MEDIKKA

JOURNAL OF THE UNIVERSITY OF NIGERIA MEDICAL STUDENTS

2026 EDITION

ADVANCING PREVENTIVE AND COMMUNITY HEALTH IN RESOURCE-LIMITED SETTING:

Bridging Knowledge, Practice and Policy

INSIDE:

- Closing Knowledge-Practice Gaps in Preventive Health
- Digital Health Innovations in Low-Resource Communities
- Policy Reforms for Stronger Primary Awareness as Strategies for bridging the knowledge Gap.
- Advancing Preventive and Community Health: An Interview with a Leading Voice in West African Research

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Bridging Knowledge, Practice and Policy

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The following categories of manuscripts are accepted for publication:
Research articles: Original research concerning any aspect (e.g. aetiopathogenesis, epidemiology, diagnosis, management and prevention) of disease. Animal research contributions of relevance to human health are also welcome.
Review articles including meta-analysis: Detailed systematic and critical evaluation of the literature on a specified clinical problem. Reviews should include information such as type of studies and the selection process.
Short communication and case reports: These may be unique case reports, clinical experiences and short reports of origin research.
All articles are subjected to peer-review by the MEDIKKA board of editorial consultants.

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- Title of Article/Paper
- Name, Address, Qualifications and Departmental/Institutional Affiliation of the Author (s)
- References using Vancouver style
- Tables and illustrations
- Key words for indexing (three to six)
- Original and research articles should contain an abstract of 150-200 words.

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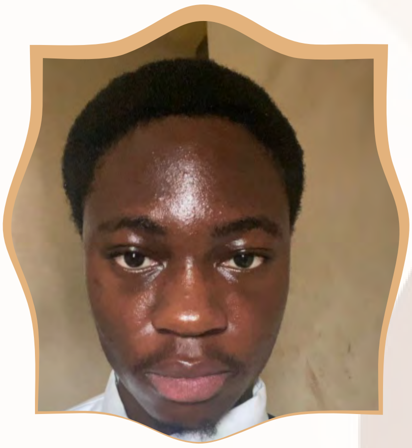

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NOTE FROM THE EDITOR-IN-CHIEF

In October 2025, the "Red Letter"issued by the Coordinating Minister of Health, Muhammad Ali Pate, served as a national call to action, emphasizing stronger primary healthcare, improved funding, and accountability. It underscored a truth we have ignored for so long: meaningful health outcomes in Nigeria will be driven by prevention and community-based care. This edition aligns with that urgency, seeking to bridge knowledge, practice, and policy in ways that are practical and impactful.

In practice, every outreach I have attended as a medical student has pointed to the same gap at the level of prevention and community care. Conditions that should be prevented or detected early still present late, majorly, for gaps in structure and execution. This is where our system is failing and where the work must begin.

We are deeply grateful to Dr. Chukwuani Francis for his mentorship and support during the final review ofthis edition. His commitment to maintaining high standards has been invaluable.

My sincere appreciation to our research supervisor and editorial advisors, Prof. Madu Anoneze, and Prof. Samuel Uwazeuoke, for their guidance and indispensable contributions. Their expertise and support have significantly strengthened the quality of our work and our pursuit of excellence in research.

To the President of the University of Nigeria Medical Students Association, Abraham Chukwuka Theophilus, thank you for the opportunity, and to the previous Editor-in-Chief, Dr. Grace Kaluokoro, for your guidance.

I also want to acknowledge the editorial board who went through hell and back to make this happen. Thank you for your tireless efforts and dedication; your commitment has been pivotal in bringing this edition to life.

We hope that this edition informs, challenges, and drives action toward stronger prevention and community health.

Okike Christian Chinemerem
Editor-in-Chief, Medikka 2026 Edition

NOTE FROM THE PRESIDENT

As medical students and professionals, true learning is not just about gaining knowledge; it is about finding the power to protect and improve the lives of those in our communities.

It is a great honor to welcome you to this new edition of MEDIKKA. For more than 40 years, our journal has been a leading voice for medical research within the University of Nigeria Medical Students' Association (UNMSA). This edition continues that proud tradition by focusing on one of our most important challenges.

The theme for this year, "Advancing Preventive and Community Health in Resource Limited Settings: Bridging Knowledge, Practice and Policy," is very important. Today, healthcare systems everywhere are struggling. Because of this, we must move from just treating sickness to preventing it before it starts. In places where money and supplies are limited, preventive medicine is the best way to save lives.

This edition acts as a bridge. We want to take the knowledge from our classrooms and apply it to real practice in our local areas. This helps us create better policies that improve health for everyone. Whether it is stopping the spread of infections or managing long term illnesses through community work, the research here shows how we can succeed even with limited resources.

I want to thank the Editorial Board and our Editor in Chief for their hard work. I also thank the students, doctors, and researchers.

As you read these pages, I hope you see them as a guide for action. Let us be the healthcare providers who go beyond the hospital and work directly with the people. Everyone deserves good health, no matter where they live or what resources they have.

Thank you for supporting MEDIKKA. Together, let us work to make our communities healthier.

Abraham Chukwuka Theophilus
President, University of Nigeria Medical Students' Association (2025/2026)

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ASSESSMENT OF KNOWLEDGE, ATTITUDE, AND PRACTICES REGARDING SICKLE CELL DISEASE AMONG SECONDARY SCHOOL STUDENTS IN ENUGU SOUTH LGA, ENUGU STATE

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ABSTRACT

INTRODUCTION: Sickle cell disease is a group of inherited blood disorders with a high burden in sub Saharan Africa with Nigeria contributing a significant proportion. It is of significant public health concern. Despite the prevalence of the disease, there's still a poor understanding and awareness of this disease.

Taking into account that secondary school students are still at a critical stage, assessing their knowledge, attitude and practices regarding sickle cell disease will play a pivotal role in planning for effective control and preventive strategies.

AIM: To assess the knowledge, Attitudes and Practice of secondary school students towards Sickle cell disease in Enugu South LGA, Enugu State.

METHODS: A descriptive cross-sectional study was carried out among Secondary School Students in Enugu South. A random sampling technique was used to recruit a minimum of 234 participants. The survey instrument was a self administered questionnaire as the primary data collection tool. Data obtained was transferred and stored in an excel sheet and published. Data was analyzed using python with the level of statistical significance will be set at P less than 0.05.

RESULTS: A total of 234 students participated in the study. Most respondents were aged 15–18 years (84.6%), and females slightly outnumbered males (53.3% vs 46.7%). More than half attended private schools (57.3%), and the majority were Christians (93.2%). Parental education was generally high, with most mothers (70.4%) and fathers (55.7%) having tertiary education.

Awareness of sickle cell disease was high (87.6%), with schools being the most common source of information (44.4%). Knowledge levels were mixed: while most respondents correctly identified SCD as a genetic condition (82.5%) and recognized genotype testing as preventive (90.6%), only 15.4% knew it affects red blood cells, and 33.3% correctly identified its symptoms. Understanding of complications and crisis triggers was also limited. However, knowledge of inheritance patterns, diagnosis through blood tests, and genotype compatibility for marriage was relatively good.

CONCLUSION: Although awareness of sickle cell disease among secondary school students was high, significant gaps in knowledge persist, particularly regarding disease mechanism, symptoms, and crisis triggers. Strengthening school-based health education and awareness programs is recommended to improve comprehensive understanding and promote preventive practices.

INTRODUCTION Sickle cell disease (SCD), caused by a point mutation in the β-globin gene, is a class of inherited hemoglobinopathy resulting in the substitution of valine for glutamic acid and the production of hemoglobin S. This mutation causes red blood cells to sickle under hypoxic conditions, leading to chronic hemolysis, vaso-occlusion, and multi-organ damage. Clinically, SCD is associated with recurrent pain crises, anemia, stroke, and reduced life expectancy [1].

SCD remains the predominant single-gene disorder worldwide and is linked with high rates of illness and death, especially in low- and middle-income nations [2]. The global burden of SCD is increasing, with millions living with the disease and hundreds of thousands of infants born with it each year. Sub-Saharan Africa accounts for about 75–80% of global cases, indicating an overwhelming disease burden in the region [3]. Recent estimates indicate that over 300,000 infants are born annually with SCD, with the majority of cases occurring in sub-Saharan Africa {4,5}

The highest burden is in Nigeria, with an estimated 2–3% prevalence of SCD and 20–25% of its population carrying the sickle cell trait. A recent systematic review and meta-analysis revealed a pooled prevalence of 4.0% and 21.0% for SCD and sickle cell trait, respectively, among Nigerian children and adolescents, highlighting the extent of the public health concern [6].

Advances in early diagnosis and comprehensive care have improved survival in high-income settings; however, these gains have not been equally realized in resource-limited environments. In many African countries, including Nigeria, late diagnosis and limited access to preventive services continue to contribute to high morbidity and mortality [7]. Given that SCD is inherited in an autosomal recessive pattern, preventive strategies, particularly genotype screening and genetic counseling, remain central to reducing disease incidence. Adolescents represent a key population for such interventions, as they are approaching reproductive age and decisions [8].

In spite of this, knowledge and understanding of SCD remain inadequate in many populations. Research has invariably demonstrated a difference between awareness and accurate knowledge of the disease. For example, a high level of awareness (92.5%) was reported among Nigerian undergraduates, but only 37.5% had good knowledge of SCD [9]. In addition, in adolescents from Southeast Nigeria, although a majority were aware of their genotype, only a few had sufficient knowledge of transmission and implications of the disease [10].

Adolescents are an important target group in SCD prevention, since knowledge of one's own genotype status and mode of inheritance has a direct bearing on reproductive decisions. Education and awareness from an early age can likely have a substantial impact on the prevalence of SCD by leading to informed partner choice and the utilisation of premarital screening. Efforts to promote effective prevention among young people have been hampered by continuing misconceptions and socio-cultural beliefs, as well as knowledge gaps [11].

These knowledge gaps are often accompanied by misconceptions that may influence attitudes and behaviors, including stigma toward affected individuals and low uptake of genotype screening. Inadequate understanding of SCD among adolescents is particularly concerning, as this group is increasingly involved in social relationships that may eventually lead to marriage, where uninformed decisions can contribute to continued transmission of the disease [12].

Furthermore, existing studies have reported variability in attitudes toward individuals living with SCD, as well as inconsistent engagement in preventive practices such as premarital genotype testing [12]. These patterns suggest that knowledge alone may not be sufficient and that attitudes and practices must also be examined to provide a comprehensive understanding of the issue [9].

While several studies have investigated knowledge and awareness of SCD in Nigeria, context-specific evidence focusing on secondary school students is limited in Enugu South Local Government Area. The lack of such localized information hinders the development of targeted, culturally appropriate interventions aimed at improving knowledge, shaping positive attitudes, and promoting preventive practices among this population.

Aim of the Study

This study aims to assess the knowledge, attitudes, and practices regarding sickle cell disease among secondary school students in Enugu South Local Government Area, Enugu State, Nigeria.

Specific objectives

To assess the level of knowledge of sickle cell disease among secondary school students

To evaluate the attitudes of students toward individuals living with sickle cell disease

To examine the practices of students regarding sickle cell disease, including genotype testing To determine factors associated with good knowledge and positive attitudes toward sickle cell disease

Research questions

What proportion of secondary school students has adequate knowledge of sickle cell disease?
What are the attitudes of students toward individuals living with sickle cell disease?
What preventive practices related to sickle cell disease are adopted by students?

Materials and Methods

Study design

This study employed a descriptive cross-sectional design to assess knowledge, attitudes, and practices regarding sickle cell disease among secondary school students at a single point in time. The study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for reporting observational studies [13].

Study setting

The study was conducted in Enugu South Local Government Area, Enugu State, Nigeria. The area consists of urban and semi-urban communities with a mix of public and private secondary schools. The population is predominantly Igbo, with English and Igbo as the major languages of communication.

Study Population

The study population comprised senior secondary school students (SS1–SS3) enrolled in selected secondary schools within the study area

Inclusion Criteria

Registered SS1–SS3 students in selected schools
Present during data collection
Provided informed consent (and parental/guardian consent where applicable)

Exclusion Criteria

Junior secondary school students
Students absent during data collection
Students who declined participation

3.4 Sample Size Determination

Sample size was determined using Cochran's formula for cross-sectional studies:

$n = (Z^2 \times P \times (1 - P)) / d^2$

Where: $Z = 1.96$ $P = 0.788$ $d = 0.05$ After adjustment for non-response, the minimum sample size was 286 participants.

Sampling Technique

A multistage sampling method was used:

Secondary schools were listed and stratified by ownership (public/private).
Schools were selected using simple random sampling.
Students were stratified by class (SS1–SS3).
Participants were selected using simple random sampling within each stratum.

Study Variables

Outcome variables

Knowledge of sickle cell disease (good/poor) .
Attitude toward sickle cell disease (positive/negative)
Practices regarding sickle cell disease (appropriate/inappropriate)

Independent variables

Age
Sex
Class level
Type of school
Parental educational level
Other socio-demographic characteristics

Data Collection Instrument

Data were collected using a structured, self-administered questionnaire comprising four sections: socio-demographic characteristics, knowledge, attitude, and practices.

Content validity was ensured through expert review by specialists in public health and hematology. The instrument was pre-tested in a comparable population to ensure clarity and consistency.

Data Collection Procedure

Approval was obtained from school authorities before data collection. Eligible students were briefed on the study objectives and procedures. Questionnaires were distributed and completed during school hours under supervision to ensure completeness and reduce response bias.

Data Measurement and Scoring

Knowledge responses were scored as correct or incorrect, with total scores categorized into good and poor knowledge based on a predefined cut-off.

Attitude was assessed using a 5-point Likert scale ranging from strongly disagree to strongly agree. Composite scores were computed and classified as positive or negative attitudes.

Practices were similarly assessed using structured responses and categorized into appropriate or inappropriate practices based on total scores.

Data Analysis

Data were analyzed using Python.

Descriptive statistics such as frequencies, proportions, and means were used to summarize variables.

Associations between categorical variables were assessed using Chi-square tests. Statistical significance was set at $p < 0.05$.

Control of Bias

Selection bias was minimized through random sampling techniques. Information bias was reduced using a standardized questionnaire and supervised administration. Consistency in data collection procedures was maintained across all selected schools.

Ethical Considerations

The research protocol was designed in accordance with guidelines for biomedical researchers involving Human Subjects and the ethical standards of the Declaration of Helsinki (14). Approval was obtained from the ethics committee of UNTH for this study. Written informed consent was obtained from participants (and guardians where applicable). Participation was voluntary, and confidentiality and anonymity were strictly maintained.

