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GOVERNMENT HEALTHCARE INFRASTRUCTURE REFORM AND THE PROVISION OF MEDICAL EQUIPMENT AND FACILITIES IN NIGER-DELTA, NIGERIA

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ABSTRACT

This study examined the impact of healthcare infrastructure reform on the provision of medical equipment and facilities in Niger-Delta, Nigeria. The study was motivated by the persistent challenges faced by healthcare institutions in the region, including inadequate medical equipment, deteriorating healthcare infrastructure, and limited access to modern healthcare technologies. The study adopted a survey research design in order to obtain relevant data from healthcare professionals working in selected healthcare facilities across the region. The population of the study consisted of 9,732 healthcare professionals, including medical doctors, nurses, laboratory scientists, and hospital administrators working in healthcare institutions in the In Niger-Delta, Nigeria. Using the Taro Yamane (1967) sample size determination formula, a sample size of 384 respondents was selected for the study. Data were collected through the use of a structured questionnaire, while 360 properly completed questionnaires were retrieved and used for the analysis. The collected data were analyzed using descriptive statistics such as frequency distribution tables and percentages, while the formulated hypotheses were tested using the Chi-square (χ^2) statistical technique at a 0.05 level of significance. The findings of the study revealed that healthcare infrastructure reform had significantly improved the availability of medical equipment in healthcare facilities in the Niger-Delta geopolitical zone. The results also indicated that healthcare infrastructure reforms had positively influenced the development and functionality of healthcare facilities, thereby improving healthcare service delivery in the region. However, the study also identified some persistent challenges affecting healthcare infrastructure development, including inadequate funding, poor maintenance culture, and unequal distribution of healthcare facilities between urban and rural communities. Based on the findings, the study concluded that healthcare infrastructure reform plays a crucial role in strengthening healthcare systems and improving healthcare service delivery. The study recommended increased government investment in healthcare infrastructure, improved provision and maintenance of modern

AJEMATES
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medical equipment, and strengthened public–private partnerships in healthcare development. The study contributed to existing knowledge by providing empirical evidence on the relationship between healthcare infrastructure reform and the provision of medical equipment and healthcare facilities in the In Niger-Delta, Nigeria of Nigeria.

Keywords: Healthcare infrastructure reform, medical equipment, healthcare facilities, healthcare service delivery, Niger-Delta Nigeria.

Introduction

Healthcare infrastructure constitutes the backbone of an effective health system because it determines the availability, accessibility, and quality of medical services delivered to the population. Healthcare infrastructure includes hospitals, clinics, laboratories, diagnostic equipment, medical technologies, and other physical facilities required for the delivery of health services. In many developing countries, including Nigeria, healthcare systems have historically faced challenges such as inadequate medical equipment, poor facility maintenance, insufficient funding, and uneven distribution of healthcare resources across regions. These challenges significantly affect the efficiency of healthcare delivery and the overall health outcomes of the population (World Health Organization, 2021).

In recent years, governments across the world have undertaken healthcare infrastructure reforms aimed at strengthening health systems, improving access to medical services, and ensuring the availability of modern medical equipment and functional healthcare facilities. Healthcare infrastructure reform generally involves policies, investments, and strategic initiatives targeted at upgrading health facilities, procuring modern medical equipment, expanding hospital capacity, and improving maintenance systems within healthcare institutions. Such reforms are critical in developing countries where healthcare systems often struggle to meet the growing demand for quality medical services (Bloom, 2018).

In Nigeria, healthcare infrastructure reform has become a major policy focus due to persistent gaps in the provision of healthcare facilities and medical equipment across the country. The Nigerian healthcare system operates through a three-tier structure consisting of primary, secondary, and tertiary levels of care managed by local, state, and federal governments respectively. Despite this structure, many healthcare facilities lack essential diagnostic and treatment equipment, and several hospitals operate in deteriorating physical environments (Aregbeshola & Khan, 2018). These challenges have prompted various reform initiatives by the Nigerian government and international development partners to improve healthcare infrastructure and strengthen service delivery.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
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The Niger-Delta geopolitical zone of Nigeria, which comprises Akwa Ibom State, Bayelsa State, Cross River State, Delta State, Edo State, and Rivers State, plays a significant role in the Nigerian economy due to its abundant oil and gas resources. However, despite its economic importance, the region still faces several healthcare challenges, including inadequate healthcare infrastructure, limited access to modern diagnostic equipment, and disparities in healthcare service delivery between urban and rural communities (Okeke, 2020). Many healthcare facilities in the region lack modern technologies such as CT scanners, digital diagnostic systems, and advanced surgical equipment, which are essential for effective medical treatment.

Fig. 1.1: Modern hospital equipment and healthcare facilities used in Nigerian hospitals.



Source: Adapted from World Health Organization Health Facility Infrastructure Reports (2025).

Healthcare infrastructure reform initiatives in Nigeria, including hospital revitalization programs, public-private partnerships, and targeted investment in medical technologies, aim to address these challenges. For example, the Nigerian government and health sector stakeholders have initiated programs to upgrade teaching hospitals, strengthen primary healthcare centers, and expand the availability of essential medical equipment across various regions of the country (Federal Ministry of Health, 2022). These reforms are expected to enhance the availability of medical equipment and improve the overall functionality of healthcare facilities.

Despite these initiatives, concerns remain regarding the effectiveness of healthcare infrastructure reforms in improving the provision of medical equipment and facilities, particularly in the Niger-Delta geopolitical zone. Issues such as poor policy implementation, inadequate funding, corruption, and weak maintenance culture continue to affect the sustainability of healthcare infrastructure development in the region (Eze & Okechukwu, 2019).

Therefore, it becomes necessary to examine the impact of healthcare infrastructure reform on the provision of

medical equipment and healthcare facilities in Niger-Delta, Nigeria. Understanding the extent to which these reforms have improved healthcare infrastructure will help policymakers, healthcare administrators, and development partners design more effective strategies for strengthening the healthcare system and improving health service delivery in the region.

