditures, purchase medications, and invest in preventive healthcare measures. Consequently, financial deepening facilitates the accumulation of health capital by reducing financial barriers to healthcare access.

The theory further suggests that increased access to private sector credit can improve health outcomes by supporting investments in healthcare infrastructure and service delivery. Financial institutions provide credit to healthcare providers, hospitals, pharmaceutical firms, and other health-related enterprises, enabling them to expand operations, acquire modern medical equipment, and improve service quality. These improvements increase the availability and accessibility of healthcare services, thereby

contributing to better health outcomes among the population. In this regard, financial deepening enhances both the demand and supply sides of healthcare delivery.

In the Nigerian situation, financial deepening has progressed considerably through banking sector reforms, financial liberalization policies, digital financial innovations, and financial inclusion initiatives. These developments have increased the volume of financial resources available within the economy and improved access to formal financial services. According to human capital theory, such improvements in financial intermediation should facilitate greater household investment in healthcare and contribute to improved health indicators such as higher life expectancy and lower mortality rates. Financial inclusion, in particular, enables previously excluded populations to access savings, credit, and insurance products that can be used to finance healthcare needs.

Furthermore, financial deepening may improve health outcomes indirectly through its impact on economic growth and income generation. Human capital theory maintains that higher incomes increase the ability of individuals to invest in their health and well-being. By promoting investment, employment creation, and productivity growth, financial deepening raises household incomes and strengthens the capacity of individuals to afford quality healthcare services. Improved income levels may also enhance nutrition, housing conditions, sanitation, and other determinants of health, thereby contributing to better health outcomes.

Despite the expansion of Nigeria's financial sector, health outcomes remain relatively poor compared with global standards. This situation suggests that the benefits of financial deepening may not have been fully transmitted to the healthcare sector or may be constrained by structural challenges such as poverty, income inequality, inadequate healthcare infrastructure, and limited financial access in rural communities. Human capital theory therefore provides a useful basis for examining whether financial deepening has effectively enhanced health investments and improved health outcomes in Nigeria. The relevance of human capital theory to this study lies in its proposition that improved access to financial resources promotes investment in health capital, which subsequently enhances health outcomes. The theory predicts a positive relationship between financial deepening indicators such as broad money supply as a ratio of GDP, private sector credit as a ratio of GDP, and financial inclusion, and health outcome indicators such as life expectancy.

2.2.2 Grossman Health Demand Theory

The Grossman health demand theory, developed by Grossman (1972), is one of the most influential theoretical frameworks for analyzing the determinants of health outcomes. The theory extends the human capital theory by conceptualizing health as a form of capital that individuals possess and can accumulate through deliberate investment. Grossman (1972) argued that health differs from other forms of capital because it directly affects an individual's well-being while simultaneously enhancing productivity and income-generating capacity. In this regard, health is viewed not only as a consumption

good that provides utility but also as an investment good that yields economic returns over time.

A central proposition of the theory is that individuals are born with an initial stock of health capital, which depreciates gradually due to aging, illness, environmental conditions, and unhealthy lifestyle choices (Grossman, 1972). As the stock of health deteriorates, individuals experience reduced productivity, increased vulnerability to diseases, and lower quality of life. To prevent or slow down this depreciation, individuals invest in health-enhancing activities such as medical care, proper nutrition, exercise, education, and preventive healthcare. Such investments increase the stock of health capital and improve overall health outcomes. Consequently, healthcare services are demanded not for their own sake but because they contribute to the production and maintenance of good health.

The theory further posits that individuals behave rationally in making health investment decisions. According to Grossman (1972), healthcare investments are undertaken when the expected benefits exceed the associated costs. The benefits of maintaining good health include longer life expectancy, improved productivity, higher earnings, reduced absenteeism from work, and enhanced quality of life. Conversely, the costs involve expenditures on medical treatment, medications, transportation, health insurance, and other healthcare-related services. Therefore, the ability of individuals to invest in health depends largely on their access to financial resources and the affordability of healthcare services.

Another important implication of the Grossman model is the role of income in determining health outcomes. Grossman (1972) argued that individuals with higher incomes are more capable of investing in health capital because they possess greater financial resources to access quality healthcare services, nutritious diets, and healthier living conditions. Consequently, higher-income households tend to enjoy better health outcomes than lower-income households. This proposition suggests that factors that improve financial capacity can significantly influence healthcare utilization and health status.

The relevance of the Grossman health demand theory to financial deepening lies in its recognition of financial resources as a critical determinant of health investment decisions. Financial deepening refers to the expansion and increased efficiency of financial institutions, financial markets, and financial services within an economy (Shaw, 1973; McKinnon, 1973). Through financial deepening, individuals gain improved access to savings facilities, credit markets, insurance products, and other financial services that facilitate healthcare financing. The theory suggests that when financial constraints are reduced, individuals are more likely to invest in health capital, resulting in improved health outcomes.

In the Nigerian context, financial deepening can enhance health outcomes by increasing households' ability to finance healthcare expenditures. Over the years, Nigeria has experienced significant financial sector reforms aimed at expanding financial inclusion, strengthening banking institutions, and improving access to financial services (Sanusi, 2012). These developments have increased the availability of formal financial

products such as savings accounts, microcredit schemes, mobile banking services, and health-related insurance products. According to the Grossman framework, such improvements in financial access should increase healthcare utilization and promote investments in health-enhancing activities, thereby improving population health outcomes.

Broad money supply as a percentage of GDP ($M2/GDP$), a common measure of financial deepening, can also be linked to the Grossman theory. An increase in $M2/GDP$ reflects greater liquidity and financial resources within the economy, which enhances the capacity of financial institutions to extend loans and provide financial services (King & Levine, 1993). As financial resources become more readily available, households are better positioned to finance healthcare expenditures and invest in preventive healthcare measures. Consequently, increased financial depth may contribute to improvements in life expectancy and reductions in mortality rates in Nigeria.

Similarly, private sector credit as a percentage of GDP (CPS/GDP) plays a crucial role in the health investment process. The Grossman model suggests that access to credit reduces financial barriers to healthcare utilization by enabling households to smooth consumption and finance medical expenditures during periods of income shortfalls (Grossman, 1972). In Nigeria, increased private sector credit can enable individuals to obtain timely medical treatment rather than postponing healthcare due to financial difficulties. Furthermore, healthcare institutions can access credit facilities to expand operations, acquire modern medical equipment, and improve service delivery. These developments contribute to enhanced healthcare accessibility and better health outcomes.

Financial inclusion, which represents another important aspect of financial deepening, further strengthens the theoretical linkage between financial development and health outcomes. Financial inclusion refers to the provision of affordable and accessible financial services to all segments of society, particularly low-income and vulnerable populations (Demirgüç-Kunt *et al.*, 2018). In Nigeria, a substantial proportion of the population, especially in rural areas, remains financially excluded. According to the Grossman framework, financial inclusion initiatives that provide access to savings, credit, and insurance services can increase households' ability to invest in health capital. This may lead to increased healthcare utilization, improved preventive healthcare practices, and better health outcomes.

The Grossman health demand theory also recognizes the broader economic implications of improved health outcomes. A healthier population contributes to increased labor productivity, higher income levels, and enhanced economic growth (Grossman, 2000). Financial deepening facilitates this process by mobilizing financial resources and directing them toward productive investments, including healthcare-related expenditures. Therefore, the relationship between financial deepening and health outcomes extends beyond individual welfare to encompass broader developmental outcomes.