To determine factors associated with good knowledge and positive attitudes toward sickle cell disease

RESULTS

SOCIO DEMOGRAPHIC

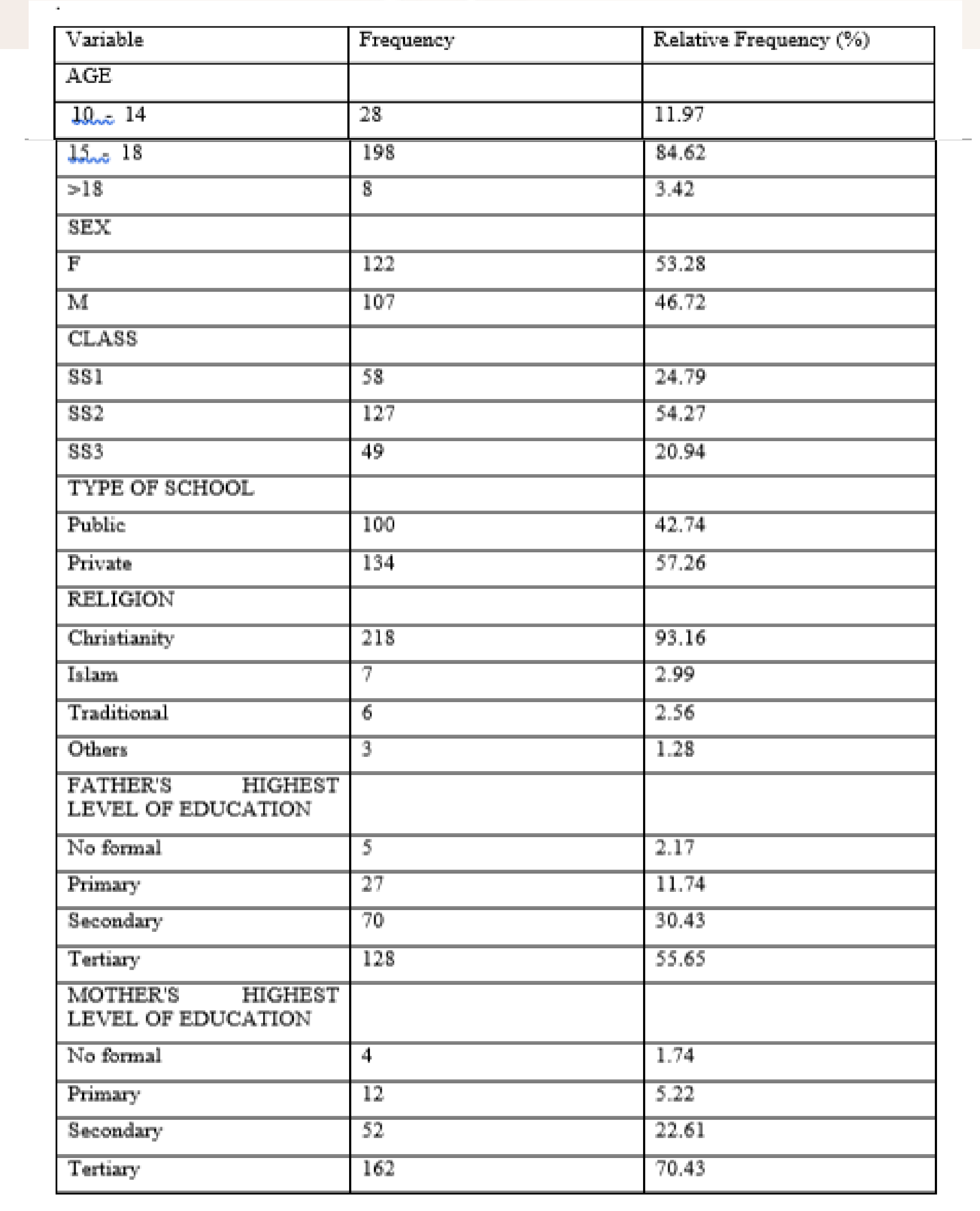
A total of 234 secondary school students participated in the study. The majority of respondents were aged 15–18 years (198, 84.6%), while 28 (11.97%) were aged 10–14 years and 8 (3.4%) were above 18 years. There were slightly more females (122, 53.3%) than males (107, 46.7%).

Most respondents were in SS2 (127, 54.3%), followed by SS1 (58, 24.8%) and SS3 (49, 20.9%). A higher proportion of participants attended private schools (134, 57.3%) compared to public schools (100, 42.7%)

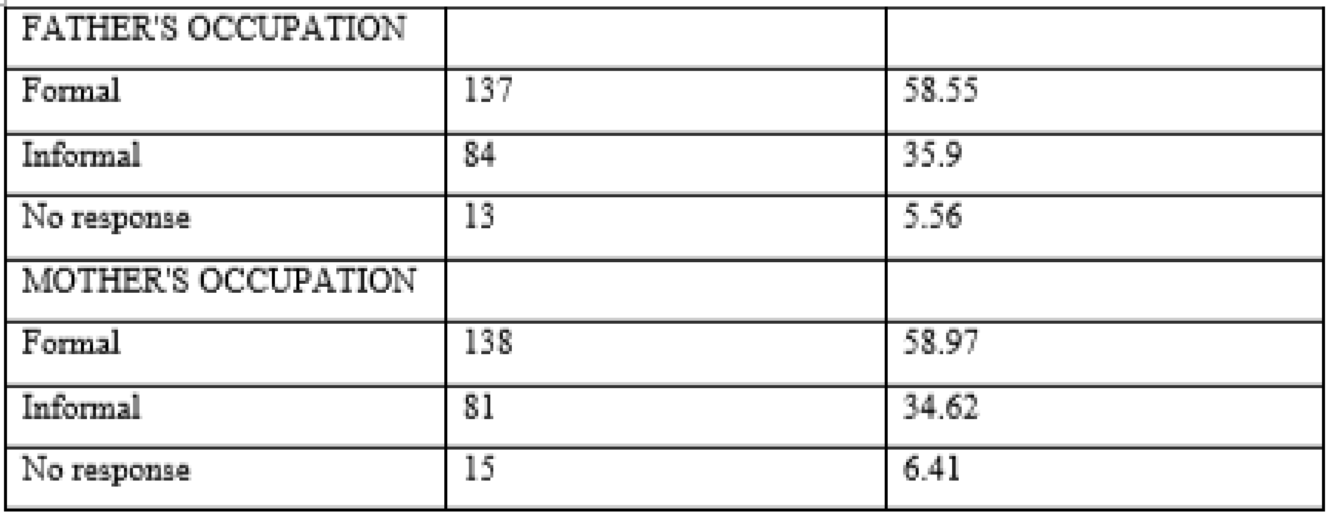
The majority of respondents were Christians (218, 93.2%), while 7 (3.0%) were Muslims, 6 (2.6%) practiced traditional religion, and 3 (1.3%) belonged to other religions

Regarding parental education, most fathers had tertiary education (128, 55.7%), followed by secondary (70, 30.4%), primary (27, 11.7%), and no formal education (5, 2.2%). Similarly, most mothers had tertiary education (162, 70.4%), followed by secondary (52, 22.6%), primary (12, 5.2%), and no formal education (4, 1.7%).

For occupation, 137 fathers (58.6%) and 138 mothers (59.0%) were engaged in formal employment, while 84 fathers (35.9%) and 81 mothers (34.6%) were in informal employment. A small proportion did not respond.



Variable	Frequency	Relative Frequency (%)
AGE		
10 - 14	28	11.97
15 - 18	198	84.62
>18	8	3.42
SEX		
F	122	53.28
M	107	46.72
CLASS		
SS1	58	24.79
SS2	127	54.27
SS3	49	20.94
TYPE OF SCHOOL		
Public	100	42.74
Private	134	57.26
RELIGION		
Christianity	218	93.16
Islam	7	2.99
Traditional	6	2.56
Others	3	1.28
FATHER'S HIGHEST LEVEL OF EDUCATION		
No formal	5	2.17
Primary	27	11.74
Secondary	70	30.43
Tertiary	128	55.65
MOTHER'S HIGHEST LEVEL OF EDUCATION		
No formal	4	1.74
Primary	12	5.22
Secondary	52	22.61
Tertiary	162	70.43

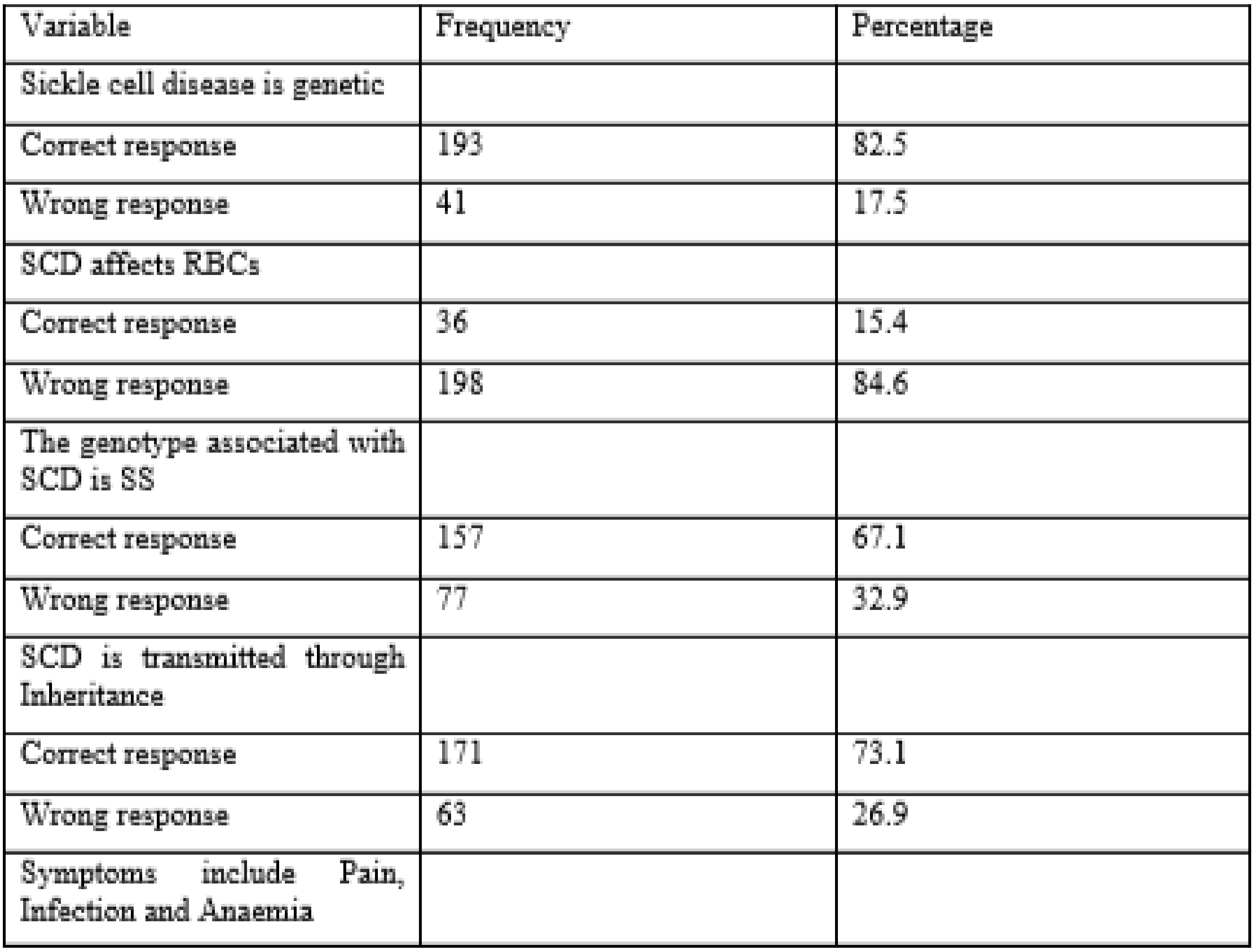


FATHER'S OCCUPATION		
Formal	137	58.55
Informal	84	35.9
No response	13	5.56
MOTHER'S OCCUPATION		
Formal	138	58.97
Informal	81	34.62
No response	15	6.41

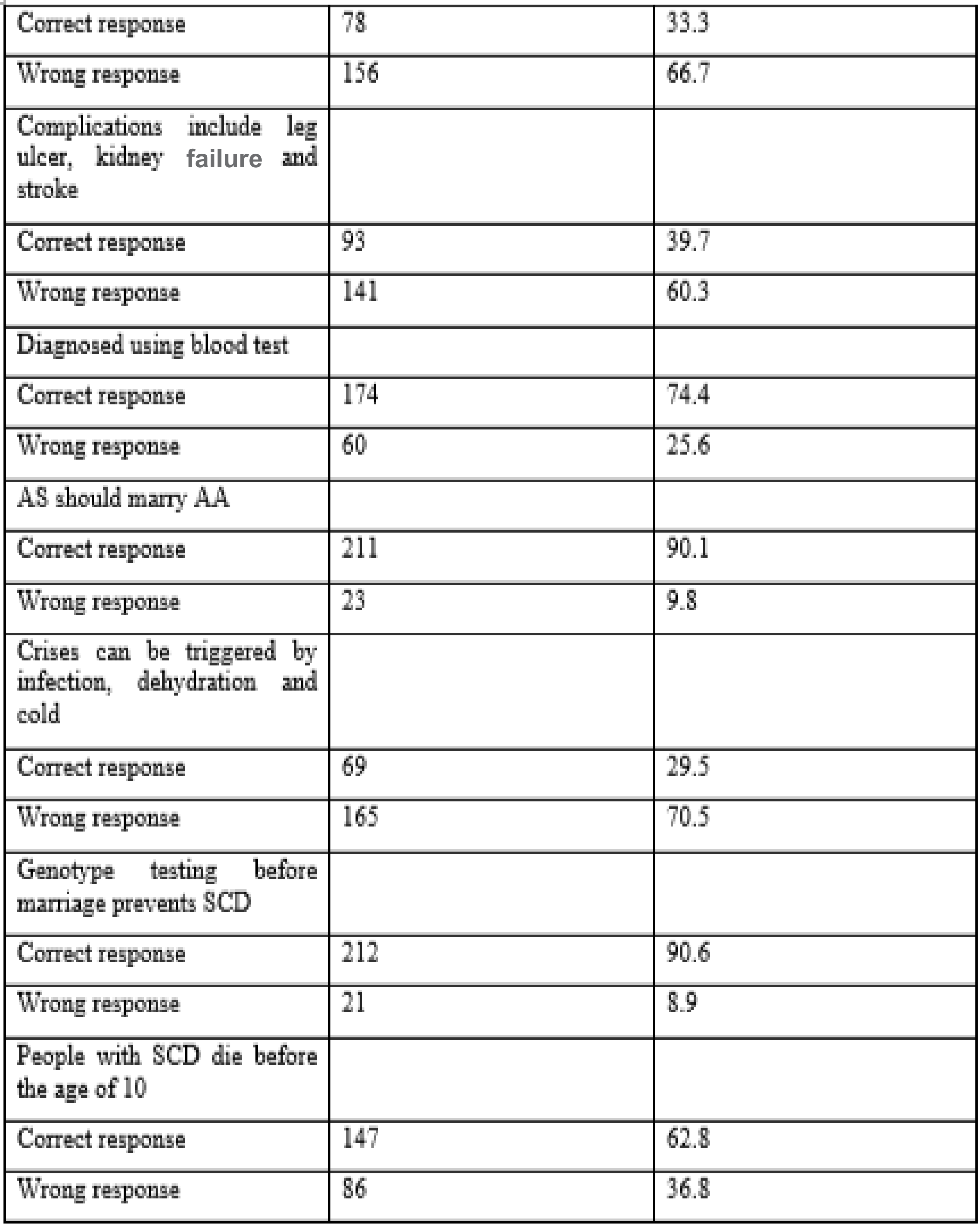
TABLE 1:

KNOWLEDGE:

The study revealed varying understanding across the different domains.