Statement of the Problem

The availability of adequate medical equipment and functional healthcare facilities is essential for effective healthcare delivery and improved health outcomes. Healthcare infrastructure plays a critical role in diagnosing diseases, providing treatment, and ensuring efficient medical services for the population. However, in many developing countries, including Nigeria, healthcare systems continue to struggle with infrastructural deficiencies that limit the quality and accessibility of medical services (World Health Organization, 2022).

Over the years, the Nigerian healthcare sector has experienced persistent challenges related to inadequate healthcare facilities, obsolete medical equipment, poor maintenance culture, and uneven distribution of healthcare resources. Many public hospitals and primary healthcare centers operate with outdated diagnostic tools, insufficient laboratory facilities, and poorly maintained infrastructure. These challenges significantly hinder the ability of healthcare providers to deliver effective medical services and respond to emerging health challenges (Aregbeshola & Khan, 2018).

Fig. 1.2: Examples of poorly equipped and deteriorating healthcare facilities in parts of Nigeria.



Source: Adapted from Federal Ministry of Health Infrastructure Assessment Report (2024).

In response to these challenges, the Nigerian government and health sector stakeholders have implemented several healthcare infrastructure reform initiatives aimed at strengthening healthcare delivery. These reforms include the renovation and upgrading of healthcare facilities, procurement of modern medical equipment, expansion of primary healthcare services, and the introduction of

public-private partnerships in healthcare infrastructure development (Federal Ministry of Health, 2022). Such reforms are intended to improve the availability of essential medical equipment and enhance the functionality of healthcare facilities across the country.

Despite these policy interventions, many healthcare facilities in several regions of Nigeria continue to experience infrastructural deficiencies. The Niger-Delta geopolitical zone of Nigeria, which includes Akwa Ibom State, Bayelsa State, Cross River State, Delta State, Edo State, and Rivers State, continues to face significant healthcare infrastructure challenges despite its economic importance and contribution to national revenue through oil and gas resources (Okeke, 2020).

Several healthcare facilities in the region lack essential diagnostic equipment such as ultrasound machines, X-ray machines, and laboratory technologies required for effective disease diagnosis and treatment. In many rural communities, primary healthcare centers operate with minimal medical equipment and poorly maintained infrastructure, thereby limiting access to quality healthcare services. Furthermore, some hospitals experience equipment shortages, equipment breakdowns, and inadequate maintenance systems that reduce the efficiency of healthcare service delivery (Eze & Okechukwu, 2019).

Another major concern is the uneven distribution of healthcare infrastructure between urban and rural areas in the In Niger-Delta, Nigeria. While some urban hospitals may have relatively better facilities, many rural health centers remain under-equipped and poorly funded. This disparity contributes to limited access to healthcare services for rural populations and increases the burden on already overcrowded urban hospitals.

Although healthcare infrastructure reforms have been introduced to address these issues, questions remain regarding their effectiveness in improving the provision of medical equipment and healthcare facilities in the Niger-Delta geopolitical zone. There is limited empirical evidence assessing the extent to which these reforms have translated into tangible improvements in healthcare infrastructure within the region.

Therefore, this study seeks to examine the impact of healthcare infrastructure reform on the provision of medical equipment and facilities in Niger-Delta, Nigeria. The study aims to evaluate whether the reforms have significantly improved healthcare infrastructure and to identify the challenges affecting the effective implementation of such reforms.

Objectives of the Study

The aim of this study is to examine the impact of healthcare infrastructure reform on the provision of medical equipment and facilities in Niger-Delta, Nigeria. The specific objectives of the study are to:

i. Examine the extent to which healthcare infrastructure reform has

improved the availability of medical equipment in healthcare facilities in Niger-Delta, Nigeria.

ii. Assess the impact of healthcare infrastructure reform on the development and functionality of healthcare facilities in Niger-Delta, Nigeria.

Research Questions

The following research questions will guide the study:

i. To what extent has healthcare infrastructure reform improved the availability of medical equipment in healthcare facilities in Niger-Delta, Nigeria?

ii. What impact has healthcare infrastructure reform had on the development and functionality of healthcare facilities in Niger-Delta, Nigeria?

Research Hypotheses

The following hypotheses will be tested in this study:

i. H_{01}: Healthcare infrastructure reform has no significant impact on the availability of medical equipment in healthcare facilities in Niger-Delta, Nigeria.

ii. H_{02}: Healthcare infrastructure reform has no significant impact on the development and functionality of healthcare facilities in Niger-Delta, Nigeria.

Significance of the Study

This study is significant because it contributes to the growing body of knowledge on healthcare infrastructure development and healthcare service delivery in developing countries, particularly in Nigeria. By examining the impact of healthcare infrastructure reform on the provision of medical equipment and facilities, the study will provide empirical evidence on how reforms influence healthcare system performance.

The findings of this study will be beneficial to policymakers and government agencies such as the Federal Ministry of Health and state ministries of health in the In Niger-Delta, Nigeria. The study will provide insights that can help policymakers evaluate existing healthcare infrastructure reform policies and develop more effective strategies for improving healthcare facilities and medical equipment provision.

Healthcare administrators and hospital managers will also benefit from this study because it will highlight the challenges affecting the implementation of healthcare infrastructure reforms. Understanding these challenges can help healthcare managers improve the maintenance and management of medical equipment and health facilities.

Furthermore, the study will be useful to international development organizations such as the World Health Organization and other health development partners involved in supporting healthcare infrastructure development in Nigeria. The findings can guide future interventions

aimed at strengthening healthcare systems and improving healthcare service delivery.

The study benefit researchers and students in fields such as public health, health administration, and health policy. It will serve as a reference material for future academic studies related to healthcare infrastructure, healthcare reforms, and health system development in Nigeria.

Finally, the study will contribute to improving healthcare service delivery in Niger-Delta, Nigeria by identifying the gaps and challenges affecting the effective provision of medical equipment and healthcare facilities.