Despite substantial progress in financial sector development, Nigeria continues to experience relatively poor health outcomes characterized by low life expectancy, high

maternal mortality rates, and high infant mortality rates (World Health Organization [WHO], 2023). This suggests that the benefits of financial deepening may not have been fully transmitted to the healthcare sector due to persistent challenges such as poverty, inequality, inadequate healthcare infrastructure, and limited financial access among vulnerable populations. Consequently, investigating the extent to which financial deepening influences health outcomes remains an important empirical issue.

The Grossman health demand theory therefore provides a strong theoretical foundation for examining the relationship between financial deepening and health outcomes in Nigeria. The theory predicts that improvements in financial deepening indicators such as broad money supply, private sector credit, and financial inclusion will enhance individuals' capacity to invest in health capital, resulting in improved health outcomes. Accordingly, a positive relationship is expected between financial deepening and indicators such as life expectancy, while a negative relationship is expected with indicators such as infant and maternal mortality rates.

2.3 Empirical Review

Several studies have investigated how financial deepening influences health outcomes, but the results are not clear or consistent. Most of the research on financial deepening has focused on its impact on economic growth and unemployment. There are not many studies that look specifically at how financial deepening influences health. One study, by Claessens and Feijen in 2007, examined the link between financial development and health outcomes using data from different countries. Their findings showed that financial development helped reduce child deaths and improved people's lifespan by increasing spending on healthcare and making healthcare services more accessible.

Furthermore, Odhiambo (2011) looked into how financial development connects with social development in some African countries. The study found that when the financial sector grows, it has a positive effect on social welfare, including health results. Also, Adegbite and Machethe (2020) studied financial development and health outcomes in developing countries and found that a stronger financial sector helps people get better healthcare and live longer. Similarly, Ibrahim and Alagidede (2021) studied how financial inclusion affects health outcomes in Sub-Saharan Africa and found that more access to financial services lowers infant deaths and increases life expectancy.

Ugherughe, Akakabota and Alagba (2021) used ordinary least squares and Granger causality methods to look at how financial deepening affects health outcomes in Nigeria from 1986 to 2018. The ordinary least squares results showed that financial deepening has a positive and significant effect on health outcomes. The Pair-wise Granger causality test showed a one-way cause running from life expectancy at birth to CPS/GDP and M2/GDP.

Xiao and Tao (2022) investigated how financial inclusion affects population health in Asian countries using data from 2007 to 2019. They measured health by looking at death rates and how long people live. Their study found that having more access to digital financial services increases life expectancy but lowers death rates in Asia. They also found that financial inclusion has a positive effect on life expectancy and a negative

effect on death rates. The study also found that factors like internet use, GDP, and foreign investment help improve population health by increasing life expectancy and reducing death rates.

Shi, Wang, and Altunta (2022) looked at how financial development and financial globalization contribute to rising life expectancy in China, India, and Japan. They used data from 1991 to 2019 as well as quantitative technique and found that there is a long-term connection between financial development, financial globalization, and life expectancy, especially when considering GDP, health spending, and internet use. Their results showed that financial development increases life expectancy by about 0.599% in China. They also found that financial globalization increases life expectancy by about 1.247% in Japan and 1.121% in India.

Jemiluyi and Jeke (2023) looked into how health and financial development are connected in South Africa. They used yearly data from the World Development Indicators and a model called ARDL-ECM. Their results showed that financial development affects health in different ways. Specifically, when financial development is measured by how much credit is given to private businesses, it has a negative effect on life expectancy at birth but helps lower child deaths, which improves child health.

Banerjee, Maruta, and Donato (2023) found that financial inclusion has a positive effect on health outcomes. They used data from 61 developing and transitional countries between 2011 and 2017 as well as quantitative technique. Their study suggested that financial inclusion works better in places where there is a lot of poverty and income inequality. It helps poorer people invest in their health and deal with health problems more effectively.

In Pakistan, Rahim and Muzaffar (2024) used an Autoregressive Distributed Lag (ARDL) model to look at how public health spending and financial development affect health outcomes. Their findings showed that both public health spending and financial development have an impact on health outcomes, both in the short term and the long term. The results from the co-integration analysis showed that there is a stable and significant long-term connection between health outcomes and the factors that influence them. When looking at the short-term relationship using the error correction method, they found that life expectancy, infant mortality, and under-five mortality have a negative and statistically significant link with both public health expenditure and the ratio of domestic credit to the private sector compared to GDP. This means that these health indicators will adjust more quickly towards the balanced state in the long run.

Naveenan, Liew, and Kijkasiwat (2024) looked at how financial inclusion improves health indicators in emerging markets. They created a financial inclusion index that included both traditional banking and financial technology (fintech), using the Entropy Weight method. Their study found that better financial inclusion in emerging markets leads to better health outcomes. They also emphasized the importance of understanding the many benefits of financial and digital inclusion when developing health policies in these regions.

Onwuka, Chibueze, and Udentia (2025) used the Autoregressive Distributed Lag method to study the connection between financial inclusion and health outcomes in

Nigeria from 1989 to 2023. The result revealed a positive link between improvements in life expectancy and financial inclusion. They also identified obstacles to financial inclusion as a barrier to better health outcomes.

3. Research Gap

Most past studies have focused on how financial deepening connects with economic growth, poverty reduction, investment, and human development (Levine, 2005; Nwakanma & Nnamdi, 2014). However, there is not much research looking at how financial deepening affects health in Nigeria specifically. Many earlier studies used data from different countries or groups of countries, which made it hard to understand how things work in Nigeria's unique economic and institutional setting (Claessens & Feijen, 2007; Ibrahim & Alagidede, 2021). Also, few studies have looked at both broad money supply and private sector credit together as ways to measure financial deepening and how they influence health outcomes. This study addressed these gaps by using recent Nigerian data over time and applying the ARDL method to look at both long-term and short-term effects of financial deepening on health.

3.1 Stylised Issues in Health Outcomes in Nigeria

In 2003, the infant mortality rate, which shows how healthy a country's people are and how good their living conditions are, was 100 deaths for every 1,000 babies born. That same year, the number of children who died between their first and fifth birthdays was 112 out of every 1,000 children who survived their first year. For the period, the rate of deaths among children under five years old was 201 deaths for every 1,000 births. By 2008, the child mortality rate had dropped to 88 deaths for every 1,000 children who made it to their first birthday, but this was only for those who didn't live to their fifth birthday. The infant mortality rate then was 75 deaths per 1,000 live births, and the under-five mortality rate in Nigeria was 157 deaths per 1,000 live births (NDHS, 2003 & 2008; George-Anokwuru, 2023). In 2013, the number of infant deaths and deaths of children under five was 69 and 128 per 1,000 live births, respectively. At that time, one out of every 15 Nigerian children died before their first birthday, and one out of every eight children did not live to see their fifth birthday. By 2018, the under-five mortality rate in Nigeria had increased slightly to 132 per 1,000 live births, meaning that one in every eight Nigerian children did not reach their fifth birthday. Infant deaths, which make up half of all child deaths, were at 67 per 1,000 live births in 2018. Every 10 minutes, one Nigerian woman died during childbirth, and every minute, one Nigerian child under five years old died (NDHS, 2013 & 2018; George-Anokwuru, 2023).