Variable	Frequency	Percentage
Sickle cell disease is genetic		
Correct response	193	82.5
Wrong response	41	17.5
SCD affects RBCs		
Correct response	36	15.4
Wrong response	198	84.6
The genotype associated with SCD is SS		
Correct response	157	67.1
Wrong response	77	32.9
SCD is transmitted through Inheritance		
Correct response	171	73.1
Wrong response	63	26.9
Symptoms include Pain, Infection and Anaemia		



Correct response	78	33.3
Wrong response	156	66.7
Complications include leg ulcer, kidney failure and stroke		
Correct response	93	39.7
Wrong response	141	60.3
Diagnosed using blood test		
Correct response	174	74.4
Wrong response	60	25.6
AS should marry AA		
Correct response	211	90.1
Wrong response	23	9.8
Crises can be triggered by infection, dehydration and cold		
Correct response	69	29.5
Wrong response	165	70.5
Genotype testing before marriage prevents SCD		
Correct response	212	90.6
Wrong response	21	8.9
People with SCD die before the age of 10		
Correct response	147	62.8
Wrong response	86	36.8

A total of 193 respondents (82.5%) correctly recognised sickle cell disease as a genetic condition, while 41 (17.5%) did not. Only 36 (15.4%) correctly identified that the disease affects red blood cells, whereas 198 (84.6%) gave incorrect responses.

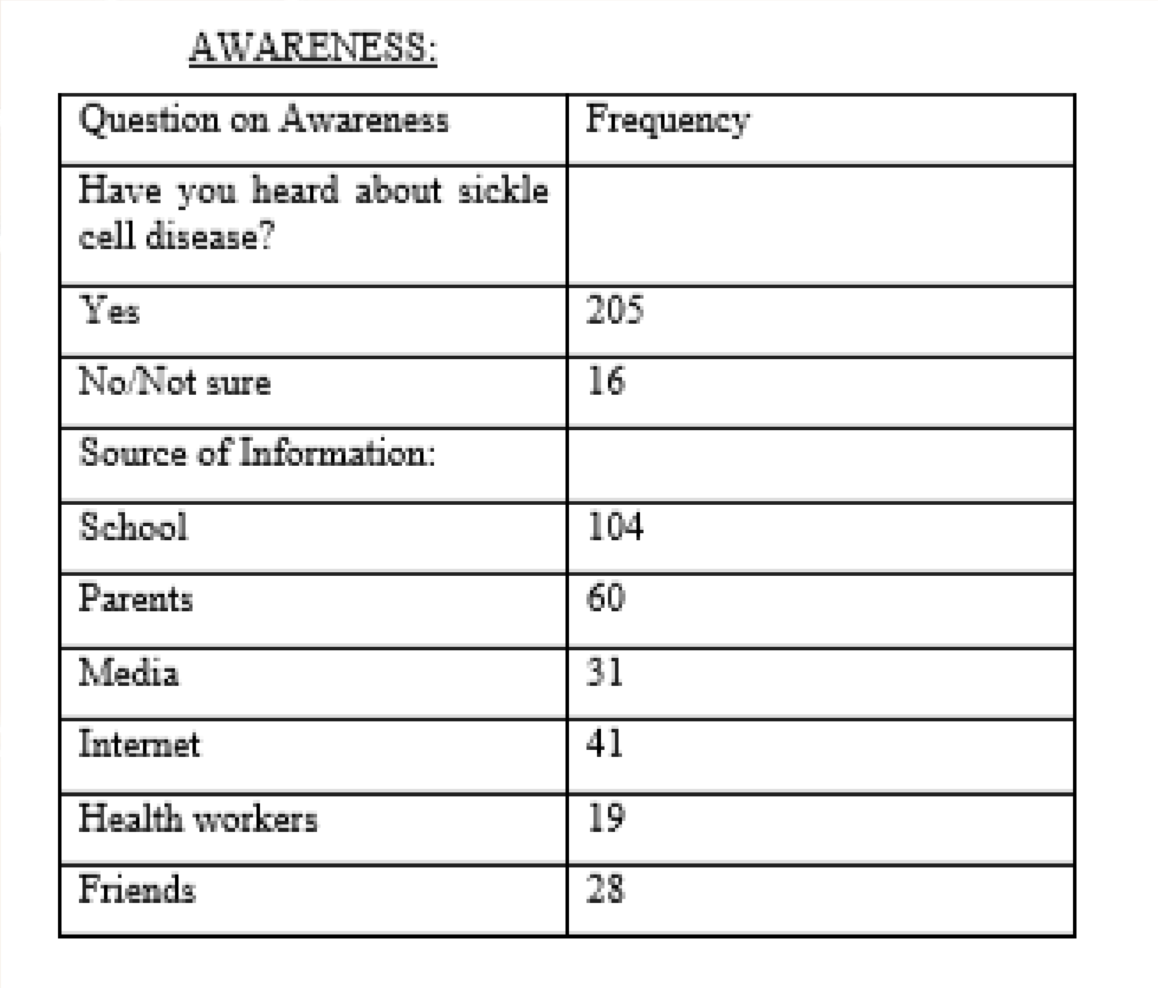
One hundred and fifty-seven students (67.1%) correctly stated that SS is the genotype associated with sickle cell disease, while 77 (32.9%) were incorrect. Similarly, 171 (73.1%) knew that the disease is inherited, while 63 (26.9%) did not.

For symptoms, only 78 (33.3%) correctly identified pain, infections, and anaemia, while 156 (66.7%) were wrong. Regarding complications such as leg ulcer, kidney failure, and stroke, 93 (39.7%) answered correctly, while 141 (60.3%) did not.

Most respondents, 174 (74.4%), correctly identified blood test as the method of diagnosis, while 60 (25.6%) did not. A large majority (211, 90.1%) correctly indicated that individuals with AS genotype should marry AA, while 23 (9.9%) did not.

Only 69 (29.5%) correctly identified triggers of crisis such as infection, dehydration, and cold, while 165 (70.5%) were incorrect. Genotype testing before marriage as a preventive measure was correctly identified by 212 (90.6%) respondents, while 21 (8.9%) were wrong.

Finally, 147 respondents (62.8%) correctly stated that people with sickle cell disease may die early, while 86 (36.8%) did not agree.



AWARENESS:

Question on Awareness	Frequency
Have you heard about sickle cell disease?	
Yes	205
No/Not sure	16
Source of Information:	
School	104
Parents	60
Media	31
Internet	41
Health workers	19
Friends	28

Out of 234 respondents, 205 (87.6%) reported that they had heard of sickle cell disease, while 16 (6.8%) had not or were unsure.

The sources of information included school (104, 44.4%), parents (60, 25.6%), internet (41, 17.5%), media (31, 13.2%), friends (28, 12.0%), and health workers (19, 8.1%).

genetic concepts are relatively well understood among respondents

Knowledge was mixed: while understanding of genetic transmission, genotype association, and preventive practices was relatively good, significant gaps existed in understanding of clinical manifestations, triggers of crises, and disease complications. Preventive knowledge and attitudes toward genotype testing before marriage were strongly positive.

However, misconceptions and stigmatizing beliefs persisted in certain domains, particularly regarding social interaction and disease prognosis.

However, the poor knowledge of clinical features, triggers of crises, and complications suggests a gap between theoretical awareness and applied biomedical understanding. This disconnect may limit students' ability to recognize disease severity or engage in informed decision-making in real-life contexts. The misconception that individuals with SCD commonly die before age 10 reflects outdated or inaccurate perceptions, despite advances in management that have significantly improved life expectancy [16].

The findings are broadly consistent with studies conducted among adolescents in sub-Saharan Africa, where awareness of SCD is generally high but detailed biomedical knowledge remains limited. Similar patterns have been reported in Nigerian secondary school populations, where students demonstrate good awareness of inheritance patterns but poor understanding of symptoms and complications [17,18].

Despite the good knowledge surrounding its mode of inheritance, majority of the respondents from our study (74%) could highlight that sickle cell was diagnosed using

blood test which is a sharp contrast with the study carried out in Jos metropolis (12) which revealed that gap in diagnostic knowledge.

Also seen, from the study above, our respondents had a significant gap in knowledge concerning the cellular component which is primarily affected by sickle cell disease with 84% of them indicating WBC and platelet as the affected cell. This is a contrast with what we've seen in Jos metropolis (12).

Our findings show a significant association between the type of school attended and students' knowledge of sickle cell disease. This variation may be attributed to differences in the quality of education and the availability of learning resources and infrastructure across the different school settings.

Overall, our findings were consistent with a moderate knowledge base but significant gaps in pathophysiology of the disease process. Furthermore, 147 respondents incorrectly believed that individuals with SCD die before the age of 10, indicating the presence of a significant misconception regarding disease progress.

In Nigeria, prevalence of SCD is estimated to be 2-3% and the trait, 25% of the population. In our study, 88% of participants strongly agreed that's people living with SCD should not be discriminated against.

However, a good number expressed their discomfort sharing food with individuals living with sickle cell disease with a total of 59.1% agreeing to not share food and 25% sharing food. Also, 62.39% of the population indicated an inability to share clothes with people living with SCD, 25.21% could share their clothes; 12.39% being neutral.

Although participants expressed good general supportive attitudes, there still appears to be an underlying sense of fear or misconception, when it comes to close social interactions. This is evident in their unwillingness to share clothes, food and play with one them. This raises concerns about the true level of acceptance of individuals living with SCD.

However, persistent misconceptions and stigma mirror earlier reports indicating that social myths about SCD remain prevalent despite improved educational efforts [22].

The persistence of misconception leading to stigmatization in this study is consistent with earlier reports, which demonstrates that cultural belief and social myths about sickle cell disease are still prevalent. The high awareness seen in this study when compared to others may be due to improvements in health education across secondary schools.

Knowledge of one's genotype remains the single most effective method of preventing conception of fetuses with this disorder. Genotype testing can be therefore be considered a measure to reduce the prevalence of this gene disorder.

In our study, 68.8% of respondents reported knowing their genotype, while 31% either did not know or were uncertain. Although this level of awareness can be considered moderate, it still highlights the need for improved genotype knowledge among students. However, these findings differ from a study conducted in Surulere, which reported a lower proportion (37.2%) of students who were aware of their genotype. This may suggest suboptimal health-seeking behaviour among students.

Despite the proportion of students from our findings who were aware of their genotype, a large majority (92%) indicated that they would encourage others to check their genotype, while 85% also supported genotype compatibility among partners. This suggests that the level of awareness and knowledge they possess may have positively influenced their attitudes and beliefs toward genotype screening and compatibility.

About two-thirds (66.7%) of the students reported participation in sickle cell disease awareness programmes, and a slightly higher proportion (72.2%) indicated that they had shared information about the condition with others. This shows a reasonable level of involvement in health education activities among the respondents. It also suggests that exposure to awareness initiatives may have encouraged students to disseminate information within their communities. Overall, these findings point toward positive health-related practices and a willingness among students to support awareness on sickle cell disease.

Theoretical and Practical Implications

From a theoretical perspective, these findings support the Knowledge–Attitude–Practice (KAP) framework, which suggests that knowledge does not always translate directly into accurate beliefs or behaviors. While preventive knowledge was strong, gaps in clinical understanding and persistent stigma indicate incomplete cognitive integration of health information [23].

Practically, the results highlight the need for more comprehensive school-based health education programs that go beyond genetic inheritance to include clinical presentation, management, and lived experiences of individuals with SCD. Incorporating survivor testimonies and interactive learning may improve conceptual understanding and reduce stigma [24,25].

Additionally incorporating genotype counseling and screening initiatives can be useful to strengthen further preventive practice.

Strengths of the Study

A major strength of this study is the relatively large sample size and inclusion of students from both public and private schools, enhancing the generalizability within the study setting. The study also comprehensively assessed knowledge, attitudes, and practices, allowing for a multidimensional understanding of student perceptions regarding SCD.

Limitations

This study has some limitations. First, it relies on self-reported data, which may be subject to recall and social desirability bias. Second, its cross-sectional design limits the ability to infer causality between socio-demographic factors and knowledge or behavior. Additionally, the study did not assess depth of curriculum exposure, which may influence knowledge variability among schools. Finally, findings may not be generalizable beyond the study population.

The internal consistency of the attitude scale was modest (a= 0.54) and findings were interpreted descriptively. The scale was used to assess descriptively, the general attitudinal patterns towards sickle cell disease and results were interpreted accordingly.

Recommendations for Future Research

Future studies should explore the effectiveness of structured school-based interventions on improving SCD knowledge and reducing stigma. Longitudinal studies could assess how knowledge and attitudes evolve over time.

Additionally, qualitative research is recommended to better understand the origins of misconceptions and cultural influences on attitudes toward SCD.

Conclusion

In conclusion, this study demonstrates that while secondary school students show good awareness and generally positive preventive attitudes toward sickle cell disease, significant gaps remain in clinical knowledge and social perceptions. Strengthening health education curricula with a more holistic approach is essential to bridge these gaps, reduce stigma, and promote informed reproductive and health decisions among adolescents.