Fig. 1.3: Improved healthcare infrastructure and modern medical equipment supporting service delivery in Nigerian hospitals.



Source: Adapted from World Health Organization Health System Strengthening Report (2024).

This study focuses on the impact of healthcare infrastructure reform on the provision of medical equipment and facilities in Niger-Delta, Nigeria. The research specifically examines how healthcare reform initiatives have influenced the availability of medical equipment and the development of healthcare facilities within the region.

Geographically, the study is limited to the Niger-Delta geopolitical zone of Nigeria, which consists of six states: Akwa Ibom State, Bayelsa State, Cross River State, Delta State, Edo State, and Rivers State. These states form a significant region in Nigeria due to their economic importance and population size. However, despite their strategic importance, the region still faces various healthcare infrastructure challenges, particularly in the provision of modern medical equipment and well-equipped healthcare facilities.

The study concentrates on healthcare facilities across the three levels of healthcare delivery in Nigeria, namely primary healthcare centres, secondary healthcare facilities (general hospitals), and tertiary healthcare institutions (teaching hospitals and specialist hospitals). The research examines how

healthcare infrastructure reform policies and programs have influenced the provision, distribution, and functionality of medical equipment and healthcare facilities within these institutions. In terms of variables, the study focuses on two major aspects of healthcare infrastructure reform:

Availability of medical equipment in healthcare facilities

Development and functionality of healthcare facilities

The study also considers reform initiatives implemented by the Nigerian government and relevant stakeholders aimed at strengthening healthcare infrastructure, including facility renovation, equipment procurement, and infrastructure expansion programs coordinated by agencies such as the Federal Ministry of Health.

The scope of this study is limited to examining the impact of healthcare infrastructure reforms on medical equipment and healthcare facilities, and it does not extensively cover other aspects of healthcare reform such as healthcare financing, workforce development, or health insurance systems.

Fig. 1.4: Map showing the Niger-Delta geopolitical zone of Nigeria and its constituent states



Source: Adapted from National Population Commission Regional Map of Nigeria (2020)

Conceptual Review

Healthcare infrastructure reform

Healthcare infrastructure reform refers to deliberate policy actions and institutional changes aimed at improving the physical structures, equipment, and technological systems used in healthcare delivery. It involves the modernization, expansion, and rehabilitation of healthcare facilities to ensure that they are capable of providing effective and efficient medical services to the population.

Healthcare infrastructure reform includes several components such as the construction of new hospitals and clinics, renovation of existing healthcare facilities, procurement of modern medical equipment, strengthening of maintenance systems, and the introduction of new healthcare technologies. According to the World Health Organization (2021), strong healthcare infrastructure is fundamental to achieving universal health coverage and improving population health outcomes.

In developing countries, healthcare infrastructure reforms are often implemented to address challenges such as deteriorating hospital buildings, inadequate medical equipment, insufficient diagnostic technologies, and overcrowded health facilities. These reforms aim to enhance the capacity of healthcare institutions to deliver quality healthcare services.

In Nigeria, healthcare infrastructure reform has become a priority due to the persistent gaps in healthcare service delivery across the country. The Nigerian government has introduced several initiatives aimed at strengthening healthcare infrastructure, including hospital revitalization programs, upgrading of teaching hospitals, and expansion of primary healthcare centers under the supervision of the Federal Ministry of Health.

Such reforms are expected to improve access to healthcare services, reduce the burden on overcrowded hospitals, and ensure that healthcare facilities are adequately equipped to handle modern medical challenges.

Medical Equipment in Healthcare Delivery

Medical equipment refers to the tools, machines, and technological devices used by healthcare professionals for the diagnosis, treatment, monitoring, and prevention of diseases. The availability and functionality of medical equipment play a critical role in determining the effectiveness of healthcare service delivery.