The World Health Organization (WHO) says a maternal death is when a woman dies while she is pregnant or within 42 days after the pregnancy ends, no matter where or how long the pregnancy was. The death should be from a cause connected to the pregnancy or its treatment, but not from accidents or other unrelated reasons. The maternal mortality rate is calculated by dividing the number of maternal deaths in a certain area (like a country, state, or county) within 42 days after a pregnancy ends, due

to problems from pregnancy, childbirth, or the time right after birth, by the total number of live births in that area during the same period. Then, this number is multiplied by 100,000 to get the rate. Maternal death is a big issue for Nigeria's health system. According to WHO (2019), there were 66,000 maternal deaths in Nigeria in 2002 and 2003. From 2004 to 2010, the number stayed around 65,000 to 64,000 each year. It slightly rose to 65,000 in 2011 and then went up again to 66,000 in 2012, 2013, and 2014. In 2015, it was 67,000, and it stayed at that level in 2016 and 2017. The reasons for the rise in maternal deaths in Nigeria include a lack of enough healthcare workers and facilities, poverty, and early marriage. Also, banditry and insurgency have made it hard for pregnant women to get prenatal care.

In addition, from 1981 to 1990, life expectancy was 46. It went down a little in 1991 to 45. Then, from 1992 to 1998, it was back to 46. In 1999 and 2000, it went up to 47. In 2001 and 2002, it increased to 48. In 2003 and 2004, it went up to 49. In 2005, 2006, and 2007, it reached 50. In 2008, 2009, 2010, and 2011, it climbed to 51. From 2012 to 2017, it stayed at 52. In 2018, 2019, 2020, and 2021, it went up to 53. In 2022 and 2023, it was 54 (World Bank, 2023).

3.2 Stylised Issues on Indicators of Financial Developments in Nigeria

Indicators of financial system development have evolved considerably over time, reflecting changes in monetary conditions and financial market performance. In 2011, the financial sector recorded a mixed performance. The ratio of broad money supply (M2) to nominal GDP declined to 36.4%, compared with 39.5% recorded at the end of 2010. Meanwhile, aggregate money in the money market increased by 24.7% by the end of 2011, largely driven by increases in government securities, treasury bills, and commercial papers. Interest rates on fixed-income instruments, including government bonds and treasury bills, were generally higher in 2011 than in the preceding year. Although the yield curve remained largely normal during most of the year, it became inverted toward the end of the period, reflecting the relatively tight monetary policy stance adopted by the Central Bank of Nigeria. Similarly, the Nigerian Stock Exchange recorded a mixed performance during the year (CBN, 2011; George-Anokwuru, 2026).

In 2013, Nigeria's financial development indicators recorded a mixed performance. The ratio of broad money supply to nominal GDP declined slightly to 19.3% compared with the level recorded at the end of 2012. Similarly, the banking sector's capacity to extend credit to the private sector, measured by the private sector credit-to-GDP ratio (CP/GDP), fell marginally to 20.4% from 20.9% in the preceding year. In contrast, the total value of money market assets increased by 10.0%, largely reflecting growth in Nigerian Treasury Bills, bankers' acceptances, commercial papers, and Federal Government bonds. Returns on fixed-income securities declined during the year, while most money market interest rates were lower than their previous-year levels, suggesting improved liquidity within the banking system. The Nigerian stock market, however, recorded a relatively strong performance, as major market indicators generally exhibited upward movements (CBN, 2013; George-Anokwuru, 2026).

In 2014, Nigeria's financial development indicators recorded a mixed performance. Financial system efficiency, measured by the ratio of currency outside banks to broad money supply (M2), improved as the ratio declined from 9.2% in 2013 to 7.6% in 2014. The ratio of broad money supply to nominal GDP increased to 21.0%, representing a 1.7 percentage-point rise over the level recorded at the end of 2013. Similarly, the banking sector's capacity to provide credit, measured by the claims on the private sector-to-GDP ratio (CPS/GDP), increased marginally to 20.1%, compared with 20.0% in the preceding year. The total value of money market assets also expanded by 12.4%, largely driven by increased holdings of Nigerian Treasury Bills, bankers' acceptances, commercial papers, and Federal Government bonds. Returns on fixed-income securities increased during the year, partly reflecting the Central Bank of Nigeria's tight monetary policy stance and excess liquidity conditions, which constrained activity in the financial markets. Most money market interest rates remained relatively stable during the first ten months but increased toward the end of the year following a 100-basis-point increase in the monetary policy rate to 13.0%. In contrast, the Nigerian Stock Exchange experienced a challenging year, with most major market indicators recording declines (CBN, 2014; George-Anokwuru, 2026).

In 2015, the financial sector again exhibited a combination of positive and negative developments. The ratio of broad money supply to GDP remained unchanged at 21.0%, indicating stability in financial depth relative to the size of the economy. The banking sector's overall credit-to-GDP ratio improved, rising to 22.7% from 21.4% in 2014. However, credit to the private sector relative to GDP declined slightly to 19.7%, compared with 20.1% in the previous year. This decline was partly associated with increased government borrowing, which absorbed a greater share of available credit and potentially constrained lending to private-sector activities. Financial system efficiency improved marginally, as the ratio of currency outside banks to broad money supply declined from 7.6% in 2014 to 7.3% in 2015. Nevertheless, overall financial savings weakened during the year. The value of money market assets increased substantially by 22.1%, driven mainly by growth in bankers' acceptances, certificates of deposit, and Federal Government bonds. Performance on the Nigerian Stock Exchange was mixed: although the total market capitalization of listed equities increased marginally by 0.8%, the All-Share Index, trading volume, and value of transactions declined relative to the previous year (CBN, 2015; George-Anokwuru, 2026).

In 2016, Nigeria's financial sector recorded a mixed performance, with improvements in some indicators alongside deterioration in others. Financial depth, measured by the ratio of broad money supply (M2) to GDP, increased to 23.1%, compared with 21.3% at the end of 2015. Similarly, the banking sector's capacity to support economic activity improved, as the aggregate credit-to-GDP ratio rose to 26.7%, from 23.0% in the preceding year. Credit to the private sector also increased, reaching 21.2% of GDP, compared with 19.2% at the end of 2015. However, indicators of financial system efficiency weakened, with the currency outside banks-to-M2 ratio increasing to 7.8%, while the currency outside banks-to-GDP ratio rose to 1.8%, compared with 7.3% and 1.6%, respectively, in 2015. Although total financial savings, including quasi-money,

increased marginally from their December 2015 level, their ratio to GDP declined slightly to 12.13%, from 12.17%. Foreign currency deposits constituted a significant proportion of these savings, increasing to 4.5% of GDP from 4.0% in the previous year. Money market assets expanded substantially by 35.5%, largely due to increased outstanding Nigerian Treasury Bills and Federal Government bonds. In contrast, activity on the Nigerian Stock Exchange weakened, with total market capitalization and the All-Share Index declining by 4.8% and 6.2%, respectively. Although the volume of securities traded increased marginally by 3.2%, the total value of transactions declined significantly by 39.6% relative to the preceding year (CBN, 2016; George-Anokwuru, 2026).