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ADVANCING COMMUNITY HEALTH IN RESOURCE-LIMITED SETTING- THE ROLE OF PORTABLE XRAY AND ULTRASOUND IN RURAL NIGERIA

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ABSTRACT

Background: Rural communities in Nigeria face a profound crisis regarding the uneven distribution of healthcare services. While urban centers often possess a high density of traditional radiological facilities, rural zones suffer from a lack of diagnostic imaging, unstable power grids, and a shortage of specialized personnel. This disparity leads to late disease detection, particularly for tuberculosis (TB) and obstetric complications. Despite challenges such as equipment costs, maintenance, and the need for technical training, portable imaging presents a manageable and scalable strategy for resource-limited settings in Nigeria.

Objective: This study evaluates the use of reviews the transformative potential of portable imaging technologies, specifically lightweight digital X-ray and hand-held point-of-care ultrasound (POCUS) to improve the community health outcome in rural settings.

Methods: This review utilized a structured literature synthesis approach, Focusing on peer-reviewed studies published between 2022 and 2026.

Data were retrieved from major medical databases including PubMed, Google Scholar, and PMC. The search criteria specifically targeted portable X-ray, handheld ultrasound, POCUS in Africa, and Nigerian rural health care.

Results: ultra-portable digital X-ray devices, when used with Computer-Aided Detection (CAD) software, achieve diagnostic accuracy comparable to human radiologists in screening for TB. These systems are user-friendly, durable, and suitable for use in low resource environments. Point of care ultrasound has Improved maternal outcomes significantly and also plays a fundamental role in assessment of trauma and chronic conditions. Significant challenges noted were continuous training of staff, the need for solar powered charging systems, and high initial costs.

Conclusion: Portable imaging techniques and equipment have proven to be practical and accessible tools, playing an important role in closing the diagnostic gap in Nigeria. Evidence shows that they have significantly improved maternal outcomes and enabled earlier detection of conditions like tuberculosis. Their wider adoption could enhance early disease detection, support more informed clinical decision-making, and ultimately strengthen primary healthcare systems.

Keywords: Portable Radiography, Point-of Care Ultrasound, Rural Healthcare, Diagnostic Imaging Access, Telemedicine Integration, Handheld Ultrasound in Africa.

Introduction

The Nigerian healthcare landscape is characterized by a stark divide between urban and rural settings. Approximately 60% of the population resides in rural areas where access to quality diagnostic services is often nonexistent or hidden behind prohibitive paywalls [1]. In these regions, morbidity and mortality rates for treatable conditions remain high due to delayed diagnosis. Diseases such as tuberculosis (TB), trauma, and chronic respiratory illnesses dominate the rural health profile but frequently go undetected because of a lack of foundational radiological services.

Traditional imaging modalities, such as fixed X-ray machines and bulky ultrasound consoles, require stable electricity, specialized housing, and on-site radiologists, and these requirements are what most rural primary health centers cannot afford [5]. Consequently, patients must travel long distances to urban centers, a journey often complicated by poor road infrastructure and financial constraints.

This delay is particularly lethal in obstetric emergencies or in the transmission cycle of infectious diseases like TB. Technological evolution has recently introduced battery-operated digital X-ray units and hand-held ultrasound devices. These portable radiological gadgets are designed to operate in rugged environments with minimal infrastructure [2]. This paper explores how these technologies can be leveraged to advance community health in Nigeria, focusing on their clinical effectiveness, operational feasibility, and the potential for large-scale integration into the national health system.

The Diagnostic Gaps in Nigeria

Healthcare inequities in Nigeria are well-documented, with diagnostic imaging being one of the most neglected sectors in rural health planning. Research indicates that the absence of radiology services at the primary-care level directly contributes to the failure of national health programs, such as the National Tuberculosis and Leprosy Control Programme (NTBLCP). For instance, a chest X-ray is often the first line of screening for TB, yet many rural clusters lack even a basic analog unit [2].

The Case for Portable X-ray.

Evidence from the Niger Delta region has shown that deploying portable digital X-ray devices in "hard-to-reach" communities can revolutionize case finding. In one initiative, mobile units identified over 1,000 presumptive TB cases that would have otherwise gone undiagnosed [2]. These devices allow for "Active Case Finding" (ACF), where health workers bring the diagnostic tool to the patient's doorstep rather than waiting for a symptomatic patient to visit a distant hospital.

The Case for Portable Ultrasound.

Maternal health remains a critical concern in sub-Saharan Africa. In rural Nigeria, the lack of obstetric ultrasound leads to undiagnosed malpresentations, multiple gestations, and placenta previa, all of which contribute to high maternal mortality rates. Portable ultrasound (POCUS) has demonstrated significant value in Southern Nigeria, enabling the detection of uterine abnormalities and prostatic enlargement during community outreach [1]. Furthermore, recent studies in rural Africa have shown that hand-held ultrasonography can be used to identify heart failure and pulmonary disease, a structured literature synthesis approach, conditions often misdiagnosed as simple respiratory infections in resource-limited clinics [7].

Literature search strategy

This review follows focusing on peer-reviewed studies published between 2022 and 2026. Data were retrieved from major medical databases including PubMed, Google Scholar, and PMC. The search criteria specifically targeted portable X-ray, hand-held ultrasound, POCUS in Africa, and Nigerian rural healthcare.

The methodology involved a critical appraisal of study designs, sample sizes, and diagnostic yields, integrating clinical data with operational feedback from healthcare workers in the field. This allowed for a comprehensive assessment of both the clinical impact (how well the device works) and the operational feasibility (how easy it is to use in a village without constant power).

1. Portable X-ray and TB Management

Findings indicate that ultra-portable digital X-ray devices, when used with Computer-Aided Detection (CAD) software, achieve diagnostic accuracy comparable to human radiologists in screening for TB [2]. In Northern and Southern Nigeria, these devices were found to be:

User-Friendly: Health workers with basic training could operate the hardware.

Durable: Units functioned effectively despite heat, dust, and transport over rough terrain. High Yield: The use of AI-driven CAD allowed for immediate triage, ensuring that only those with highly suggestive X-rays were referred for further molecular testing (e.g., GeneXpert), thus saving costs and time [2].

2. Portable Ultrasound and POCUS

Handheld ultrasound devices have shifted the paradigm of "point-of-care" diagnostics. Studies corroborate that non-physician clinicians (nurses and midwives) can be trained to perform basic obstetric and abdominal scans with high sensitivity [3].

Clinical Impact: In South-South Nigeria, mobile ultrasound enabled the identification of highrisk pregnancies, allowing for planned referrals to secondary facilities before labor complications occurred [1].

Broad Utility: Beyond obstetrics, POCUS was effective in emergency triage for trauma and screening for chronic conditions like heart failure and organomegaly [7].

3. Operational and Clinical Synergy

The deployment of these technologies significantly reduced the "turnaround time" for diagnosis. In regions where telemedicine was integrated, rural providers could upload images to the cloud for remote interpretation by radiologists in urban centers, bridging the specialist gap [4]. However, the findings also highlighted bureaucracy: high procurement costs, the need for solarpowered charging stations, and the necessity of continuous medical education (CME) for staff [5,6].

Strategies for Sustainable Integration

The data suggests that portable imaging is not merely luxury but a foundational necessity for rural health equity. However, successful implementation requires a multi-faceted approach.

Task-Shifting and Capacity Building

Nigeria faces a severe shortage of radiologists. Therefore, task-shifting —whereby nurses, midwives, and community health extension workers (CHEWs) are trained to use portable devices as it is the only viable way to scale these services. Evidence shows that with standardized training, non-physicians can reliably obtain diagnostically useful images [3].

Telemedicine and Digital Health.

The utility of portable imaging can be proliferated when combined with telemedicine. By using mobile data (MTN, Airtel, Glo), rural clinics can transmit digital X-rays or ultrasound loops to specialists for real-time consultation [4]. This not only improves diagnostic accuracy but also serves as a continuous learning tool for rural staff.

Infrastructure and Maintenance.

While these devices are portable, they are not indestructible. Implementing these technologies requires a maintenance-first mindset. Partnerships with private vendors or Non-governmental organizations (NGOs) are essential to ensure that broken probes or software glitches do not render the equipment useless [5]. Furthermore, the use of organic amendments and local materials in building low-cost, shielded screening booths can help mitigate radiation risks in temporary rural camps [6].

Policy and Economic Considerations

The efficiency of medical technology in Nigeria is often hampered by bureaucratic delays and lack of funding. Policymakers must prioritize the procurement of portable units over expensive, fixed machines for rural areas. Investment in solar-powered diagnostic hubs would alleviate the "unstable power" barrier identified in the literature [1,5].

Conclusion

Portable X-ray and ultrasound technologies represent a technological leapfrog for rural Nigeria. They allow the healthcare system to bypass the need for massive, expensive hospital infrastructure and bring life-saving diagnostics directly to the people. Evidence confirms that these tools drastically improve the detection of TB and maternal complications, which are among the leading causes of death in Nigeria.

For these technologies to be sustainable, the Nigerian government and healthcare stakeholders must invest in three pillars: Training (Task-shifting), Connectivity (Telemedicine), and Maintenance (Strategic Partnerships). By doing so, Nigeria can serve as a global model for how resource-limited settings can leverage innovation to achieve Universal Health Coverage (UHC) and advance community health outcomes. A key limitation of this review is its narrow bibliographic scope — the literature search was restricted to a four-year window (2022–2026) and limited to three databases (PubMed, Google Scholar, and PMC), which risks excluding relevant foundational studies and evidence from other repositories, however, the author broadened the analytical scope by integrating operational field feedback from healthcare workers alongside clinical data, assessing both diagnostic accuracy and real-world deployment feasibility across Nigeria's Niger Delta and South-South regions, thereby supplementing the restricted bibliographic base with contextually grounded, practice-level evidence.

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BRIDGING THE GAP: STRENGTHENING PRIMARY HEALTH CARE IN RURAL NIGERIA

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ABSTRACT

Introduction: The primary health care system serves as a point of first call for about 70% of the population. Despite the abundance of primary health care centres in Rural Nigeria, there's the sub optimal Gap in services provided due to systemic, structural limitations. Strengthening primary health care in rural Nigeria requires a multi dimensional approach which combines maintainable financing, expansion of workforce, infrastructural development and digital innovation. These efforts are necessary to improve delivery of service and achieve a sustainable universal health coverage.

INTRODUCTION

The architectural integrity of Nigeria's national health system is predicated upon the functionality of its primary health-care (PHC) framework, which serves as the first point of contact for approximately 70% of the population.[2] Despite this centrality, the system has historically grappled with a disconnect between policy conceptualisation and grassroots execution. In the contemporary landscape of 2024 to 2026, Nigeria is undergoing a transformative reset through the Nigeria Health Sector Renewal Investment Initiative (NHSRII). This initiative seeks to move beyond the fragmented, donor-dependent models of the past toward a unified, sector-wide approach (SWAp) that emphasises accountability, domestic financing, and technological integration.[3],[4] This evolution is necessitated by staggering health indices, including a doctor-to-population ratio of 1:5,000 and a functionality rate of only 20% across the nation's 34,076 PHC facilities.[2],[5]

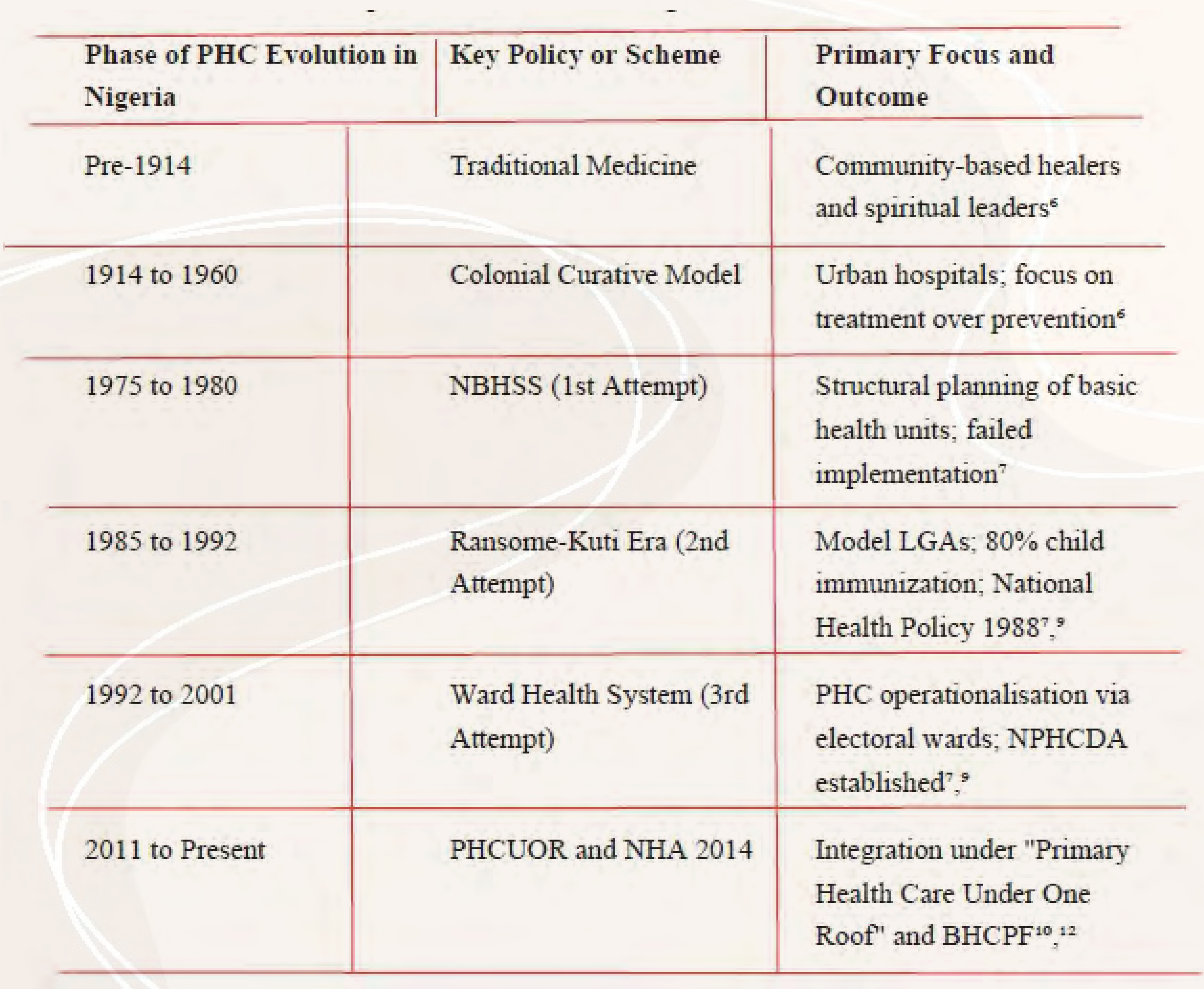
Historical Trajectory and Policy Evolution