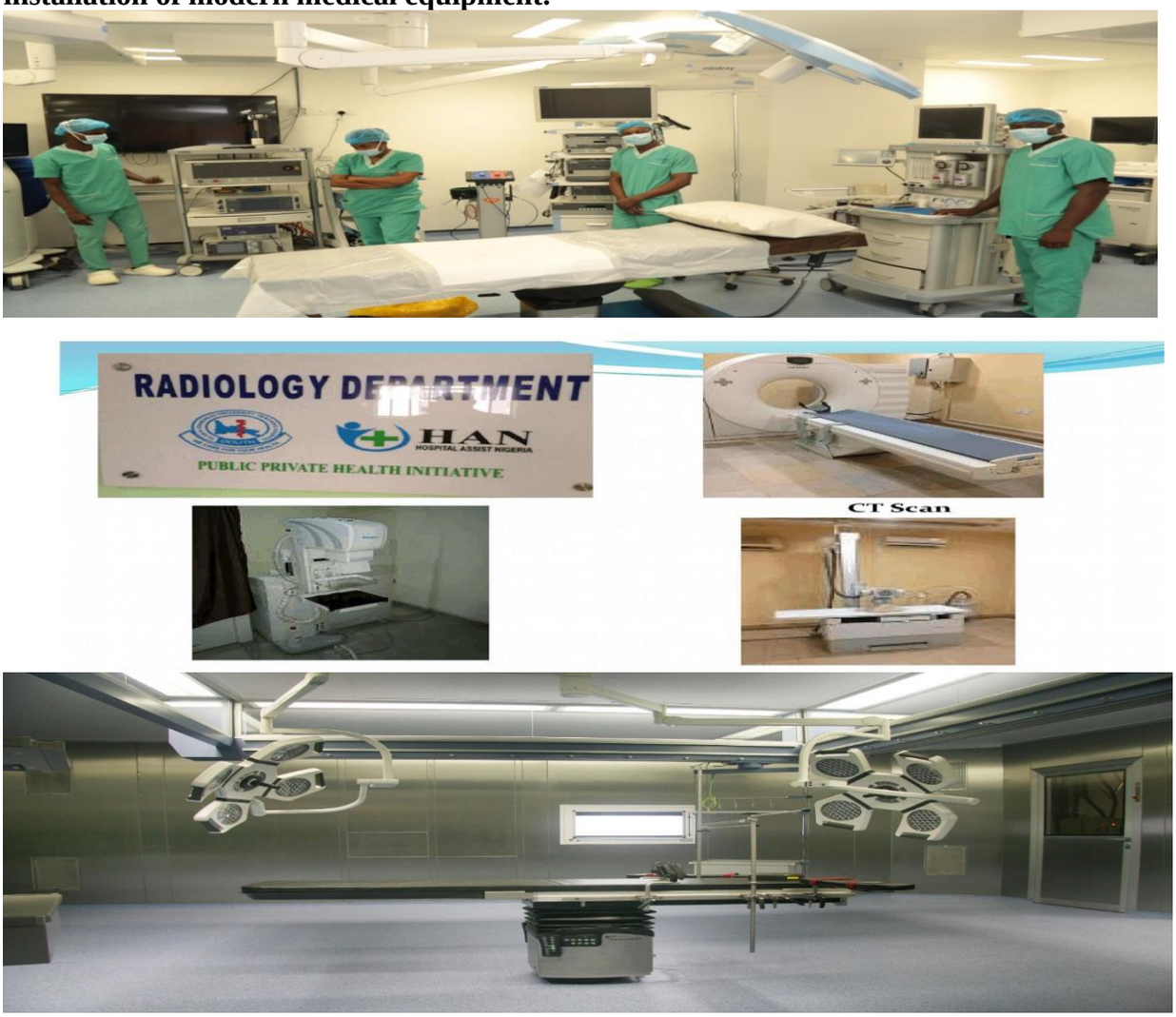
Examples of essential medical equipment include diagnostic machines such as X-ray machines, ultrasound scanners, CT scanners, laboratory diagnostic devices, patient monitoring systems, surgical instruments, and life-support equipment. These tools enable healthcare providers to detect diseases accurately, monitor patients' conditions, and perform complex medical procedures.

According to Bloom (2018), modern medical equipment significantly improves the quality of healthcare services by enabling early diagnosis and effective treatment of diseases. Without adequate medical equipment, healthcare facilities may struggle to provide proper medical care, leading to increased morbidity and mortality rates.

In Nigeria, the shortage of modern medical equipment remains a major challenge in many healthcare institutions. Several public hospitals operate with outdated equipment, while some facilities lack essential diagnostic technologies required for effective healthcare delivery. This situation affects the quality of healthcare services provided to patients. Healthcare infrastructure reform is therefore essential in ensuring that healthcare facilities are equipped with modern medical technologies that can support efficient healthcare delivery.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

Fig. 2.1: Healthcare infrastructure reform involving hospital renovation and installation of modern medical equipment.



Source: Adapted from World Health Organization Health Infrastructure Development Report (2021).

Fig. 2.2: Examples of modern medical diagnostic equipment used in hospitals.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org



Source: Adapted from Federal Ministry of Health Medical Equipment Development Report (2022).

Fig. 2.3: Examples of modern medical diagnostic equipment used in hospitals.



Source: Adapted from Federal Ministry of Health Medical Equipment Development Report (2022).

Healthcare Facilities

Healthcare facilities refer to the physical locations where healthcare services are provided to patients. These include hospitals, clinics, laboratories, maternity centers, and primary healthcare centers. Healthcare facilities serve as the operational base for healthcare professionals and medical equipment used in the delivery of healthcare services.

Healthcare facilities are typically categorized into three levels in the Nigerian healthcare system:

Primary Healthcare Facilities – These are community-based health centers responsible for providing basic healthcare services such as immunization, maternal care, and treatment of common illnesses.

Secondary Healthcare Facilities – These include general hospitals that provide more advanced medical services such as specialized treatments, laboratory diagnostics, and surgical procedures.

Tertiary Healthcare Facilities – These are teaching hospitals and specialist hospitals that provide highly specialized medical care and advanced medical treatments.

According to Aregbeshola and Khan (2018), the quality and availability of healthcare facilities significantly influence healthcare accessibility and service delivery in developing countries. Poorly equipped or poorly maintained healthcare

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

facilities can limit the ability of healthcare providers to deliver effective medical services.

In Niger-Delta, Nigeria, several healthcare facilities still face challenges such as outdated infrastructure, insufficient medical equipment, and inadequate maintenance systems. Healthcare infrastructure reform initiatives are therefore essential in addressing these challenges and strengthening healthcare delivery in the region.

Fig. 2.4: Examples of healthcare facilities including hospitals and primary healthcare centers.



Source: Adapted from National Primary Health Care Development Agency Infrastructure Report (2021).

Theoretical Framework

Health Systems Theory

The Health Systems Theory was developed by the World Health Organization as a framework for understanding how different components of a healthcare system interact to deliver healthcare services effectively. The theory identifies six key building blocks of a healthcare system: Healthcare service delivery, Health workforce, Health information systems, Access to essential medicines and technologies, Health financing and Leadership and governance

According to the theory, effective healthcare service delivery depends largely on the availability of functional infrastructure and modern medical equipment. When healthcare facilities are properly equipped and adequately maintained, healthcare professionals can deliver services more efficiently and effectively.

This theory is relevant to this study because healthcare infrastructure reform directly affects the availability of medical equipment and healthcare facilities, which are essential components of a functional healthcare system.

Modernization Theory

Modernization Theory was proposed by Walt Whitman Rostow in 1960 to explain how societies develop economically and socially through modernization processes. The theory argues that development occurs when societies adopt modern technologies, infrastructure, and institutional systems that enhance productivity and efficiency. In the context of healthcare, modernization involves the adoption of advanced medical

technologies, improved healthcare infrastructure, and efficient healthcare management systems.