In 2017, Nigeria's financial sector experienced a generally weaker performance across several indicators. The ratio of broad money supply to GDP declined to 20.3%, compared with 23.2% at the end of December 2016. Similarly, the banking system's capacity to finance economic activities, measured by the aggregate credit-to-GDP ratio, fell to 23.3%, from 26.5% in the previous year. Credit to the private sector as a proportion of GDP also declined to 19.2%, compared with 21.7% at the end of 2016. Despite these declines, financial system efficiency improved, as reflected in the reduction of the currency outside banks-to-M2 ratio (COB/M2) from 7.7% in 2016 to 7.1% in 2017. The value of money market assets contracted sharply by 61.1%, primarily due to reductions in outstanding Nigerian Treasury Bills and Federal Government bonds. In contrast, the Nigerian Stock Exchange recorded a strong performance, with most major market indicators registering substantial increases. Total market capitalization and the All-Share Index increased by 41.6% and 42.3%, respectively. In addition, the volume and value of securities traded increased by 4.7% and 121.7%, respectively, relative to the previous year (CBN, 2017; George-Anokwuru, 2026).

In 2018, Nigeria's financial sector recorded a mixed performance, with some indicators showing improvement while others deteriorated. The relative importance of the banking sector increased, as reflected in the M3-to-GDP ratio, which rose to 26.2%, representing a 0.9 percentage-point increase over the level recorded at the end of 2017. Financial savings also increased during the year. In addition, the efficiency of financial intermediation improved, as indicated by the decline in the ratio of currency outside banks to broad money supply from 6.2% to 5.7%. However, access to credit weakened, with the aggregate credit-to-GDP ratio declining to 21.6%, from 22.8% in 2017. Similarly, credit to the private sector as a proportion of GDP fell from 19.6% to 17.8%. The ratio of banking system assets to GDP also declined to 42.6%, compared with 45.2% at the end of 2017. The value of money market assets decreased marginally by 1.9%, largely owing to reductions in bankers' acceptances and Nigerian Treasury Bills. The structure of the banking industry remained unchanged, with 27 licensed banks operating during the year. The Nigerian capital market, however, experienced a difficult year, as most major market indicators declined. Total market capitalization and the All-Share Index fell by 41.6% and 42.3%, respectively. Although the volume of securities traded increased marginally by 0.8%, the value of transactions declined by 6.2% relative to the preceding year (CBN, 2018; George-Anokwuru, 2026).

In 2019, the Nigerian financial sector continued to exhibit mixed developments. The relative importance of the banking sector, measured by the M3-to-GDP ratio, declined slightly to 24.1%, from 25.8% at the end of December 2018. Similarly, financial savings weakened marginally, with the quasi-money-to-GDP ratio falling to 16.8%, compared with 17.5% in 2018. Financial intermediation efficiency, however, showed a slight improvement, as reflected in the increase in the currency outside banks-to-broad money ratio to 5.82%, from 5.7% in the previous year. The banking system's capacity to finance economic activities improved, with the domestic claims-to-GDP ratio increasing to 25.1%, from 22.3% in 2018. Likewise, private-sector credit as a proportion of GDP increased marginally to 18.5%, compared with 18.4% in the preceding year. Money market interest rates generally declined relative to 2018, reflecting prevailing liquidity conditions. The value of money market assets increased by 6.2% during the year, while the number of licensed banks rose from 27 to 29. In the capital market, performance remained mixed. Although the stock market closed the year on a positive note, the NSE All-Share Index recorded a negative return. Furthermore, the volume and value of securities traded declined by 20.8% and 19.7%, respectively, compared with the previous year (CBN, 2019; George-Anokwuru, 2026).

In 2021, Nigeria's financial sector maintained a relatively strong performance, as reflected in several key financial indicators. Financial savings continued to expand, with the other deposits-to-GDP ratio (OD/GDP) increasing to 14.8%, from 14.4% in 2020. The ratio of banking system assets to GDP remained unchanged at 67.3%, suggesting stability in the relative size of the banking sector within the economy. Similarly, the ratios of claims on other sectors to GDP (COS/GDP) and claims on the private sector to GDP (CPS/GDP) increased to 20.3% and 13.8%, respectively, compared with 19.6% and 12.3% in 2020. The expansion in credit was largely associated with continued policy measures aimed at supporting domestic economic activities through increased financing. However, the indicator of financial system efficiency, measured by the currency outside banks-to-broad money ratio (COB/M2), showed a marginal movement, reaching 6.7%, compared with 6.6% at the end of December 2020 (CBN, 2021; George-Anokwuru, 2026).

In 2022, the financial sector continued to demonstrate resilience, with key indicators pointing to further expansion in financial intermediation. The other deposits-to-GDP ratio (OD/GDP) increased to 15.6%, from 15.2% in 2021, indicating continued growth in financial savings. Furthermore, the ratio of banking system assets to GDP increased substantially to 71.4%, compared with the previous year. This expansion suggests a growing role of the banking sector in the economy and reflects the continued strengthening of Nigeria's financial system during the period (CBN, 2022; George-Anokwuru, 2026).

4. Materials and Methods

This study used secondary data spanning 1981 to 2023. Annual time series data on broad money supply as a ratio of GDP in %, private sector credit as a ratio of GDP in %, life expectancy, total government expenditure on health and inflation rate were collected

from the numerical bulletin of Nigeria's apex bank and World Bank. In addition, the researcher would have loved to cover from 1960 when Nigeria gained independence from Great Britain to 2022 but because of paucity of data the researcher decided to cover for the period data were available. Therefore, the period 1981 to 2023 was chosen because of paucity of data.

4.1 Model Specification

The research model for this study is founded on the explicit form of the Grossman health demand theory, which makes it clear that improvements in financial deepening indicators such as broad money supply and private sector credit will enhance individuals' capacity to invest in health capital, resulting in improved health outcomes. That is,

$$\text{HEO} = f(\text{FD}) \quad (1)$$

Where: HEO is health outcomes (life expectancy), and FD is financial deepening variables (broad money supply as a ratio of GDP in %, private sector credit as a ratio of GDP in %).

Accordingly, a positive relationship is expected between financial deepening and health outcomes (life expectancy). Importantly, health outcomes such as life expectancy are influenced not only by financial sector development but also by the amount of resources allocated by the government to the health sector. This means that it is necessary to include government health expenditure in the model because it directly influences the availability, accessibility, and quality of healthcare services. Increased public spending on healthcare enhances healthcare infrastructure, medical personnel, and essential health services, thereby improving population health outcomes. Consequently, controlling for government health expenditure enables a more accurate assessment of the independent effect of financial deepening on health outcomes in Nigeria. It is also important to incorporate the inflation rate into the model because it affects households' real income and purchasing power, which are critical determinants of healthcare utilization. High inflation increases the cost of medical services, pharmaceuticals, and nutritious food, thereby reducing access to healthcare and worsening health conditions. Consequently, controlling for inflation allows the study to isolate the effect of financial deepening on health outcomes while accounting for macroeconomic instability. Therefore, the model for this study is presented thus:

$$\text{LXP} = f(\text{CPS/GDP}, \text{M3/GDP}, \text{TGEH}, \text{INF}) \quad (2)$$

The log linear form of equation (2) produced;

$$\text{LnLXP}_t = \varphi_0 + \varphi_1 \text{CPS/GDP}_t + \varphi_2 \text{M3/GDP}_t + \varphi_3 \text{LnTGEH} + \varphi_4 \text{INF} + \varepsilon_t \quad (3)$$

Where, LXP is life expectancy, M3/GDP is broad money supply as a ratio of GDP in %, CPS/GDP is private sector credit as a ratio of GDP in %, TGEH is total government

expenditure on health, INF is the inflation rate, ε is the error term which denotes other variables not included in the model, t is the period of time, Ln is the natural logarithm, and φ_0 is the intercept. The parameter estimates are expected to behave in line with φ_1 , φ_2 and $\varphi_3 > 0$; and $\varphi_4 < 0$.