The conceptual origins of primary health-care in Nigeria predate the formal adoption of Western medical models, as traditional health practices and community-based support systems once provided the primary safety net for the sick and elderly.[6]

The colonial era (1914 to 1960) introduced a structural emphasis on curative, hospital-based medicine, which is a legacy that has persistently influenced the health system's preference for tertiary care over preventive measures.[6],[7] Following independence in 1960, political actors initially prioritised the expansion of health-care infrastructure, yet the fundamental shift toward a comprehensive PHC strategy did not gain momentum until the mid-1970s.[7]

The global pivot toward PHC was solidified by the 1978 Alma-Ata Declaration, which repositioned health as a fundamental human right and a core component of socio-economic development.[6],[8] Nigeria responded with three distinct historical attempts to institutionalize this vision. The first attempt (1975 to 1980) introduced the National Basic Health Services Scheme (NBHSS), which planned for 20 health clinics per Local Government Area (LGA), but this effort largely failed due to administrative fragmentation and implementation inertia.[7],[9]

The second, and arguably most successful, era occurred between 1985 and 1992 under the leadership of Professor Olikoye Ransome-Kuti. Often referred to as the father of PHC in Nigeria, Ransome-Kuti established model PHC programs in 52 LGAs to serve as blueprints for the nation. This era successfully achieved universal child immunisation rates of over 80% and pioneered campaigns against HIV/AIDS.[6],[7],[10] He formalised the role of the National Primary Health Care Development Agency (NPHCDA) in 1992 to sustain these gains, although a subsequent military takeover in 1993 disrupted the momentum of these reforms.[7],[11] The third attempt (1992 to 2001) saw the introduction of the Ward Health System (WHS), which utilised electoral wards as basic operational units to improve service accessibility at the grassroots level.[9]



Phase of PHC Evolution in Nigeria	Key Policy or Scheme	Primary Focus and Outcome
Pre-1914	Traditional Medicine	Community-based healers and spiritual leaders[6]
1914 to 1960	Colonial Curative Model	Urban hospitals; focus on treatment over prevention[6]
1975 to 1980	NBHSS (1st Attempt)	Structural planning of basic health units; failed implementation[7]
1985 to 1992	Ransome-Kuti Era (2nd Attempt)	Model LGAs; 80% child immunization; National Health Policy 1988[7,9]
1992 to 2001	Ward Health System (3rd Attempt)	PHC operationalisation via electoral wards; NPHCDA established[7,9]
2011 to Present	PHCUOR and NHA 2014	Integration under "Primary Health Care Under One Roof" and BHCPF[10,12]

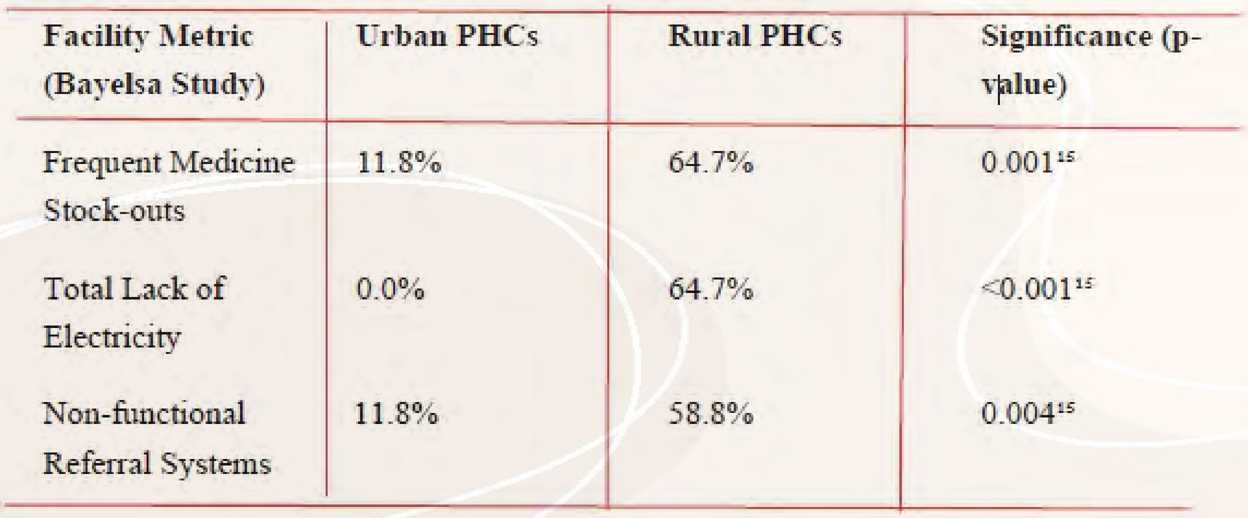
The contemporary legislative framework is anchored in the National Health Act (NHA) of 2014, which established the Basic Health Care Provision Fund (BHCPF) as a dedicated financing mechanism.[12,13] This act mandates that at least 1% of the Consolidated Revenue Fund (CRF) be allocated to health, providing the legal impetus for universal health coverage (UHC) through three gateways: the National Health Insurance Authority (NHIA) for vulnerable-group insurance, the NPHCDA for facility infrastructure and commodities, and the National Emergency Medical Treatment Committee (NEMTC) for urgent care.[12,14]

Systemic Structural and Infrastructural Constraints

Despite a theoretical abundance of PHC centres, the practical reality of rural health-care delivery in Nigeria is defined by profound infrastructural decay and service-readiness gaps. Of the 34,076 PHC facilities, only an estimated 6,815 are optimally functional.[2,15] This disparity creates a "bypass culture," where 60% to 90% of patients self-refer to secondary and tertiary hospitals. This overwhelms specialised institutions with conditions that could have been resolved at the primary level.[1,2]

Geographic and Utility-Based Disparities

The urban-rural divide is particularly acute in utility provision. Assessments in states such as Bayelsa reveal that rural facilities are significantly more likely to lack basic electricity and water supply compared to their urban counterparts.[15,16] In riverine and hard-to-reach areas, the absence of functional referral systems and adequate transportation networks makes maternal emergencies life-threatening.[15]



Facility Metric (Bayelsa Study)	Urban PHCs	Rural PHCs	Significance (p-value)
Frequent Medicine Stock-outs	11.8%	64.7%	0.001[15]
Total Lack of Electricity	0.0%	64.7%	<0.001[15]
Non-functional Referral Systems	11.8%	58.8%	0.004[15]

Beyond utilities, a staggering 75% of Nigerian PHC centres lack the essential equipment package. This package includes fundamental diagnostic tools like glucometers and sphygmomanometers.[1,15] In Northern Nigeria, critical diagnostic gaps exist; states like Zamfara, Kogi, and Kebbi were reported as having no CT scanners in public institutions as of 2018, further entrenching the divide between the rich and the poor.[1,15]

The Human Resource Crisis and Workforce Maldistribution

The human resource component of the Nigerian health system is currently in a state of crisis. It is characterised by a massive shortage of skilled professionals and an uneven distribution of existing talent.[17,18] While the WHO recommends a doctor-to-population ratio of 1:600, Nigeria's current ratio is 1:5,000.[5] Total physician density stood at only 3.8 per 10,000 population in 2023, which is far below the global average of 17.2.[19]

This shortage is exacerbated by the migration of trained professionals, often called the "brain drain," which is driven by low salaries, poor working conditions, and the search for better opportunities abroad.[17,18] Those who remain in the system are overwhelmingly concentrated in urban centres, leaving rural PHCs to be managed by overstretched community health extension workers (CHEWs) who may lack the training to handle complex complications.[5,17] Current government initiatives in 2025 aim to mitigate this by retraining 120,000 front-line health workers and approving ₦50 billion to address arrears and allowances across the workforce.[20,21]

Financing and the Shift toward Facility Autonomy

Financial barriers remain a primary impediment to health-care access, with out-of-pocket (OOP) spending accounting for 71% of total health expenditure in Nigeria.[5,22] This high reliance on OOP payments pushes millions of households into poverty every year.[5] The 2025 budget outlook shows an increase in federal health funding by nearly 60% in naira terms, yet the total allocation still represents only 5.15% of the national budget, which is far short of the 15% Abuja Declaration target.[20,23]

Performance-Based and Direct Facility Financing

To optimise the impact of limited resources, the Nigeria State Health Investment Project (NSHIP) conducted large-scale evaluations of performance-based financing (PBF) and decentralised facility financing (DFF).[18,19] These models were designed to bypass bureaucratic delays by transferring funds directly to facility bank accounts, granting managers "supervised autonomy" to procure supplies and incentivise staff.[19,24]

The results of these pilots in states such as Adamawa, Nasarawa, and Ondo demonstrated that facility-level autonomy can significantly enhance service readiness when paired with robust supervision.[19,24] For instance, regressions show that facilities with high autonomy held an additional 2.1 more outreach sessions per month. Furthermore, the use of quantitative checklists during supervision was linked to a 28.6 percentage point increase in equipment availability.[19,25] Strikingly, the DFF arm received half the funding of the PBF arm and did not pay staff bonuses but achieved comparable results in maternal and child health outcomes.

This suggests that managerial autonomy and accountability are as critical as the volume of financing itself.[18],[19],[24]

BHCPF 2.0 and the Accountability Framework

The 2025 launch of the BHCPF 2.0 revised guidelines marks a new chapter in health financing.[20],[21] This framework institutionalizes biometric verification for health workers and insurance beneficiaries to eliminate ghost workers and systemic leaks.[20],[21] In October 2025, the federal government approved a ₦32.9 billion disbursement under this new guideline to support over 8,000 PHC centers.[20]

The "Red Letter" statement by Minister Ali Pate in March 2026 underscored that these funds are meant to be managed jointly by facility committees and traditional community leaders. This signals a shift toward genuine community ownership of health assets.[14]

Digital Transformation in Rural Health-Care

Digital health innovations are viewed as essential for overcoming the logistical barriers of rural service delivery.[22],[23] The Nigeria Digital Health Initiative (NDHI) seeks to establish a national digital architecture to create a "single source of truth" for health data.[5],[21]

Remote Consultation and Barriers

Tools such as NIGCOMHEALTH allow rural residents to access professional medical guidance via mobile devices. This reduces the burden of physical travel. Despite these technological gains, systemic barriers persist. Rural grid access to electricity remains at approximately 41.1%, and internet penetration is only 40%.[23] These infrastructural deficits make the sustainability of digital systems difficult, which leads to a reliance on paper-based records.[23] Furthermore, digital literacy among health-care professionals is as low as 26.7% in some regions, which necessitates a move toward offline-capable EHR systems and integrated training in medical curricula.[23]

Quality Improvement and Local Capacity Building

Reversing the trend of PHC under-utilization requires a rigorous focus on the quality of care. Pilot interventions using SafeCare international standards have shown that continuous governance support and local capacity building can drive measurable improvements.[24] In a study of 40 rural facilities across six states, those receiving treatment, including facility-specific quality plans and weekly facilitation, showed an 11% average improvement in quality scores over nine months.[24] The areas of most significant gain were inpatient care (+21%) and patient rights/access (+20%). Laboratory services showed the least improvement, which is likely due to the high capital cost of re-equipping labs.[24]

These findings suggest that transformational leadership is a critical building block for sustainable health reforms. This involves leaders setting clear goals and fostering trust. Collaborative leadership models that involve teams in shared accountability have been shown to improve accountability and teamwork in rural settings where resources are sparse.[25]

Conclusions and Strategic Recommendations

The comprehensive analysis of the Nigerian PHC system reveals that while historical evolution has been marred by fragmentation, the current reform era under President Tinubu's administration offers a pathway to sustainability. The shift to a Sector-Wide Approach (SWAp) and the institutionalization of the Health Sector Renewal Compact have successfully aligned federal, state, and local governments under a single results framework for the first time.[3] To ensure that PHC remains the bedrock of national resilience, the following strategic directions are recommended: The transition from aid to investment-based partnerships, exemplified by the US-Nigeria MoU, requires the Nigerian government to meet its commitment of allocating more of its budget to health to fill the massive ₦4.89 trillion funding gap.[21],[23]

The success of the BHCPF 2.0 guidelines depends on the rollout of digital expenditure tracking and biometric verification to ensure that funds reach the ward-level facilities without systemic leaks.[20],[21]

Ultimately, the restoration of the Nigerian health system rests on the ability to put the Nigerian person at the center of attention.[20] By fostering collaborative leadership and engaging communities through ward committees, Nigeria can translate its policy blueprints into a functional reality that saves lives and prevents the financial ruin of its citizens.[20],[24] A key limitation of this review is its heavy reliance on policy documents, government press releases, and grey literature sources that are inherently susceptible to reporting bias and do not carry the methodological rigour of peer-reviewed evidence however the author triangulated these sources with quantitative data from independently conducted impact evaluations, notably the World Bank's Nigeria State Health Investment Project (NSHIP) assessment, anchoring policy claims in concrete empirical figures such as a 2.1 increase in monthly outreach sessions and a 28.6 percentage-point rise in equipment availability, thereby grounding the narrative in verifiable outcome data.

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ADVANCING PREVENTIVE AND COMMUNITY HEALTH IN RESOURCE-LIMITED SETTINGS: HEALTH EDUCATION AND PUBLIC AWARENESS STRATEGIES FOR BRIDGING KNOWLEDGE GAPS.

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ABSTRACT;

Background
Preventive and community health are central to improving outcomes in resource-limited settings, where high disease burden and limited access to care persist. Health education and public awareness are key strategies for improving health knowledge and promoting positive behavioural change, yet significant knowledge gaps remain.

Objective
This narrative review examines health education and public awareness strategies for advancing preventive and community health and their role in bridging health knowledge gaps in resource-limited settings.

Methods
A narrative review of published literature, policy documents, and reports was conducted using relevant academic databases. Studies addressing health education strategies, public awareness interventions, and behavioural change models in low- and middle-income settings were thematically synthesized.

Results
Health education is delivered through school-based programmes, community outreach, health services, and mass media, supported by government and international stakeholders. These interventions improve awareness and engagement but are limited by socioeconomic inequality, cultural and religious beliefs, weak health systems, and inadequate funding. Behavioural change theories highlight additional challenges in translating knowledge into sustained practice.

Conclusion
Health education and public awareness are essential for strengthening preventive and community health in resource-limited settings. However, persistent structural and behavioural barriers limit their effectiveness. Strengthening multisectoral collaboration, improving resource allocation, and tailoring `interventions to local contexts` are critical to bridging health knowledge gaps and improving outcomes.