Modernization theory suggests that investment in healthcare infrastructure and medical technologies is essential for improving healthcare delivery and achieving better health outcomes. In developing countries such as Nigeria, healthcare infrastructure reform represents an important step toward modernizing the healthcare system and improving access to quality healthcare services.

Empirical Review

Several empirical studies have been conducted on healthcare infrastructure development, healthcare reforms, and the provision of medical equipment in developing countries. These studies provide useful insights into how healthcare infrastructure reforms influence the quality and availability of healthcare services.

Aregbeshola and Khan (2018) conducted a study on healthcare financing and health system performance in Nigeria. The study examined how healthcare funding and infrastructure influence service delivery in public healthcare institutions. Using secondary data analysis, the researchers found that inadequate investment in healthcare infrastructure and medical equipment significantly affects healthcare service delivery. The study concluded that increased government investment in healthcare infrastructure is necessary to improve the availability of medical equipment and healthcare facilities.

Eze and Okechukwu (2019) examined the challenges of healthcare infrastructure development in Nigerian public hospitals. The study used a survey research design and collected data from healthcare workers across selected hospitals. The findings revealed that many healthcare institutions operate with obsolete medical equipment and poorly maintained facilities. The researchers recommended that healthcare infrastructure reforms should focus on regular equipment replacement and improved maintenance systems.

Okeke (2020) investigated healthcare infrastructure challenges in the In Niger-Delta, Nigeria of Nigeria. The study found that despite the economic importance of the region, several healthcare facilities lack essential diagnostic and treatment equipment. The research concluded that improved healthcare infrastructure reforms are necessary to enhance healthcare accessibility and quality service delivery in the region.

Adamu and Ojo (2021) conducted a study on the impact of healthcare infrastructure investment on healthcare service delivery in Nigeria. The study adopted a quantitative research design and analyzed data obtained from healthcare institutions across several states. The results showed that hospitals with improved infrastructure and modern medical equipment recorded higher efficiency in healthcare delivery and better patient outcomes.

Abubakar and Bello (2020) examined the availability of medical equipment in public

healthcare facilities in Nigeria. The study revealed that many hospitals operate with limited diagnostic equipment, which affects the ability of healthcare professionals to provide effective medical services. The researchers recommended the implementation of healthcare infrastructure reform policies aimed at improving equipment availability.

Uche and Nwankwo (2021) studied the role of healthcare infrastructure in improving healthcare accessibility in rural communities. The study found that rural healthcare facilities often suffer from inadequate infrastructure and limited access to medical equipment. The researchers emphasized that healthcare infrastructure reforms should prioritize rural healthcare development.

Onyema and Nwachukwu (2019) conducted research on healthcare infrastructure development and health outcomes in developing countries. The findings indicated that countries with stronger healthcare infrastructure and modern medical technologies tend to achieve better health outcomes and improved healthcare service delivery.

Ibrahim and Abdullahi (2022) investigated the effectiveness of healthcare infrastructure reform policies implemented by the Nigerian government. The study revealed that although several reform initiatives have been introduced, challenges such as poor implementation, corruption, and inadequate funding still hinder the full realization of healthcare infrastructure improvements.

Oladipo and Adeyemi (2020) examined the relationship between hospital infrastructure and healthcare service quality. The study found that hospitals with modern equipment and well-maintained facilities were more capable of providing efficient healthcare services compared to poorly equipped hospitals.

World Health Organization (2021) reported that healthcare infrastructure and access to medical technologies are essential components of strong healthcare systems. The report emphasized that countries must invest in modern healthcare infrastructure and equipment to ensure effective healthcare service delivery.

The reviewed empirical studies show that healthcare infrastructure reforms significantly influence the provision of medical equipment and healthcare facilities. However, the studies also reveal that several challenges still affect the effective implementation of healthcare reforms, particularly in developing countries.

Gaps Literature

The review of existing literature shows that several studies have examined healthcare infrastructure development, healthcare financing, and the availability of medical equipment in developing countries, particularly in Nigeria. These studies provide useful insights into the relationship between healthcare infrastructure and healthcare service delivery. However, despite the

contributions of these studies, several gaps still exist in the literature.

One major gap identified in the literature is the limited focus on healthcare infrastructure reform as a specific determinant of medical equipment provision and healthcare facility development. Many previous studies, such as Aregbeshola and Khan (2018) and Oladipo and Adeyemi (2020), focused mainly on healthcare financing and health system performance without specifically examining how healthcare infrastructure reforms directly influence the availability of medical equipment in healthcare facilities.

Another gap relates to the geographical coverage of previous studies. Many empirical studies on healthcare infrastructure in Nigeria have focused on the national level or specific states without paying particular attention to the Niger-Delta geopolitical zone. The In Niger-Delta, Nigeria, which includes Akwa Ibom State, Bayelsa State, Cross River State, Delta State, Edo State, and Rivers State, is economically significant due to its oil and gas resources, yet it still faces considerable healthcare infrastructure challenges. There is limited empirical research that specifically investigates how healthcare infrastructure reforms affect the provision of medical equipment and healthcare facilities within this region.

In addition, several previous studies have focused primarily on healthcare financing, workforce challenges, and policy implementation, while relatively little attention has been given to the actual outcomes of infrastructure reforms in terms of improved medical equipment availability and healthcare facility development.

Furthermore, some existing studies relied largely on secondary data or policy analysis, with limited primary data collected directly from healthcare institutions and healthcare professionals. This creates a gap in understanding the real experiences of healthcare providers regarding the availability and functionality of medical equipment in healthcare facilities.

Another important gap is the lack of comparative analysis between healthcare infrastructure reforms and the practical realities within healthcare institutions, particularly in rural healthcare facilities where access to modern medical equipment is often limited.

Therefore, this study seeks to address these gaps by examining the impact of healthcare infrastructure reform on the provision of medical equipment and healthcare facilities in Niger-Delta, Nigeria. The study will provide empirical evidence on the extent to which healthcare infrastructure reforms have improved healthcare facilities and the availability of medical equipment within the region.