4.2 Techniques of Data Analysis

Augmented Dickey-Fuller (ADF) unit root test, Johansen Co-integration test and Error Correction Mechanism (ECM) were used in this study as the main analytical techniques. Moreover, all the variables in the model were tested for stationarity using the Augmented Dickey-Fuller (ADF) unit root test procedure. Usually, the ADF test consists of estimating the following regression:

$$\Delta Y_t = M_1 + M_2 t + \delta Y_{t-1} + \sum \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (4)$$

Where, Y is a time series, t is a linear time trend, Δ is the first difference operator, ε is a pure white noise error term, M_1 is a constant, M_2 and δ are parameters and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$, etc. The number of lagged difference terms to include is often determined empirically; the idea is to include enough terms so that the error term in (3) is serially uncorrelated. In ADF, we test whether $\delta = 0$ (Gujarati & Sangeetha, 2007).

The study employed the Autoregressive Distributed Lag Bounds testing method for co-integration developed by Pesaran and Shin (1999). Unlike other co-integration tests, the bounds test is applicable irrespective of whether the variables included in the model are $I(0)$ or $I(1)$ or a mixture of those. However, the technique is not appropriate in the presence of $I(2)$ series. Therefore, before employing the Bounds Test, it was necessary to test for the level of integration of all the variables of interest by using the ADF Test. The test to find out if the variables in this study are co-integrated or have a long-run relationship was done by computing the Bounds F-statistic (bound test for co-integration). The null hypothesis of no co-integration is rejected when the value of the test statistic exceeds the upper critical bounds value, while it is not rejected if the F-statistic is lower than the lower bounds value. Otherwise, the co-integration test is inconclusive. The Autoregressive Distributed Lag (ARDL) method was employed in order to capture the long-run as well as the short-run dynamic relationship among the variables.

Therefore, the ARDL model is written as follows:

$$\begin{aligned} \Delta \ln LXP_{t,j} = & b_0 + b_1 \ln LXP_{t-1,j} + b_2 CPS/GDP_{t-1,j} + b_3 M3/GDP_{t-1,j} + b_4 \ln TGEH_{t-1,j} \\ & + b_5 INF_{t-1,j} + \sum_{i=1}^{n1} a_{1i,j} \Delta \ln LXP_{t-1,j} + \sum_{i=0}^{n2} a_{2i,j} \Delta CPS/GDP_{t-1,j} \\ & + \sum_{i=0}^{n3} a_{3i,j} \Delta M3/GDP_{t-1,j} + \sum_{i=0}^{n4} a_{4i,j} \Delta \ln TGEH_{t-1,j} + \sum_{i=0}^{n5} a_{5i,j} \Delta INF_{t-1,j} + \mu_t \\ & - - - - - \quad (5) \end{aligned}$$

Where Δ is the difference operator, n is the optimal lag length, $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ represent the short-run dynamics of the model and b_1, b_2, b_3, b_4, b_5 are the long-run elasticities, and μ_t is the error term. ECM_{t-1} is the error correction term obtained from the co-integration model. The error coefficients (λ_1) show the rate at which the co-integration model corrects its previous period's disequilibrium or the speed of adjustment to restore the long-run equilibrium relationship. The coefficient of ECM is expected to be negative and statistically significant. A negative and significant ECM_{t-1} coefficient implies that any short-run movement between the dependent and explanatory variables will converge back to the long-run relationship.

5. Results and Discussion

To ensure valid statistical inferences, the study employed the Augmented Dickey-Fuller (ADF) unit root test to examine the stationarity properties of the variables. The test is based on two hypotheses: the null hypothesis (H_0) assumes that the variable contains a unit root and is therefore non-stationary, while the alternative hypothesis (H_1) states that the variable has no unit root and is stationary. The results of the ADF unit root test are presented in Table 1.

Table 1: Unit Root Test Outcome via Augmented Dickey-Fuller

Variables	Level form		First difference		Order of integration
	ADF Statistics	5% Critical Value	ADF Statistics	5% Critical Value	
LXP	-2.295475	-3.520787	-9.047153	-3.523623	1(1)
CPS/GDP	-1.904951	-3.520787	-5.267562	-3.523623	1(1)
M3/GDP	-2.309234	-3.520787	-6.137517	-3.523623	1(1)
TGEH	-1.989393	-3.520787	-5.996702	-3.526609	1(1)
INF	-4.085462	-3.523623	-	-	1(0)

Recall: LXP, CPS/GDP, M3/GDP, TGEH and INF as defined previously.

Source: Author (2026).

The ADF unit root test results presented in Table 1 indicate that, at the 5% significance level, INF is stationary at level, I(0), as its ADF test statistic exceeds the corresponding 5% critical value. In contrast, LXP, CPS/GDP, M3/GDP, and TGEH become stationary after first differencing, indicating that they are integrated of order one, I(1). The presence of a combination of I(0) and I(1) variables satisfies the stationarity requirement for applying the Autoregressive Distributed Lag (ARDL) model to investigate the existence of a long-run relationship among the variables.

Table 2: ARDL Bounds Test for Co-integration

Model		F-Statistic = 4.295119
LXP= F(CPS/GDP, M3/GDP, TGEH, INF)		K = 4
Critical Values	Lower Bound	Upper Bound
5%	3.05	3.97

Recall: LXP, CPS/GDP, M3/GDP, TGEH and INF as defined previously.

Source: Author (2026).

The ARDL bounds test for cointegration provides evidence of a long-run relationship among the variables: LXP, CPS/GDP, M3/GDP, TGEH, and INF. This is supported by the computed F-statistic of approximately 4.3, which exceeds the corresponding upper-bound critical value at the 5% significance level. Consequently, the null hypothesis of no long-run relationship is rejected, confirming the existence of a stable long-run equilibrium relationship among the variables. This finding therefore justifies the estimation and interpretation of both the long-run and short-run effects within the ARDL framework.

Table 3: Estimated ARDL Long-Run Coefficients. Dependent Variable: LXP ARDL (2, 1, 1, 2, 2)

Regressors	Coefficient	t-Statistic	P-Value
CPS/GDP	-0.005322	-2.116444	0.0437
M3/GDP	0.005338	2.011580	0.0543
TGEH	6.99E-07	3.746711	0.0009
INF	-0.000486	-1.632381	0.1142

Recall: LXP, CPS/GDP, M3/GDP, TGEH and INF as defined previously.

Source: Author (2026).

The long-run coefficients presented in Table 3 indicate that private sector credit as a percentage of GDP (CPS/GDP) and the inflation rate (INF) are negatively associated with life expectancy in Nigeria. In contrast, broad money supply as a percentage of GDP (M3/GDP) and total government expenditure on health (TGEH) exhibit positive relationships with life expectancy. The results further reveal that CPS/GDP, M3/GDP, and TGEH have statistically significant effects on life expectancy, whereas the effect of inflation is statistically insignificant. These findings suggest that, over the long run, changes in private sector credit, broad money supply, and government health expenditure are important determinants of life expectancy in Nigeria, while variations in inflation do not exert a statistically significant influence.