Introduction:

Health is a positive concept emphasizing social and personal resources as well as physical capabilities. Improving health is a shared responsibility of health care providers, public health officials, and a variety of other actors in the community who can contribute to the well-being of individuals and populations.[3]
Health education is a social science that draws from a multitude of fields, often taking a biopsychosocial approach towards promoting health and preventing disease.[1] This can include instruction in hygiene, reproductive health, nutrition, and more, and help address global healthcare crises. The extent of common knowledge about a conflict, disaster, or risk, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.

Public awareness is a key factor in effective disaster and conflict risk reduction. Its development is pursued, for example, through the development and dissemination of information through media and educational channels, the establishment of information centers, networks, and community or participation actions, and advocacy by senior public officials and community leaders.[2]

Developing strategies to bridge the knowledge gap is crucial for our national development. Everyone has a role to play in this campaign and we hope to arrive at a more prosperous nation and world, health-wise. (State the aim of the review here).

Method

Study Design

This is a narrative review of health education and public awareness strategies for advancing preventive and community health in resource-limited settings.

Search Strategy

Literature was sourced from PubMed, Google Scholar, Scopus, and institutional reports, including publications from international health agencies. Studies published between 2000 and 2026 were considered, with emphasis on recent evidence. Keywords related to health education, public awareness, preventive health, and community interventions were used.

Study Selection

Studies were included based on relevance to health education, public awareness, and preventive health strategies in resource-limited or low- and middle-income settings. Both original studies and review articles were considered, with selection guided by thematic relevance.

Data Synthesis

Findings were synthesized thematically under key domains: health education strategies, public awareness approaches, stakeholder roles, behavioural change models, and implementation barriers. A descriptive approach was used to integrate evidence and identify recurring patterns and gaps.

Understanding the need for health education and enhancing:

Health education has always been needed for our national growth. The number of people that have died because they lacked basic information concerning their ailments is quite appalling. It is crucial that we analyse more and more effective ways to reach both nearby and distant populations and equip them with information that will give them a better chance not just at survival but at optimal living.

Health disparities

In addition to providing educational resources and programming to a community, public health educators also work to ensure all members of a community have equal access to wellness resources and healthcare services.[4] "When considering care access and delivery within communities, health equity and social justice are one in the same," said Dr. Natalie Rahming, an adjunct healthcare faculty member at SNHU with almost two decades of experience working in the healthcare field. "The social determinants of health classify the various ways in which an individual's identity characteristics and social positions are woven into a fabric of discrimination."[4]

Nationwide, access to a store that sells healthier foods is 1.4 times less likely in census tracts with fewer college educated adults (less than 27% of the population) than in tracts with a higher proportion of college-educated persons.[5] Highly informed individuals are more likely to seek preventive services. For instance, a good percentage of university graduates (who typically have higher health literacy) are up-to-date with colorectal cancer screenings, compared to those with some high school education.

Community Health Education

From campaigns and legislation to enforce seat belt use and prevent smoking to programs that boost the awareness and prevention of diabetes, public health workers provide research and guidance to inform policy development. "In alignment to work on policy, community health leaders are needed to support the community with prevention strategies, interventions and programs designed to improve disparities of care based on social, economic, and environmental factors," said Dr. Toni Clayton, executive director of health professions at SNHU. Clayton holds a PhD with a focus on healthcare and is also vice chairperson of the SNHU Online Institutional Review Board.

Economic Importance Of Health Education

Health education can also boost a community's economy by reducing healthcare spending and lost productivity due to preventable illness. Obesity and tobacco use, for example, cost the United States billions of dollars each year in healthcare costs and lost productivity. According to the U.S. Centers for Disease Control and Prevention (CDC), obesity costs the U.S. healthcare system almost $173 billion a year. And the total economic cost of tobacco use costs the United States more than $600 billion in direct health care costs and lost productivity every year, according to a 2025 American Lung Association report.

Also, the Nigerian government spending on education showed significant positive effects on economic growth in Nigeria. The cointegration result showed the existence of a short run relationship among the variables studied.The findings revealed a significant positive relationship between government expenditure on education and economic growth. It further indicated one per cent increase in government expenditure on education leads to 0.17 per cent increase in GDP growth. In the same vein, primary enrollment contributed significantly to economic growth; one per cent increase in school enrollment brought about a 0.019 rise in Nigeria's GDP. On the other hand, the ARDL short run result obtained indicated a negative and significant relationship between government healthcare expenditure and economic growth.[6]

Health education aims to alleviate the economic burden associated with high healthcare cost, for example, an individual that had been informed on the importance of drinking enough water is less likely to spend on certain ailments associated with reduced water intake like Urolithiasis. This in turn will strengthen the human resources in the country, elevating or sustaining the GDP in its best possible way.

Components Of Health Education

In order to pursue the goal of bridging the gap as regards to health education, we ought to understand what and what are the components of the concept. There are several components that must work together for us to reach a satisfactory end.

School-Based Health Instructions

This involves incorporating this important health information into the school systems via their curriculum, from primary to tertiary level [10]. This helps to equip the students with knowledge concerning hygiene, nutrition, prevention of certain diseases, and so on [10]. This helps in reinforcing better health habits at an early age [10].

Health Services

The services provided within this context will encourage a lot of people to make use of it and further get enlightened concerning their health [11]. Services like immunization, screening, counseling of pregnant women, first aid, etc, help to encourage more and more spread of the promotion of health education [11]. It is important for people around the world to understand that they can access these services without having to break the bank [11]. These services should be rendered by individuals that are properly trained to avoid careless mistakes as we are dealing with the lives and trust of the people [11].

Healthful Living

This focuses on the physical and social aspect of health education [12]. It involves educating the public over the importance of sanitation, clean water supply, clean classrooms and workplaces [12]. Poor sanitation creates environments that promote the breeding of disease-carrying vectors [12]. This is a crucial aspect of health education [12].

Community Health Education

This involves outreach to the general public focused on rural areas [13]. It involves screening, diagnostic testing, and basic medical services [13]. This helps bring medicine to the people, and this should be encouraged as it is an important aspect of health education [13].

Key Stakeholders In Health Education:

Regardless of the strategy we implore, we must be aware of the fact that there are certain stakeholders that must work in synergy for this goal to be achieved in its fullest.

The Government

The government plays a very important role in ensuring that health education is so widespread that the knowledge gap is bridged completely or close to that. In Nigeria, we have certain agencies, tasked with ensuring that health education gets across the country. These agencies include the Nigeria Centre for Disease Control (NCDC), Nigerian Primary Health Development Agency. The government sets policies like the Nigerian Health Promotion Policy of 2019, Nigerian Health Sector Renewal Investment Initiative, which was launched in 2023. These were created to ensure that health education had a lot of the public's attention. Initiatives like these and others help to shape the nation zeal and drive for bridging the knowledge gap when it comes to the health sector.

Community And Religious Influencers

The community leaders are some of the most trusted set of leaders in countries like Nigeria, this therefore places on them a responsibility to ensure that certain health myths are being dispelled. During some of the pandemic crises around 2020-2023, the government engaged the traditional leaders, leading to an efficient mode of indirect communication with the people. Community health workers, the frontline educators should educate people door-to-door. Primary and secondary schools should incorporate this into their system and make sure the students are enlightened enough.

Several individuals expressed their doubts concerning the COVID vaccine, and some of their fears were dispelled when they saw their leaders taking the same vaccine. This and many more show of leadership is why the community and religious leaders must be involved for effective health education.

International Bodies

Organisations like the World Health Organization (WHO), UNICEF, USAID, amongst others have been part of the move for health education reaching more and more throughout the surface of the earth. Several NGOs have also been involved in this campaign too. Nigerian Primary Health Centre Development Agency (NPHCDA) launched a huge campaign, targeting 106 million children for vaccination against measles, rubella, polio.[7] Efforts were also made by UNICEF to vaccinate 7.4 million young girls, ages 9-14 against cervical cancer.[7]. These and several more are some of the good these international organisations do, and they are very crucial to cause.

The Intrapersonal Concept

This involves an approach that influences an individual's behavior. There are about 6 models under this concept.

a. Rational Model

Within this model education strategies target individuals and groups and strive to encourage positive and prevent negative health behavior choices. This is done by presenting relatively unbiased information. This model, also known as the knowledge, attitudes, practices model (KAP), is based on the premise that increasing a person's knowledge will prompt a behaviour change. It assumes that the only obstacle to acting "responsibly" and rationally is ignorance, and that information alone can influence behaviour by "correcting" this lack of knowledge.[8]

b. Health Belief Model.

The health belief model was one of the earliest behaviour change models to explain human health decision-making and subsequent behaviour. Social psychologists during the 1950s wanted to explain why some people refused chest X-rays for detecting tuberculosis even though the service was free. What they discovered was that people's beliefs about the severity of a disease and their susceptibility to it influenced their willingness to take preventive action. Over the next few years this theory was modified to include six constructs to help predict whether people will take action to prevent, screen for, and control illness.[8] According to the WHO, these constructs includes;

- ● Perceived Susceptibility - Beliefs about the chances of getting a condition.
- ● Perceived Severity - Beliefs about the seriousness of a condition and its consequences. A potential change strategy will involve specifying the consequences of a condition and recommended action.
- ● Perceived Benefits - Beliefs about the effectiveness of taking action to reduce risk or seriousness. Here, you explain how, where, and when to take action and what the potential positive results will be.
- ● Perceived Barriers - Beliefs about the material and psychological costs of taking action. You offer reassurance, incentives, and assistance; correct misinformation.
- ● Cue-to-action - Factors that activate “readiness to change” – a trigger mechanism. You provide “how to” information, promote awareness and employ reminder systems.
- ● Self-efficacy - Confidence in one’s ability to take action. Here, you provide training and guidance in performing action, use progressive goal setting,give verbal reinforcement and demonstrate desired behaviour.

c. The Extended Parallel Process Model (EPPM)

Some persuasive strategies try to bring about particular health decisions or behaviour by presenting a message that is biased or emotionally loaded. Such strategies may use reasoning, urging and inducement, and base their message on rational and/or emotional appeals. Persuasive communications also commonly use “fear tactics” to raise the arousal level of recipients and to make them feel more susceptible to specific risks. Most mass advertising is persuasive in nature. The EPPM has its roots in the health belief model. It proposes that people, when presented with a risk message, engage in two appraisal processes.

First, they perceive whether they are susceptible to an identified threat and whether the threat is severe. (Perceived susceptibility is the extent to which one feels at risk for a particular health threat. Perceived severity is the degree to which one believes the threat to be serious or harmful.) If the threat is perceived as trivial or irrelevant, they generally ignore the risk message and the urging to take the recommended action.

Second, if people believe they are susceptible to a severe threat and their level of fear is aroused, they are motivated to assess whether the recommended action can reduce that threat (i.e. response efficacy) and whether they can perform the recommended action (i.e. self-efficacy). When they feel capable of taking action, they will control the risk accordingly (e.g. "I'm at risk for HIV infection but know that I am able to use condoms which will protect me against getting HIV").

However, when they doubt their ability to minimize the threat, perhaps because of personal, social or physical barriers, they focus instead on controlling their fear (e.g. "I'm at-risk for HIV infection but don't think I can use condoms and I don't think condoms work anyway"). They will also go into a state of denial, or defensive avoidance (e.g. "I'm just not going to think about it"). In sum, perceived threat (i.e., perceived susceptibility and severity) motivates action. Perceived efficacy (i.e. recommended response efficacy and and self-efficacy) determines whether individuals control the danger and make behavioural changes or control their fear through psychological defence mechanisms.[8]

d. Transtheoretical Model of Change One of the most extensively researched behavioural change models developed in recent years is the transtheoretical model of change. Behaviour change is viewed as a progression through a series of five stages: pre-contemplation, contemplation, preparation, action and maintenance. This model recognizes that people have specific informational needs at each stage of behavioural change and is able to offer the most effective intervention strategies at each of these stages. Self-efficacy and balanced decision-making are central to the theory.[8]

Let's take a look at these stages;

- ● Precontemplation - One has no intention of taking action within the next six months. Here, improve the awareness, and inform such individuals of the risk of not taking action.
- ● Contemplation - Plans on taking action within 6 months. In this situation, you motivate, and give such individuals practical steps.
- ● Preparation - Plans on taking action within 30 days. Here, you assist in implementing those practical steps involved in health education.
- ● Action - Individuals have changed their behavior. You help in feedback and further complaints if any.

● Maintenance - This involves sticking to that change for at least 6 months. You assist with coping, reminders, finding alternatives, avoiding slips/relapses (as applicable).

e. Theory of Planned Action

The theory of planned behaviour asserts that achieving and maintaining behaviour change requires intent to adopt a positive behaviour or abandon a negative one. The theory holds that intent is influenced not only by the attitude toward the behaviour but also the perception of social norms (the strength of others' opinions on the behaviour and the person's own motivation to comply with those significant others) and the degree of perceived behavioural control.[8]

f. The Activated Health Education Model

The activated health education model is a three-phased model. The phases of the model are as follows.

- ● The experiential phase actively engages individuals in the assessment of their health. Through activities such as field study, laboratory testing/screening and surveys of the target behaviour, individuals become aware of their actual health behaviour. This phase establishes baseline measures and identifies observable behaviours for future goals setting.
- ● The awareness phase presents information that provides a rationale for including the previously completed experiential activity and creates awareness of the target behaviour. This phase focuses on increasing feelings of susceptibility and creating tension between actual and ideal behaviour.
- ● The responsibility phase involves participants in the change process, facilitates their identification and clarification of personal health values, and develops a customized plan for behaviour change. Self-management strategies are introduced and participants develop their own plans of action such as: self-monitoring, setting measurable goals, stimulus control, use of social support systems and visual imagery in goal achievement.[8].

Drawbacks Of Health Education And Public Awareness:

We understand the need for health education to get across not just the country but the world at large. This campaign has not been free of hitches and setbacks. And here we will be looking at a few of them.

Inadequate Professional Recognition

Health educators at the grassroot level are often seen as secondary or auxiliary to the field. This must be improved so it creates an atmosphere of inclusiveness and better raises their morale. Their representation in the decision making bodies should be improved. Their importance to the system cannot be overemphasized.

Insufficient Funding

This has been a rather perennial issue. Health education has been under funded for some time now, this has led to understaffing, inability to conduct extensive outreaches and overdependence on short-term grants. This is not enough if we are to reach our goal of bridging the rather enormous knowledge gap. In Nigeria, the health sector takes 4.2% of our budget allocation and is very poor compared to our 15% target. The government should ensure proper funding of the health sector to improve the chance of health education getting far and wide.[9]

Public misunderstanding of health education

The public are prone to misconstrue the information provided by health educators.

This is a very dangerous situation, as this might lead to drug abuse, substance abuse, and so on. This problem can be prevented by making sure that the individual on the receiving end understands the information you are passing to them. Ensuring they understand the risks, the benefits and the components of the topic of interest.