By focusing specifically on healthcare infrastructure reforms and their practical outcomes within healthcare institutions,

this research contributes to existing knowledge and provides insights that can support policymakers, healthcare administrators, and development partners in strengthening healthcare infrastructure in Nigeria.

Research Methodology

Area of the Study

The study was carried out in Niger-Delta, Nigeria. The region consists of six states: Akwa Ibom State, Bayelsa State, Cross River State, Delta State, Edo State, and Rivers State. The In Niger-Delta, Nigeria was selected for the study because of its economic importance and the persistent challenges associated with healthcare infrastructure and medical equipment availability within the region. Despite the region's contribution to the Nigerian economy through oil and gas production, several healthcare facilities still faced challenges such as inadequate infrastructure, insufficient medical equipment, and poor maintenance of existing facilities.

Healthcare institutions across the region include primary healthcare centers, general hospitals, teaching hospitals, and specialist hospitals that provide healthcare services to the population. These healthcare institutions served as the focal points for data collection in the study.

Fig. 3.2: Map showing the Niger-Delta geopolitical zone of Nigeria.



Source: Adapted from Health Research Methods Report (2021).

Research Design

This study adopted the survey research design. The survey design was considered appropriate because it enabled the researcher to collect relevant data from respondents regarding the impact of healthcare infrastructure reform on the provision of medical equipment and facilities.

The design allowed the researcher to obtain first-hand information from healthcare professionals working in various healthcare facilities within Niger-Delta, Nigeria. The survey approach also made it possible to gather opinions, perceptions, and experiences of respondents concerning healthcare infrastructure reforms and their effects on the availability of medical equipment and healthcare facilities.

The research design was suitable for this study because it facilitated the collection

of quantitative data that were analyzed to determine the relationship between healthcare infrastructure reform and the provision of medical equipment and facilities.

Population of the Study

The population of the study consisted of healthcare professionals and administrative staff working in selected healthcare facilities across the Niger-Delta geopolitical zone of Nigeria. The estimated population of the study was 9,732 respondents, which included medical doctors, nurses, laboratory scientists, hospital administrators, and other healthcare personnel involved in healthcare service delivery.

These individuals were considered suitable for the study because they possessed adequate knowledge and experience regarding healthcare infrastructure, medical equipment availability, and the functioning of healthcare facilities.

Sample Size Determination

The sample size for the study was determined using the Taro Yamane (1967) formula, which is commonly used for calculating sample sizes in survey research.

The formula is expressed as:

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

Where:
n = sample size
N = population size
e = level of significance (0.05)
Given that:
N = 9,732
e = 0.05

$$n = \frac{9732}{1 + 9732(0.05)^2}$$
$$n = \frac{9732}{1 + 9732(0.0025)}$$
$$n = \frac{9732}{1 + 24.33}$$
$$n = \frac{9732}{25.33}$$
$$n \approx 384$$

Therefore, the sample size for the study was 384 respondents.

Sampling Technique

The study adopted the stratified and simple random sampling techniques.

Stratified sampling was used to divide the population into different categories of healthcare professionals such as doctors, nurses, laboratory personnel, and hospital administrators. This ensured that all

relevant professional groups were adequately represented in the study.
After stratification, the simple random sampling technique was used to select respondents from each category. This method ensured that every member of the population had an equal chance of being selected for the study.

Method of Data Collection
Data for this study were collected using primary sources of data. The structured questionnaires developed by the researcher were distributed to the selected respondents in healthcare facilities across the Niger-Delta geopolitical zone of Nigeria. The researcher personally visited selected healthcare institutions and administered the questionnaires to the respondents with the assistance of trained research assistants. The purpose of the study was clearly explained to the respondents before the questionnaires were distributed.

Respondents were given adequate time to complete the questionnaires, after which the completed copies were retrieved for analysis. This method ensured a high response rate and improved the accuracy of the data collected. The major instrument used for data collection in this study was a structured questionnaire developed by the researcher.
The questionnaire consisted of two major sections:
Section A: Demographic information of respondents
Section B: Questions relating to healthcare infrastructure reform, availability of medical equipment, and functionality of healthcare facilities.

The questionnaire was structured using a five-point Likert scale, which included: Strongly, Agree (SA), Agree (A), Neutral (N), Disagree (D) and Strongly Disagree (SD). The instrument was designed to obtain relevant information from respondents regarding their perceptions and experiences concerning healthcare infrastructure reforms and healthcare facility development.

Reliability refers to the degree to which a research instrument consistently measures what it is intended to measure. In this study, the reliability of the questionnaire was determined through a pilot study. The pilot study was conducted by administering copies of the questionnaire to 30 healthcare workers in selected healthcare facilities outside the main study area. The purpose of the pilot test was to determine the consistency and stability of the instrument.

Data obtained from the pilot test were analyzed using the Cronbach Alpha reliability test. The reliability coefficient obtained was 0.82, which indicated a high level of internal consistency.
According to research standards, a Cronbach Alpha coefficient above 0.70 is considered acceptable for social science research. Therefore, the reliability coefficient of 0.82 confirmed that the instrument used for the study was reliable.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

Method of Data Analysis

The data collected from the respondents were analyzed using descriptive and inferential statistical methods.

The descriptive statistical tools included frequency distribution tables, percentages, and mean scores. These tools were used to summarize and present the responses obtained from the respondents.

To test the hypotheses formulated in the study, the Chi-square (χ^2) statistical technique was used. The Chi-square test was considered appropriate because it helped to determine whether there was a significant relationship between healthcare infrastructure reform and the provision of medical equipment and healthcare facilities.

The formula for Chi-square is expressed as:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Where:

χ^2 = Chi-square value

O = Observed frequency

E = Expected frequency

The decision rule for hypothesis testing was as follows:

Result and Discussion

Out of the 384 questionnaires distributed, 360 questionnaires were properly completed and returned, while 24 questionnaires were not returned or were incorrectly filled. This gave a response rate of 93.75%, which was considered adequate for the analysis of the study.