Table 4: Error Correction Representation for the Selected ARDL Model ARDL (2, 1, 1, 2, 2)

Regressors	Coefficients	t-Statistic	P-Value
CPS/GDP	-0.001645	-2.214947	0.0380
M3/GDP	0.001144	1.192380	0.2464
LOG(TGEH)	3.08E-07	2.635306	0.0155
INF	-0.000272	-3.052561	0.0060
ECM (-1)	-0.231963	-3.979571	0.0007
R-squared = 0.691646 D-W stat. = 1.979609			
Adjusted R-squared = 0.549328 Akaike info criterion = -6.982711			

Schwarz criterion = -6.428190

Recall: LXP, CPS/GDP, M3/GDP, TGEH and INF as defined previously.

Source: Author (2026).

Table 4 presents the short-run dynamic coefficients associated with the long-run relationships estimated through the Error Correction Model (ECM). The error correction term (ECT) carries the expected negative sign and is statistically significant, confirming the presence of an adjustment mechanism towards long-run equilibrium. This indicates that deviations from the long-run equilibrium in life expectancy are corrected over time, allowing the health outcome to gradually return to its equilibrium path following short-run disturbances. Furthermore, the Durbin-Watson (DW) statistic of 1.979609 is close to the conventional value of 2, suggesting that the model does not suffer from a serious problem of serial correlation. The model demonstrates a strong explanatory power, as indicated by an R-squared value of approximately 0.69. This implies that about 69% of the variations in health outcome (life expectancy) during the period under investigation are explained by the variables included in the model, while the remaining 31% is attributable to other factors not captured in the model and is represented by the error term. Overall, the ECM results indicate a good fit and provide evidence of meaningful short-run dynamics alongside the established long-run relationship.

In addition, the coefficient for private sector credit as a ratio of GDP in % is negative and statistically significant in the short run. The negative and statistically significant relationship with both public health expenditure and domestic credit to the private sector to GDP ratios means that expectancy, infant mortality and under-five mortality will adjust more quickly towards equilibrium in the long run. This outcome is consistent with the studies of Jemiluyi and Jeke (2023), as well as Rahim and Muzaffar (2024), who employed an Autoregressive Distributed Lag (ARDL) model to study the influence of public health expenditure and financial development on health outcomes. They found a negative and statistically significant relationship between credit to private sector to GDP ratios and life expectancy. The negative and statistically significant coefficient of private sector credit as a ratio of GDP in % indicates that increases in private sector credit as a ratio of GDP in % are associated with reductions in life expectancy in Nigeria. This finding suggests that the benefits of private sector credit as a ratio of GDP in % have not been effectively transmitted to the health sector and may reflect persistent inefficient credit allocation, rising inequality, and inadequate healthcare financing. The result implies that private sector credit as a ratio of GDP in %, in the absence of complementary healthcare and inclusion policies, may be insufficient to improve health outcomes. Therefore, policies aimed at enhancing private sector credit, strengthening healthcare financing, and promoting equitable access to financial resources are necessary to ensure that private sector credit as a ratio of GDP in % contributes positively to life expectancy in Nigeria.

Furthermore, the coefficient of broad money supply as a ratio of GDP in percentage has a positive sign but is statistically insignificant in the short run. The positive but statistically insignificant coefficient of broad money supply as a ratio of GDP

(M2/GDP) suggests that financial deepening exerts a favourable but weak influence on life expectancy in Nigeria. Although increases in financial depth may enhance access to financial resources and support health-related investments, the magnitude of this effect is insufficient to produce a statistically significant improvement in life expectancy. The result implies that financial sector expansion alone may not be enough to improve health outcomes unless accompanied by effective healthcare financing mechanisms, improved healthcare infrastructure, greater financial inclusion, and supportive socio-economic policies. Therefore, while broad money supply as a ratio of GDP in percentage has the potential to promote better health outcomes, its impact on life expectancy appears limited within the Nigerian context.

Turning to the control variables, this study discovered a significant positive influence of total government expenditure on health on life expectancy in Nigeria during the period of study. The positive and statistically significant coefficient of total government expenditure on health indicates that increased public investment in the healthcare sector significantly enhances life expectancy in Nigeria. Specifically, higher government health spending improves access to healthcare services, strengthens healthcare infrastructure, increases the availability of medical personnel, and supports disease prevention and treatment programs. These improvements contribute to better health outcomes and increased longevity among the population. The finding is consistent with the Human Capital Theory and Grossman Health Demand Theory, which emphasize the role of healthcare investment in improving health capital and overall welfare (Becker, 1964; Grossman, 1972). Therefore, government expenditure on health serves as an important mechanism for enhancing population health and promoting sustainable development in Nigeria.

At the same time, the coefficient of the inflation rate has a negative sign and is statistically insignificant in the short run. The negative and statistically significant coefficient of the inflation rate indicates that inflation exerts a detrimental effect on life expectancy in Nigeria. Specifically, increases in the general price level reduce households' purchasing power, increase the cost of healthcare services and essential commodities, and constrain investments in health capital. As a result, healthcare utilization declines, nutritional standards deteriorate, and health outcomes worsen, leading to reductions in life expectancy. The finding supports the Grossman health demand theory, which emphasizes the importance of financial capacity in determining health investment decisions, and suggests that macroeconomic instability poses a significant threat to population health.

5.1 Post Estimation Diagnostic Tests Results

Post-estimation diagnostic tests were conducted to assess the reliability, adequacy, and statistical validity of the estimated model and to determine whether its results provide a sound basis for policy inference and recommendations. Specifically, the Wald test was employed to examine the validity of the imposed coefficient restrictions, while the Breusch-Godfrey (B-G) Lagrange Multiplier (LM) test was used to detect the presence of serial correlation in the residuals. The Breusch-Pagan-Godfrey heteroskedasticity test

was applied to determine whether the residuals exhibit constant variance, while the normality test was used to assess whether the model residuals conform to a normal distribution. The results of these diagnostic tests are presented in Tables 5, 6, and 7, and Figure 1, respectively.

Table 5: Wald Test Result

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	13091049	(5, 21)	0.0000
Chi-square	65455247	5	0.0000

Source: Author (2026).

The results presented in Table 5 indicate that the F-statistic is 13,091,049, with a corresponding probability value of 0.0000. Since the probability value is below the conventional 5% significance level (0.05), the null hypothesis is rejected. This indicates that the explanatory variables, when considered jointly, have a statistically significant effect on health outcomes, measured by life expectancy, in Nigeria over the period under investigation.

Table 6: Breusch-Godfrey Test for Serial Correlation

F-statistic	0.131359	Prob. F(2,25)	0.8775
Obs*R-squared	0.426376	Prob. Chi-Square(2)	0.8080

Source: Authors' Computed Result from (E-views 10).

The results displayed in Table 6 show that the error correction model does not have a serial autocorrelation issue. This is because the chi-square value and the probability associated with it are higher than 0.05.

5.2 Heteroskedasticity Test Results

The Breusch-Pagan-Godfrey test, which is also called the Autoregressive Conditional Heteroskedasticity test, was used to determine if the variability of the error terms in the ECM model is constant across all levels.