Policy And Political Change

The political climate is usually subject to change and with that change comes with changes that will either benefit or adversely affect the health sector. These changes make the continuity of a long term health project almost impossible.

Conclusion:

The gap in knowledge as regards to health education is very concerning. We have to collectively create more public awareness concerning this issue. Individuals react to information differently, due to intrapersonal, interpersonal or environmental reasons or a combination of all three. Health educators should understand their target audience and adopt an appropriate model to inform the community. Regardless of the benefits of this campaign, it is still met with drawbacks, this article has highlighted some of those drawbacks, and with the assiduous input of all involved,

the stakeholders and the concerned community, we can continuously bridge that gap, and get to a better position as far as the health of individuals are involved nationally and globally. This review was limited by heterogeneous study designs, potential publication bias, reliance on secondary data, and contextual variability in resource-limited settings; these were addressed through thematic synthesis, multi-database searching, grey literature inclusion, and cautious interpretation restricted to observed associations.

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HEPATITIS B VACCINE HESITANCY IN SUB-SAHARAN AFRICA: A BARRIER TO VIRAL HEPATITIS ELIMINATION AND CANCER PREVENTION

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ABSTRACT:

Background: Hepatitis B virus (HBV) infection remains a leading cause of morbidity and mortality in Sub-Saharan Africa (SSA), where chronic HBV is the primary driver of hepatocellular carcinoma (HCC). Despite the availability of a safe and effective vaccine, coverage across the region remains critically low, limiting progress toward viral hepatitis elimination.

Objectives: This narrative review examines the key determinants of HBV vaccine hesitancy in SSA — including sociocultural beliefs, misinformation, low health literacy, health system barriers, economic constraints, governance challenges, and gender dynamics — and their implications for viral hepatitis control and HCC prevention.

Methods: A narrative review was conducted using PubMed/MEDLINE, Google Scholar, and the WHO Global Health Library. Search terms included 'hepatitis B vaccine hesitancy Sub-Saharan Africa,' 'HBV birth-dose coverage Africa,' 'hepatocellular carcinoma hepatitis B Africa,' and HBV immunization low-income countries.' Peer-reviewed articles, WHO reports, and epidemiological surveys published from 2010 to 2025 were included.

Results: An estimated 50–80 million people in SSA live with chronic HBV, yet birth-dose vaccination coverage remains below 2% in many countries. Vaccine hesitancy stems from a complex interplay of misinformation, mistrust in health systems, sociocultural beliefs, low health literacy, cold-chain inadequacies, inconsistent vaccine supply, financial constraints, and gender-based decision-making. These factors sustain high HBV transmission and contribute to SSA's disproportionate HCC burden, which is frequently diagnosed at an advanced, untreatable stage.

Conclusion: HBV vaccine hesitancy is a critical barrier to viral hepatitis elimination and HCC prevention in SSA. Overcoming it requires integrated, community-sensitive strategies that combine active engagement, policy reform, health system strengthening, and targeted health education to improve timely birth-dose uptake and bridge the gap between vaccine availability and accessibility.

Introduction

Immunization is one of the most cost-effective public health interventions, substantially reducing the global burden of infectious diseases. Sustained vaccination programs have prevented millions of cases, including over four million vaccine-preventable diseases in Italy over 115 years [1], with similar successes reported in high-income countries [2]. During the COVID-19 pandemic, unvaccinated individuals experienced significantly higher infection and mortality rates compared with vaccinated populations, even during Delta and Omicron waves, while booster doses improved protection, particularly among older adults [2]. These findings reinforce the importance of maintaining up-to-date immunization strategies.

Despite these advances, chronic hepatitis B virus (HBV) infection remains a major global health challenge, particularly in low- and middle-income countries (LMICs), where prevalence is high and access to diagnostics, treatment, and preventive services is limited [3]. Although universal infant vaccination has reduced transmission, gaps in screening, linkage to care, and prevention of mother-to-child transmission persist, hindering progress toward WHO 2030 elimination targets [3].

Sub-Saharan Africa bears a disproportionate HBV burden, with millions chronically infected and at increased risk of hepatocellular carcinoma (HCC), a leading cause of cancer mortality [4]. Weak health systems, low vaccination coverage, and limited diagnostic capacity contribute to late presentation and poor outcomes, with many progressing to cirrhosis and HCC [5]. Socioeconomic constraints further exacerbate disease burden and limit effective interventions [4][5].

This review aims to synthesize current evidence on the key determinants of hepatitis B vaccine hesitancy in

Sub-Saharan Afric,a, examine their relationship to the burden of hepatocellular carcinoma and identify gaps in knowledge and implementation that must be addressed to achieve WHO's 2030 viral hepatitis elimination targets.

Methods

This narrative review was conducted using a structured search of peer-reviewed and grey literature. Three electronic databases were searched: PubMed/MEDLINE, Google Scholar, and the WHO Global Health Library. Grey literature sources included reports and policy documents from the World Health Organization (WHO), the World Bank, and Nigeria's Federal Ministry of Health. Search terms used included 'hepatitis B vaccine hesitancy Sub-Saharan Africa,' 'HBV birth-dose coverage Africa,' 'hepatocellular carcinoma hepatitis B Africa,' 'HBV immunization low-income countries,' 'hepatitis B sociocultural barriers,' 'HBV health literacy Africa,' and 'hepatitis B governance vaccine trust.' Boolean operators (AND, OR) were used to combine search terms. Publications in English from 2010 to 2026 were prioritised, with earlier seminal studies included where relevant. Titles and abstracts were screened for relevance to hepatitis B vaccine hesitancy, HBV epidemiology, and HCC burden in Sub-Saharan Africa, and full texts were retrieved for all included sources. Reference lists of key articles were also hand-searched for additional relevant literature.

Epidemiology of hepatitis B in Sub-Saharan Africa

Epidemiological data indicate that Hepatitis B virus infection is highly endemic across Sub-Saharan Africa, with an estimated 50 million chronic carriers and population carrier rates ranging from 9% to 20% [6]. This high prevalence varies across regions but consistently reflects widespread transmission, particularly in early childhood, where horizontal transmission predominates [6]. The substantial reservoir of chronic infection contributes to ongoing incidence and sustained community transmission [6]. These findings underscore the significant heterogeneity yet uniformly high burden of Hepatitis B Virus across Sub-Saharan African countries, reinforcing the need for region-specific epidemiological data to inform targeted vaccination and prevention strategies [6].

Sub-Saharan Africa bears a disproportionately high burden of chronic hepatitis B infection, with an estimated hepatitis B surface antigen prevalence of approximately 6.1%, reflecting sustained endemic transmission despite the availability of effective vaccines and antiviral therapies [7]. The region contributes significantly to global hepatitis-related morbidity and mortality, particularly through complications such as cirrhosis and Hepatocellular carcinoma [7]. Although the World Health Organisation (WHO) has set ambitious 2030 elimination targets, progress is hindered by limited screening, poor linkage to care, inadequate birth-dose vaccination coverage, and weak health systems [7]. Strengthening prevention strategies and expanding access to treatment remain essential to achieving viral hepatitis elimination in this region [7].

Hepatitis B vaccination: a tool for elimination and cancer prevention

Despite the proven effectiveness of the hepatitis B vaccine in preventing mother-to-child transmission and its inclusion in routine immunization schedules, uptake of the crucial birth-dose remains suboptimal across Sub-Saharan Africa [8]. The scoping review highlights that only about one-third of African countries have adopted the Hepatitis B birth-dose vaccine into national programs, falling short of regional World Health Organisation (WHO) targets, largely due to health systems barriers such as weak policy adoption, inadequate integration into maternal care, supply chain challenges, and limited universal screening [8]. These systemic complexities undermine the vaccine's potential impact, resulting in missed opportunities to prevent early life infection despite wide recognition of its benefits [8].

The World health organization (WHO) emphasizes early prevention of mother to child transmission of hepatitis B virus, recommending that all newborns receive a birth dose of the hepatitis B vaccine as soon as possible after delivery, ideally within the first 24 hours of life [9]. This initial dose is crucial because it significantly reduces the risk of chronic infection [9]. After the birth dose, the World health organization (WHO) advises that infants complete the primary vaccination series with two to three additional doses, depending on the national immunization schedule [9]. These combined doses enhance long-term immunity and support global efforts to eliminate hepatitis B infection [9].

Universal hepatitis B virus vaccination programs have been shown to significantly lower both chronic Hepatitis B Virus prevalence and rates of hepatocellular carcinoma [10]. In settings where universal newborn immunization was implemented, such as Hong Kong, the prevalence of chronic Hepatitis B Virus infection markedly declined in birth cohorts vaccinated after program initiation compared with unvaccinated cohorts [10].

Correspondingly, vaccinated individuals experienced lower incidences of Hepatocellular Carcinoma and other hepatic events [10]. These findings demonstrate that widespread Hepatitis B Virus immunization leads to meaningful reductions in infection burden and associated liver cancer, underscoring the value of universal vaccination in controlling Hepatitis B Virus and its long-term complications [10].

In Sub-Saharan Africa, hepatitis B birth-dose vaccine coverage at birth remains exceptionally low, with pooled estimates showing only about 1.3 % of infants receive Hepatitis B birth-dose (HepB-BD) within the first day of life [11]. This low coverage largely reflects systemic barriers in the region, including a high proportion of home births where newborns are not reached immediately after delivery, limited health infrastructure to support routine immunization, and insufficient cold-chain capacity to maintain vaccine potency at the point of use [11]. These challenges hinder timely administration of Hepatitis B birth-dose (HepB-BD) and contribute to persistently poor early coverage in many African countries [11].

Despite global recommendations for timely hepatitis B birth-dose vaccination (HepB-BD), coverage in Sub-Saharan Africa remains extremely low [12]. A systematic review found that only a small fraction of newborns receive a Hepatitis B birth-dose (HepB-BD) within 24 hours of birth in the region [12]. Key barriers include a high proportion of deliveries occurring at home without access to skilled health workers, weak health systems that struggle to provide routine newborn immunization services, and inadequate cold-chain infrastructure needed to store and transport vaccines safely [12]. These structural and logistical challenges continue to impede early birth-dose vaccination efforts across many Sub-Saharan African countries [12].

Conceptualizing vaccine hesitancy

Vaccine hesitancy is widely conceptualized using the "3Cs" model (confidence complacency, and convenience) which captures the complexity of vaccination decision-making [13]. In this referenced study, this framework is applied to explain variations in influenza vaccine uptake across risk groups [13]. Confidence relates to trust in vaccine safety, effectiveness, and health systems; complacency reflects low perceived disease risk and reduced motivation to vaccinate; while convenience encompasses structural and logistical factors such as access, availability, and service delivery [13]. The study highlights that hesitancy arises from the interplay of these domains, with complacency identified as a particularly significant barrier, emphasizing the need for targeted communication and improved health system strategies [13].

Determinants of hepatitis B vaccine hesitancy in SSA

Sociocultural beliefs and misinformation

Sociocultural beliefs and misinformation play a critical role in shaping hepatitis B vaccine hesitancy, particularly in low-resource settings [14]. This referenced study highlights how community perceptions of hepatitis B are often influenced by cultural interpretations, including beliefs linking the disease to spiritual causes or moral behavior, which can reduce perceived need for vaccination [14]. Additionally, misinformation and limited health literacy contribute to misconceptions about vaccine safety and efficacy, fostering fear and distrust [14]. Social norms and community narratives further reinforce these attitudes, leading to delayed or refused vaccination [14]. These findings underscore that vaccine hesitancy is deeply embedded in cultural contexts and requires culturally sensitive health education and community engagement strategies [14].

Sociocultural beliefs and misinformation significantly influence hepatitis B vaccine hesitancy by shaping how individuals perceive both the disease and the vaccine [15]. The study highlights that limited knowledge about hepatitis B, combined with persistent myths and fears about vaccine safety and side effects, contributes to reluctance or refusal [15]. Community-level mistrust (particularly toward government led health interventions) further reinforces these misconceptions [15]. Additionally, cultural narratives and inadequate community engagement allow misinformation to spread unchecked, reducing vaccine uptake and completion [15]. These findings demonstrate that hesitancy is not solely informational but deeply rooted in social trust, cultural beliefs, and communication gaps, necessitating context-specific, community-driven interventions [15].

Low health literacy and awareness

Many individuals in SSA have limited knowledge about Hepatitis B Virus transmission, complications, and prevention. Low health literacy and limited awareness play a central role in hepatitis B vaccine hesitancy among pregnant women [16]. In a Ugandan study, participants demonstrated only moderate knowledge of Hepatitis B Virus, with a mean knowledge score of 52.4%, reflecting substantial informational gaps [16].

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Notably, 74% of respondents expressed vaccine hesitancy, and those hesitant consistently had the lowest knowledge and behavioral skill scores [16]. Importantly, increasing knowledge significantly reduced hesitancy (AOR = 0.79), with each unit rise in knowledge increasing the likelihood of vaccine uptake by 1.27 times [16]. These findings highlight that inadequate awareness and poor understanding of Hepatitis B Virus transmission and prevention directly undermine vaccine acceptance, reinforcing the need for targeted health education interventions [16].

Studies consistently demonstrate that

awareness of hepatitis B (Hepatitis B Virus) remains markedly lower than that of HIV/AIDS, despite comparable transmission routes and public health significance [17]. The referenced study highlights that Hepatitis B Virus is often a "silent epidemic," with substantially reduced public recognition compared to HIV, largely due to limited health education and fewer large-scale awareness campaigns [17]. While HIV has benefited from decades of global advocacy, Hepatitis B Virus awareness remains inadequate, contributing to poor knowledge and low vaccine uptake [17]. Supporting evidence shows that in some populations, fewer than 40% are aware of Hepatitis B Virus, and knowledge levels are often poor despite high endemicity [17]. This disparity reinforces the need for intensified Hepatitis B Virus-focused public health messaging [17].

Healthcare system barriers

Structural weaknesses within health systems significantly undermine hepatitis B vaccine uptake by limiting access, reducing confidence, and creating logistical barriers [18]. In a global scoping review identifying 74 unique barriers, one-third were system-related, including poor availability and accessibility of immunization services, insufficient outreach activities, inadequate funding, and low national immunization coverage [18]. These deficits often lead to inconvenience in time and place of vaccination and poor communication by health workers, eroding trust and reinforcing hesitancy in caregivers [18]. Compounded by weak stock management and fragmented public–private participation, these shortcomings not only delay uptake but also contribute to persistent gaps in population immunity [18].