Data Presentation

Table 4.1: Questionnaire Distribution and Retrieval

Description	Frequency	Percentage
Questionnaires Distributed	384	100%
Questionnaires Returned	360	93.75%
Questionnaires Not Returned	24	6.25%
Total	384	100%

Source: Field survey, 2025

The 360 returned questionnaires formed the basis for the analysis of this study.

Demographic Characteristics of Respondents

Table 4.2: Gender Distribution of Respondents

Gender	Frequency	Percentage
Male	198	55%
Female	162	45%
Total	360	100%

Source: Field survey, 2025

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

The table above showed that 55% of the respondents were male, while 45% were female. This indicated that both genders were adequately represented in the study.

Table 4.3: Professional Category of Respondents

Category	Frequency	Percentage
Medical Doctors	78	21.7%
Nurses	132	36.7%
Laboratory Scientists	64	17.8%
Hospital Administrators	46	12.8%
Other Health Workers	40	11.0%
Total	360	100%

Source: Field survey, 2025

The table showed that nurses constituted the largest proportion of respondents (36.7%), followed by medical doctors (21.7%), laboratory scientists (17.8%), hospital administrators (12.8%), and other health workers (11.0%).

Research Question 1: To what extent has healthcare infrastructure reform improved the availability of medical equipment in healthcare facilities in Niger-Delta, Nigeria?

Table 4.4: Healthcare Infrastructure Reform and Availability of Medical Equipment

Response	Frequency	Percentage
Strongly Agree	140	38.9%
Agree	128	35.6%
Neutral	34	9.4%
Disagree	38	10.6%
Strongly Disagree	20	5.5%
Total	360	100%

Source: Field survey, 2025

The table showed that 74.5% of respondents agreed that healthcare infrastructure reforms had improved the availability of medical equipment in healthcare facilities, while 16.1% disagreed and 9.4% remained neutral. This indicated that healthcare infrastructure reforms had contributed positively to improving the availability of medical equipment in healthcare institutions.

Research Question 2: What impact has healthcare infrastructure reform had on the development and functionality of healthcare facilities in Niger-Delta, Nigeria?

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

Table 4.5: Healthcare Infrastructure Reform and Healthcare Facility Development

Response	Frequency	Percentage
Strongly Agree	150	41.7%
Agree	120	33.3%
Neutral	32	8.9%
Disagree	36	10.0%
Strongly Disagree	22	6.1%
Total	360	100%

Source: Field survey, 2025

The results indicated that 75% of respondents agreed that healthcare infrastructure reforms had improved the development and functionality of healthcare facilities, while 16.1% disagreed and 8.9% were neutral. This suggested that infrastructure reforms had contributed to improving healthcare facilities in the region.

Data Analysis

Hypothesis One: H_{01}: Healthcare infrastructure reform had no significant impact on the availability of medical equipment in healthcare facilities in Niger-Delta, Nigeria.

Table 4.6: Chi-Square Test for Hypothesis One

Response	Observed (O)	Expected (E)	$(O-E)^2/E$
Strongly Agree	140	72	64.22
Agree	128	72	43.56
Neutral	34	72	20.06
Disagree	38	72	16.06
Strongly Disagree	20	72	37.56
Total χ^2			181.46

Source: Field survey, 2025

Degree of freedom = 4

Level of significance = 0.05

Critical value = 9.49

Since the calculated Chi-square value (181.46) was greater than the critical value (9.49), the null hypothesis was rejected. This indicated that healthcare infrastructure reform had a significant impact on the availability of medical equipment in healthcare facilities.

Hypothesis Two

H_{02}: Healthcare infrastructure reform had no significant impact on the development and functionality of healthcare facilities in Niger-Delta, Nigeria.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

Table 4.7: Chi-Square Test for Hypothesis Two

Response	Observed (O)	Expected (E)	$(O-E)^2/E$
Strongly Agree	150	72	84.50
Agree	120	72	32.00
Neutral	32	72	22.22
Disagree	36	72	18.00
Strongly Disagree	22	72	34.72
Total χ^2			191.44

Source: Field survey, 2025

Degree of freedom = 4 Level of significance = 0.05. Critical value = 9.49. Since the calculated Chi-square value (191.44) was greater than the critical value (9.49), the null hypothesis was rejected. This meant that healthcare infrastructure reform had a significant impact on the development and functionality of healthcare facilities in Niger-Delta, Nigeria.

Discussion of Findings

Healthcare Infrastructure Reform and Availability of Medical Equipment

The first objective of the study was to examine the extent to which healthcare infrastructure reform improved the availability of medical equipment in healthcare facilities in the In Niger-Delta, Nigeria of Nigeria. The findings from the data analysis revealed that healthcare infrastructure reform had significantly improved the availability of medical equipment in healthcare institutions. A large proportion of the respondents agreed that healthcare reforms had resulted in the procurement of modern diagnostic equipment and improvement in the functionality of existing medical equipment within healthcare facilities.

The hypothesis testing using the Chi-square statistical method further confirmed that healthcare infrastructure reform had a statistically significant impact on the availability of medical equipment in healthcare facilities. This indicated that government efforts and policy initiatives aimed at strengthening healthcare infrastructure had contributed positively to improving healthcare service delivery.

This finding was consistent with the study conducted by Aregbeshola and Khan (2018), which reported that increased investment in healthcare infrastructure significantly improves healthcare system performance. Similarly, Abubakar and Bello (2020) found that the availability of modern medical equipment enhances the capacity of healthcare professionals to diagnose and treat medical conditions effectively. The result also aligned with reports from the World Health Organization (2021), which emphasized that access to essential medical technologies is an important component of a strong healthcare system.