Table 7: Autoregressive Conditional Heteroskedasticity Test Result

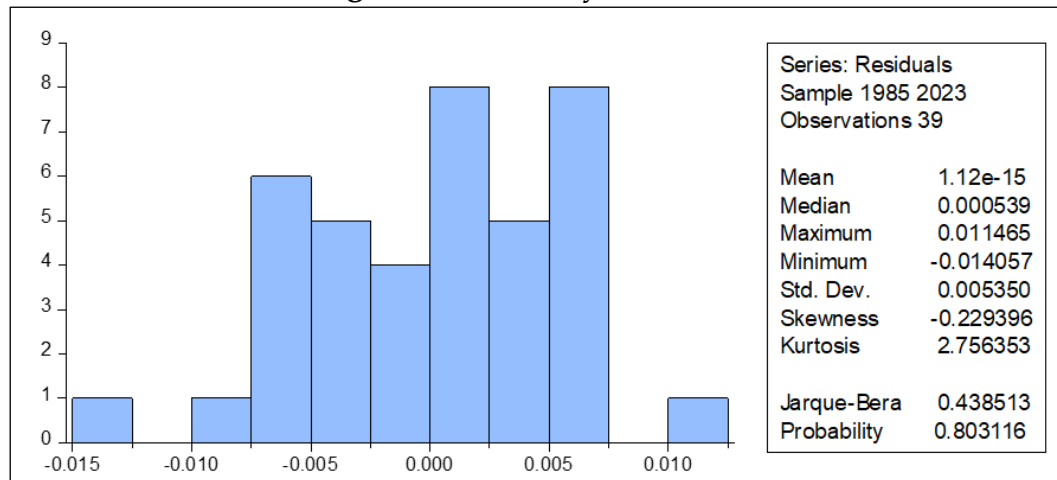
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.816458	Prob. F(13,27)	0.6398
Obs*R-squared	11.56944	Prob. Chi-Square(13)	0.5632
Scaled explained SS	6.827439	Prob. Chi-Square(13)	0.9108

Source: Author (2026).

The Breusch-Pagan-Godfrey test result in Table 7 shows that the error correction model does not have heteroskedasticity, meaning the variance of the residuals in the unemployment rate model is consistent throughout the time period covered in this study.

5.3 Normality Test Result

Figure 1: Normality Test Result



Source: Author (2026).

The results presented in Figure 1 indicate that the residuals of the ECM model are normally distributed at the 5% significance level. This is supported by the Jarque-Bera probability value of approximately 0.80, which is greater than the conventional significance threshold of 0.05. Therefore, the null hypothesis of normality cannot be rejected, suggesting that the residuals satisfy the assumption of a normal distribution.

6. Conclusion and Recommendations

This study investigated the influence of financial deepening on health Outcomes in Nigeria from 1981 to 2023. The data used came from reports by Nigeria's central bank and the World Bank, and included information on broad money supply as a ratio of GDP in %, private sector credit as a ratio of GDP in %, life expectancy, total government expenditure on health and inflation rate. The study employed an Autoregressive Distributed Lag - ARDL approach to explore how the above-mentioned variables are connected in both the long and short terms. The results revealed that in both the long and short terms, the amount of credit provided to the private sector as a ratio of GDP in percentage and the inflation rate have a negative and significant association with life expectancy. However, broad money supply as a ratio of GDP in percentage and total government expenditure on health have a positive and significant association with life expectancy. The study recommended that policymakers should strengthen financial deepening by expanding financial inclusion and improving access to formal financial services to enhance households' ability to finance healthcare expenditures and improve life expectancy. Given the positive and significant effect of broad money supply on life expectancy, the Central Bank of Nigeria should sustain monetary policies that promote financial sector development while ensuring that increased liquidity translates into productive investments in the health sector. The negative and significant relationship between private sector credit and life expectancy further suggests the need to redirect

credit toward productive sectors, particularly healthcare, through targeted lending schemes and concessional financing for healthcare providers and health-related enterprises. Furthermore, the government should increase budgetary allocations to the health sector, improve the efficiency and accountability of health expenditure, and strengthen healthcare infrastructure and service delivery. Since inflation exerts a significant adverse effect on life expectancy, both monetary and fiscal authorities should implement policies aimed at maintaining price stability, reducing inflationary pressures, and protecting households' purchasing power. Finally, greater coordination between financial sector reforms and health sector policies is essential to ensure that financial deepening effectively supports healthcare financing and contributes to sustainable improvements in health outcomes and life expectancy in Nigeria.

Creative Commons License Statement

This research work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-nd/4.0>. To view the complete legal code, visit <https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode.en>. Under the terms of this license, members of the community may copy, distribute, and transmit the article, provided that proper, prominent, and unambiguous attribution is given to the authors, and the material is not used for commercial purposes or modified in any way. Reuse is only allowed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

Conflict of Interest Statement

The author declares no conflicts of interest.

About the Author(s)

George-Anokwuru, Chioma Chidinma (PhD) is a Senior Lecturer in the Department of Economics, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria. Her teaching and research interests are in the areas of monetary and international economics. She has more than fifty publications to her credit in these broad areas. In addition, she is an economic-management consultant to various private organizations. She actively participates in local and international conferences.

References

- Adegbite, O. O., & Machethe, C. L. (2020). Financial development and health outcomes in developing countries. *Development Studies Research*, 7(1), 150–165. Retrieved from <https://www.jstor.org/stable/26832098>
- Aregbeshola, B. S., & Khan, S. M. (2018). Out-of-pocket healthcare spending and poverty among households in Nigeria. *International Journal of Health Policy and Management*,

- 7(9), 798-806. Retrieved from <https://www.abfrjournal.com/index.php/abfr/article/view/484>
- Banerjee, R., Maruta, A. A., & Donato, R. (2023). Does higher financial inclusion lead to better health outcomes? Evidence from developing and transitional economies. *Economics of Transition and Institutional Change*, 31(2), 363-401. <https://doi.org/10.1111/ecot.12341>
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, 12(1), 27-49. Retrieved from <https://link.springer.com/article/10.1007/s10887-007-9010-6>
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis with special reference to education*. University of Chicago Press. Retrieved from https://books.google.ro/books/about/Human_Capital.html?hl=fr&id=9t69iICmrZ0C&redir_esc=y
- Central Bank of Nigeria (CBN) Annual Economic Report (2011). Retrieved from https://www.cbn.gov.ng/OUT/2012/PUBLICATIONS/REPORTS/RSD/CBN%20ECONOMIC%20REPORT_OCTOBER%202011.PDF
- Central Bank of Nigeria (CBN) Annual Economic Report (2013). Retrieved from https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Nigeria_-_Economic_Review_-_Volume_1_-_Issue_2_-_December_2013.pdf
- Central Bank of Nigeria (CBN) Annual Economic Report (2014). Retrieved from https://dc.cbn.gov.ng/cbn_annual_report/2/
- Central Bank of Nigeria (CBN) Annual Economic Report (2015).
- Central Bank of Nigeria (CBN) Annual Economic Report (2016).
- Central Bank of Nigeria (CBN) Annual Economic Report (2017).
- Central Bank of Nigeria (CBN) Annual Economic Report (2018).
- Central Bank of Nigeria (CBN) Annual Economic Report (2019).
- Central Bank of Nigeria (CBN) Annual Economic Report (2020).
- Central Bank of Nigeria (CBN) Annual Economic Report (2021).
- Central Bank of Nigeria (CBN) Annual Economic Report (2022).
- Central Bank of Nigeria (CBN). (2023). *Statistical Bulletin*. Abuja: Central Bank of Nigeria.
- Claessens, S., & Feijen, E. (2007). *Financial sector development and the Millennium Development Goals*. World Bank Working Paper No. 89. Retrieved from <https://documents1.worldbank.org/curated/en/689301468175151075/pdf/386880Financia101OFFICIAL0USE0ONLY1.pdf>
- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). *The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution*. World Bank.
- George-Anokwuru, C. C. (2023). Public Health Expenditure and Infant Mortality Rate in Nigeria. *International Journal of Scientific Research and Management (IJSRM)*, 11(12), 5674-5686. <https://doi.org/10.18535/ijssrm/v11i12.em14>
- George-Anokwuru, C. C. (2026). Financial deepening and poverty in Nigeria. *European Journal of Economic and Financial Research*, 10(1), 55-79. <http://dx.doi.org/10.46827/ejefr.v10i1.2124>

- Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy*, 80(2), 223–255. Retrieved from <https://www.jstor.org/stable/1830580>
- Grossman, M. (2000). The human capital model. In A. J. Culyer & J. P. Newhouse (Eds.), *Handbook of Health Economics* (Vol. 1, pp. 347–408). Elsevier. [https://doi.org/10.1016/S1574-0064\(00\)80166-3](https://doi.org/10.1016/S1574-0064(00)80166-3)
- Gujarati, D. N. & Sangeetha (2007). *Basic Econometric*. Tata McGraw-Hill Publishing Company Ltd., Delhi. Retrieved from https://books.google.ro/books/about/Basic_Econometrics.html?id=WcCjAgAAQB&redir_esc=y
- Ibrahim, M., & Alagidede, P. (2021). Financial inclusion and health outcomes in Sub-Saharan Africa. *International Journal of Social Economics*, 48(2), 274–292.
- Jemiluyi, O. O., & Jeke, L. (2023). Time-series analysis of the health outcomes-financial development nexus: Evidence from South Africa. *International Journal of Applied Economics, Finance and Accounting*, 18(1), 130–141. <https://doi.org/10.33094/ijaefa.v18i1.1335>
- Kindig, D., & Stoddart, G. (2003). What is population health? *American Journal of Public Health*, 93(3), 380–383. <https://doi.org/10.2105/ajph.93.3.380>
- King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics*, 108(3), 717–737. <https://doi.org/10.2307/2118406>
- Levine, R. (2005). Finance and growth: Theory and evidence. In P. Aghion & S. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 1A, pp. 865–934). Elsevier. Retrieved from https://www.nber.org/system/files/working_papers/w10766/w10766.pdf
- Levine, R., & Zervos, S. (1998). Stock markets, banks, and economic growth. *American Economic Review*, 88(3), 537–558. <https://www.jstor.org/stable/116848>
- McKinnon, R. I. (1973). *Money and Capital in Economic Development*. Washington, DC: Brookings Institution. Retrieved from https://books.google.ro/books/about/Money_and_Capital_in_Economic_Development.html?id=Ryi5AAAIAAJ&redir_esc=y
- McKinnon, R. I. (1973). *Money and capital in economic development*. Brookings Institution. Retrieved from https://books.google.ro/books/about/Money_and_Capital_in_Economic_Development.html?id=Ryi5AAAIAAJ&redir_esc=y
- Mushkin, S. J. (1962). Health as an investment. *Journal of Political Economy*, 70(5), 129–157. Retrieved from <https://www.nber.org/system/files/chapters/c13577/c13577.pdf>
- Naveenan, R. V., Liew, C. Y. & Kijkasiwat, P. (2024). Nexus between financial inclusion, digital inclusion and health outcomes: evidence from developing economies. *Social Indicators Research*, 174:367–408. <https://doi.org/10.1007/s11205-024-03391-y>
- Nigeria Demographic and Health Survey (NDHS, 2013) Key Findings.
- Nigeria Demographic and Health Survey (NDHS, 2018) Key Findings.
- Nigeria Demographic and Health Survey (NDHS, 2018). Health Sector Survey.

- Nwakanma, P. C., & Nnamdi, I. S. (2014). Financial deepening and human development in Nigeria. *Research Journal of Finance and Accounting*, 5(19), 120–129. <https://doi.org/10.15678/IER.2022.0802.01>
- Odhiambo, N. M. (2011). Financial intermediaries versus financial markets: A South Africa experience. *International Business and Economics Research Journal*, 10(2), 77–84. <https://doi.org/10.19030/iber.v10i2.1795>
- Onwuka, C. O., Chibueze, A., & Udentia, B. (2025). The Relationship between Financial Inclusion and Health Outcomes: Evidence from Nigeria. *AEFUNAI Journal of Economics, Finance and Development Studies*, 2(2), 375–385. <https://doi.org/10.48028/iiprds/aefunaijefds.v2.i2.20>
- Pesaran, M. H., & Shin, Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. In S. Strøm (Ed.), *Econometrics and economic theory in the 20th century: The Ragnar Frisch Centennial Symposium*. Cambridge University Press. <https://doi.org/10.1017/CCOL0521633230.011>
- Rahim, F. U., & Muzaffar, S. (2024). Public Health Expenditure, Financial Development and Health Outcomes in Pakistan: An Analysis. *Journal of Development and Social Sciences*, 5(1), 74–87. [https://doi.org/10.47205/jdss.2024\(5-1\)08](https://doi.org/10.47205/jdss.2024(5-1)08)
- Sanusi, L. S. (2012). Banking reform and its impact on the Nigerian economy. *CBN Journal of Applied Statistics*, 2(2), 115–122. Retrieved from <https://dc.cbn.gov.ng/cgi/viewcontent.cgi?article=1284&context=jas>
- Schultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51(1), 1–17. Retrieved from <https://www.jstor.org/stable/1818907>
- Shaw, E. S. (1973). *Financial Deepening in Economic Development*. New York: Oxford University Press. Retrieved from https://books.google.ro/books/about/Financial_Deepening_in_Economic_Developm.html?id=Km9EAAAIAAJ&redir_esc=y
- Shi, G., Wang, D., & Altunta, M. (2022). Financial Development and Health Outcomes: Do Financial Globalization Matter in Selected Asian Economies? *Front. Public Health* 10:843935. <https://doi.org/10.3389/fpubh.2022.843935>
- Ugherughe, J. E., Akakabota, E. E., & Alagba, O. S. (2021). Financial deepening and health outcome in Nigeria. *Innovations*, Number 67, 201–2019. Retrieved from <https://www.semanticscholar.org/paper/Financial-deepening-and-health-outcome-in-Nigeria-Ugherughe-Akakabota/44ae57dc407abac34c08fc1c4b6e82e23a83a7ba>
- World Bank. (2023). *World Development Indicators*. Washington, DC: World Bank. Retrieved from <https://databank.worldbank.org/source/world-development-indicators>
- World Bank. (2024). *Life Expectancy at Birth (Years)*. World Bank Group. Retrieved from <https://data.worldbank.org/indicator/SP.DYN.LE00.IN>
- World Health Organization (WHO, 2019). *Maternal health in Nigeria: generating information for action*. Retrieved from <https://www.who.int/news/item/25-06-2019-maternal-health-in-nigeria-generating-information-for-action>

- World Health Organization. (2023). *World Health Statistics 2023: Monitoring Health for the SDGs*. Geneva: WHO. Retrieved from <https://www.who.int/publications/i/item/9789240074323>
- Xiao, W., & Tao, R. (2022). Financial inclusion and its impact on health: Empirical evidence from Asia. *Frontiers in Public Health*, 10, 948964. Retrieved from <https://pmc.ncbi.nlm.nih.gov/articles/PMC9283790/>