Healthcare Infrastructure Reform and Development of Healthcare Facilities

The second objective of the study was to assess the impact of healthcare infrastructure reform on the development and functionality of healthcare facilities in the Niger-Delta geopolitical zone. The

findings indicated that healthcare infrastructure reforms had positively influenced the development and functionality of healthcare facilities across the region. Many respondents acknowledged that several healthcare institutions had undergone renovation, expansion, and infrastructural improvements as a result of reform initiatives.

The Chi-square hypothesis testing also confirmed that healthcare infrastructure reform had a significant effect on the development and functionality of healthcare facilities in the region.
This finding supported the argument of Oladipo and Adeyemi (2020), who observed that healthcare institutions with modern infrastructure and well-equipped facilities are better positioned to provide quality healthcare services. The study also corroborated the findings of Adamu and Ojo (2021), who reported that improved healthcare infrastructure contributes significantly to improved healthcare service delivery. Furthermore, the findings were consistent with the principles of the Health Systems Theory, which emphasizes that strong healthcare infrastructure is essential for effective healthcare service delivery.

Persistent Challenges Affecting Healthcare Infrastructure Development
Despite the positive impacts observed, the study also revealed that several challenges continued to affect healthcare infrastructure development in the In Niger-Delta, Nigeria of Nigeria. Some respondents indicated that inadequate funding, poor equipment maintenance, and uneven distribution of healthcare infrastructure remained significant problems within the healthcare system.

These findings were consistent with the observations of Eze and Okechukwu (2019), who noted that weak maintenance culture and inadequate funding continue to hinder the sustainability of healthcare infrastructure improvements in Nigeria. The study therefore suggested that while healthcare infrastructure reforms had contributed to improving healthcare facilities and medical equipment availability, there was still a need for stronger policy implementation and improved healthcare management systems. Overall, the findings of the study demonstrated that healthcare infrastructure reform plays a crucial role in strengthening healthcare delivery systems and improving healthcare outcomes in Nigeria.

Conclusion
Based on the findings of the study, it was concluded that healthcare infrastructure reform plays a critical role in improving the provision of medical equipment and the development of healthcare facilities in Niger-Delta, Nigeria. The study established that investments in healthcare infrastructure, including facility renovation and procurement of modern medical equipment, significantly enhance healthcare service delivery. Well-equipped healthcare facilities enable healthcare professionals to perform accurate diagnoses, deliver effective treatments,

and improve overall patient outcomes. However, the study also highlighted that healthcare infrastructure reforms must be accompanied by effective policy implementation, sustainable funding mechanisms, and proper equipment maintenance systems in order to achieve long-term improvements in healthcare delivery. Therefore, strengthening healthcare infrastructure remains an essential strategy for improving healthcare access, efficiency, and quality of medical services in Nigeria.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Increased Government Investment in Healthcare Infrastructure

The government of Nigeria should increase budgetary allocation to the health sector to ensure adequate funding for the construction, renovation, and maintenance of healthcare facilities across the In Niger-Delta, Nigeria.

2. Provision of Modern Medical Equipment

Healthcare institutions should be equipped with modern diagnostic and treatment equipment to enhance the quality of healthcare services provided to patients. Strengthening Equipment Maintenance Systems Healthcare facilities should establish effective maintenance units responsible for the regular servicing and repair of medical equipment to ensure continuous functionality.

Contribution to Knowledge

This study contributed to existing knowledge by providing empirical evidence on the relationship between healthcare infrastructure reform and the provision of medical equipment and healthcare facilities in Niger-Delta, Nigeria. The study also highlighted the importance of infrastructure reforms in strengthening healthcare systems and improving healthcare service delivery in developing countries. Additionally, the research filled an existing gap in the literature by focusing specifically on the Niger-Delta geopolitical zone, which had received limited attention in previous studies on healthcare infrastructure reforms in Nigeria.

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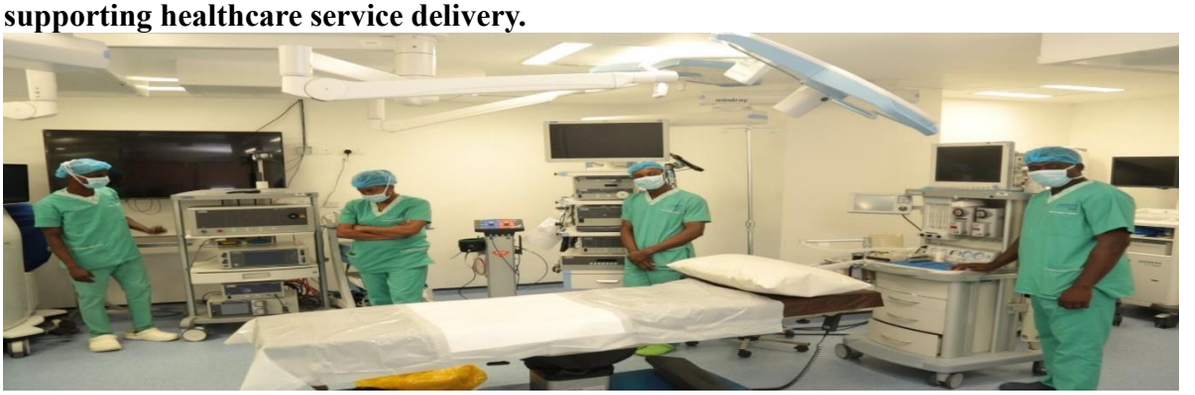
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APPENDICES

Fig. 5.1: Provision of medical equipment and improved healthcare infrastructure supporting healthcare service delivery.



Source: Adapted from World Health Organization Global Health Infrastructure Report (2021).

Fig. 5.2: Improved healthcare infrastructure and medical equipment supporting healthcare delivery in Nigerian hospitals.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
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Source: Adapted from World Health Organization Health System Strengthening Report (2024).

Fig. 5.3: Provision of medical equipment and improved healthcare infrastructure supporting healthcare service delivery.



Source: Adapted from World Health Organization Health System Strengthening Report (2024).