Structural weaknesses in health systems are a major contributor to vaccine hesitancy. These include: Inconsistent vaccine supply, Long distances to healthcare facilities, Poor service delivery, and Lack of trained personnel. Negative experiences with healthcare providers can erode trust and discourage future engagement with vaccination programs.

Economic constraints

According to the World Health Organization's global hepatitis report, nearly all low-income countries (including many in Sub-Saharan Africa) include the hepatitis B vaccine in their National Infant Immunization Programmes, and hepatitis B infant vaccination is generally provided free of charge in the public sector to ensure broad access [19]. However, despite this, coverage of the timely birth dose remains especially low in the African Region compared with other regions [19].

Although hepatitis B vaccination is often provided free of charge for infants, indirect costs such as transportation, lost wages, and time can be significant barriers. In some settings, out-of-pocket costs for adult vaccination further limit access and uptake.

Trust and governance issues

In Sub-Saharan Africa, trust in government and health systems strongly influences vaccine hesitancy, with lower levels of trust in institutions such as national governments, pharmaceutical companies, and societal norms being associated with higher reluctance to accept vaccines [20]. This relationship has been documented across multiple vaccines and contexts, highlighting governance and institutional trust as key determinants of hesitancy [20].

Gender and social dynamics

Evidence from Sub-Saharan Africa shows that mothers are typically the primary caregivers responsible for child vaccination, yet their decision-making power is frequently constrained by patriarchal norms [21]. Male partners or other family members often have stronger influence over health decisions, and where men dominate household decision-making, mothers may be unable to act on their preferences regarding child immunization [21]. This dynamic is associated with lower likelihood of children being fully immunised when women lack autonomy [21].

Hepatocellular carcinoma as a sequela of chronic hepatitis B virus infection

Sub-Saharan Africa (SSA) bears a disproportionate share of the global hepatocellular carcinoma burden, with the region and Eastern Asia accounting for more than 80 % of all cases worldwide [22]. This cancer is a leading cause of morbidity and mortality, particularly affecting men in their prime productive years [22]. Age-standardised incidence rates of Hepatocellular Carcinoma in Sub-Saharan Africa frequently exceed 8 per 100 000 person-years, with West African countries among the most affected [22].

The predominant driver of Hepatocellular Carcinoma in Sub-Saharan Africa (SSA) is chronic hepatitis B virus infection, which remains highly endemic in the region [22]. An estimated 60 million people in Sub-Saharan Africa (SSA) are living with chronic Hepatitis B Virus, and approximately 38, 800 individuals are at risk of developing Hepatocellular Carcinoma each year [22]. Chronic Hepatitis B Virus infection contributes substantially to liver carcinogenesis both directly, via viral integration and oncogenic activities, and indirectly through cirrhosis [22].

The attributable fraction of Hepatocellular Carcinoma due to chronic Hepatitis B Virus in Sub-Saharan Africa (SSA) is around 50 %, far higher than in many other regions, underscoring the virus's central role in regional liver cancer mortality [22]**.** The high Hepatocellular Carcinoma mortality in SSA is compounded by late diagnosis, limited treatment infrastructure, and inadequate surveillance, making Hepatocellular Carcinoma a critical public health priority linked to Hepatitis B Virus control efforts [22]**.**

Research gaps and future directions

Despite clear evidence that hepatitis B vaccination is safe and highly effective in preventing chronic infection and hepatocellular carcinoma, coverage remains suboptimal across Sub-Saharan Africa (SSA) [22,23]**.** Existing literature highlights numerous barriers (sociocultural beliefs, misinformation, low health literacy, weak health systems, economic constraints, and governance issues), but few studies comprehensively quantify how these determinants interact to influence vaccine hesitancy in Sub-Saharan Africa (SSA) [20]. Most research focuses on single factors or isolated populations, often urban or hospital-based cohorts, leaving rural, marginalized, and home-birth populations underrepresented [24].

Additionally, while chronic Hepatitis B Virus infection is well-established as the principal driver of Hepatocellular Carcinoma in Sub-Saharan Africa (SSA), there is limited longitudinal evidence linking vaccine hesitancy directly to Hepatocellular Carcinoma incidence, making it difficult to estimate the population-level impact of delayed or incomplete vaccination [22]. Gaps also exist in evaluating interventions designed to address vaccine hesitancy, particularly culturally tailored, community-based strategies that incorporate gender dynamics, decision-making autonomy, and trust in health systems [20].

Furthermore, surveillance data on timely birth-dose vaccination remain sparse, hindering accurate assessment of progress toward World Health Organisation (WHO) 2030 elimination targets [23,24]. Addressing these gaps is essential for designing integrated interventions that not only increase vaccine uptake but also reduce Hepatitis B Virus transmission, mitigate Hepatocellular Carcinoma burden, and strengthen health systems in resource-limited settings [22,23].

Conclusion

Hepatitis B vaccine hesitancy in Sub-Saharan Africa remains a significant barrier to viral hepatitis elimination and the prevention of hepatocellular carcinoma (Hepatocellular Carcinoma). Despite the availability of a safe and highly effective vaccine, coverage is persistently low, driven by complex and interrelated factors including sociocultural beliefs, misinformation, low health literacy, healthcare system limitations, economic constraints, and governance challenges. These barriers sustain high Hepatitis B Virus prevalence, perpetuate early-life transmission, and contribute to the disproportionate Hepatocellular Carcinoma burden in the region.

Addressing hesitancy requires culturally sensitive, community-based interventions, strengthened health systems, and targeted health education that empowers caregivers, integrates gender considerations, and fosters trust in healthcare institutions. Expanding timely birth-dose vaccination, improving surveillance, and implementing context-specific policies are essential to achieving

World Health Organisation (WHO) 2030 elimination goals. Without coordinated, multisectoral strategies, the persistent gaps in vaccination and prevention will continue to undermine efforts to reduce Hepatitis B Virus transmission and Hepatocellular Carcinoma mortality in Sub-Saharan Africa. Heterogeneous study designs were synthesized via thematic analysis; language/publication bias was reduced using databases and grey literature; causal inference was avoided by triangulating evidence and framing conclusions as associations only.

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MALARIA AND OTHER ENDEMIC DISEASE- PREVENTION STRATEGIES IN RESOURCE-LIMITED SETTINGS

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ABSTRACT

Background: Endemic infectious diseases — including malaria, neglected tropical diseases (NTDs), and cholera all remain leading causes of morbidity and mortality in resource limited settings, particularly across sub-Saharan Africa. Nigeria, as the most endemic nation for many of these diseases, represents a critical case study for understanding prevention challenges and successes
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Objective: This review examines the current evidence base for prevention strategies targeting malaria, NTDs, and cholera in resource-limited settings, with a focus on Nigeria and sub-Saharan Africa.

Methods: A narrative review of peer-reviewed literature, WHO reports, and global health agency publications from 2020 to 2025 was conducted using PubMed, Google Scholar, and WHO databases. Search terms included 'malaria prevention Nigeria,' 'NTD mass drug administration Africa,' and 'cholera WASH sub-Saharan Africa.'

Results: Malaria prevention has progressed substantially through insecticide-treated nets, chemoprevention, and the landmark deployment of the R21/Matrix-M vaccine.

NTD control through mass drug administration (MDA) has treated over 1.8 billion people globally, though coverage gaps persist in hard-to-reach populations. Cholera outbreaks continue to overwhelm health systems, driven by WASH deficits and insufficient oral vaccine availability.

Conclusion: Sustained investment in integrated, community-based prevention strategies, digital surveillance, and domestic health financing is essential. Bridging implementation gaps particularly in chemoprevention uptake, vaccine delivery, and WASH infrastructure remains the central challenge for achieving endemic disease control targets in resource-limited settings.

Keywords: Malaria; Neglected tropical diseases; Cholera; Prevention; Resource-limited settings; Nigeria; Sub-Saharan Africa; Community health

Introduction

Infectious diseases of poverty continue to impose a devastating and disproportionate burden on populations residing in resource-limited settings. Among these, malaria, neglected tropical diseases (NTDs), and cholera collectively account for hundreds of millions of infections and hundreds of thousands of deaths each year, predominantly in sub-Saharan Africa. These diseases are united by a common denominator: they thrive in environments of poverty, inadequate sanitation, limited healthcare access, and weak public health infrastructure.

Africa bears the overwhelming brunt of this burden. According to the 2024 World Malaria Report, the continent accounted for 270.8 million malaria cases and 594,119 deaths representing 96% and 97% of the global totals, respectively. [1] Nigeria alone contributes 27% of global malaria cases and 31% of global malaria deaths, making it the single largest contributor to the disease burden worldwide. [2] Similarly, over 165 million Nigerians require treatment for one or more NTDs, [3] while cholera outbreaks continue to recur with alarming regularity about 112,301 cases and 1,900 deaths were recorded across 14 sub-Saharan African countries in just the first seven months of 2024 alone. [4]

The persistence of these diseases in the 21st century is not primarily a scientific failure but an implementation one. Proven, cost-effective tools like insecticide-treated nets (ITNs), mass drug administration (MDA), oral rehydration therapy, vaccines, and WASH interventions exist and have demonstrated significant impact. Yet coverage remains incomplete, uptake suboptimal, and financing fragile. Against this backdrop, the theme of this review " advancing preventive and community health in resource-limited settings" us not merely academic; it is urgent.

This review synthesises the current evidence for prevention strategies targeting malaria, NTDs, and cholera, drawing on recent literature and WHO reports. It examines what works, what does not, and where the critical gaps lie, with a focus on Nigeria and the broader sub-Saharan African context. The goal is to provide a concise, evidence-based resource for clinicians, public health practitioners, policymakers, and students engaged in the fight against endemic disease.

Literature search strategy

This narrative review was conducted using a structured search of peer-reviewed literature and grey literature published between January 2020 and March 2026. Electronic databases searched included PubMed/MEDLINE, Google Scholar, and the WHO Global Health Library. Reports and strategic documents from the World Health Organization (WHO), Africa Centres for Disease Control and Prevention (Africa CDC), UNICEF, the Global Fund, and Nigeria's National Malaria Elimination Programme (NMEP) were also reviewed.

Malaria prevention strategies and evidence

Vector control: insecticide-treated nets and indoor residual spraying

Long-lasting insecticidal nets (LLINs) remain the cornerstone of malaria vector control in sub-Saharan Africa. By 2022, approximately 70% of households in the region owned at least one ITN, a remarkable rise from under 5% in 2000. [5] This expansion has been credited with averting an estimated 663 million clinical malaria cases between 2000 and 2022 and contributing to a 40% reduction in clinically symptomatic malaria incidence over the same period. [5]

Despite high ownership rates, utilisation continues to lag behind ownership. In Nigeria, net use among children under five rose from 1% in 2003 to 39% in 2015, and among pregnant women from 5% to 43% which shows improvements that nonetheless represent persistent implementation gaps. [6] Barriers include net damage, heat discomfort, cultural beliefs, and lack of hanging structures in homes. Community-based behavioural change interventions and net hanging campaigns have demonstrated success in bridging this gap.

A growing and serious threat to vector control efficacy is insecticide resistance. ***Anopheles stephensi***, an invasive urban malaria vector previously confined to South Asia and the Arabian Peninsula, has now been detected in Nigeria, Ghana, Ethiopia, and several other African countries, threatening to accelerate urban malaria transmission. [5] In response, **dual active-ingredient (dual AI) nets** which combines two insecticides to overcome resistance to a single compound are being rapidly scaled up, supported by a US$50 million Global Fund investment between 2021 and 2024. [7] Indoor residual spraying (IRS), while resource-intensive, remains an effective complement to LLINs in high-burden settings.

Chemoprevention

Chemoprevention constitutes one of the most impactful malaria prevention tools for vulnerable populations. **Seasonal Malaria Chemoprevention (SMC) with s**ulphadoxine-pyrimethamine plus amodiaquine (SP+AQ) is recommended for children aged 3–59 months in areas of high seasonal malaria transmission. A record 22 countries planned to implement SMC in 2025, with several, including Nigeria, also developing strategies for **Perennial Malaria Chemoprevention (PMC)** for infants. [1]

Intermittent Preventive Treatment in Pregnancy (IPTp) with sulphadoxine-pyrimethamine (SP) is WHO-recommended standard care for pregnant women in sub-Saharan Africa after the first trimester, to be administered at each antenatal care visit. Despite clear evidence of benefit which include: reduced placental malaria, maternal anaemia, and low birth weight, uptake in Nigeria remains alarmingly low. A national malaria indicator survey reported only 25% uptake among pregnant women, representing a missed preventive opportunity exceeding 73%. [8] Barriers include infrequent antenatal attendance, supply chain disruptions, and poor provider adherence to dosing guidelines. Strengthening antenatal care attendance and integrating IPTp delivery into routine ANC packages are critical corrective measures.

Malaria vaccines: a transformative development

The approval and deployment of malaria vaccine marks a historic milestone in preventive medicine. Two WHO-approved vaccines are now in active rollout across Africa: **RTS,S/AS01 (Mosquirix)**, which demonstrates up to 72% efficacy in seasonal use, and **R21/Matrix-M**, which has shown up to 75% efficacy in clinical trials, the highest of any malaria vaccine to date. Both follow a four-dose schedule beginning in infancy. [9]

More than 10 million children are now targeted annually for malaria vaccination across 25 African countries, supported by WHO, Gavi, UNICEF, and partner governments. [10] The earlier pilot programme in Ghana, Kenya, and Malawi produced a 13% reduction in all-cause child mortality, underscoring malaria's enormous contribution to under-five deaths. [11] Nigeria commenced a phased R21 rollout, initially targeting the high-burden states of Bayelsa and Kebbi. [2]

Notwithstanding, vaccination alone is insufficient. Maintaining cold-chain infrastructure across remote communities, training healthcare workers for multi-dose schedules, and combating vaccine hesitancy are substantial barriers, particularly in Nigeria's underserved rural areas. [9] Epidemiologists emphasise that vaccines produce maximum impact when deployed alongside ITNs, IRS, and community vector control. [12] The integration of vaccination into routine immunisation schedules and community health worker programmes is therefore essential.

Case management and health system strengthening

Effective malaria prevention is inseparable from a functional health system capable of rapid diagnosis and treatment. Early diagnosis using rapid diagnostic tests (RDTs) and prompt treatment with artemisinin-based combination therapies (ACTs) reduce transmission by limiting the infectious period and preventing complications. Community case management (CCM), whereby trained community health workers diagnose and treat malaria at the household level has proven particularly effective in extending reach to populations far from health facilities, and represents a critical strategy for Nigeria's vast rural communities.

Neglected tropical diseases: prevention strategies and evidence

Mass drug administration

Mass drug administration (MDA) which involves the periodic preventive treatment of entire at-risk populations, regardless of individual infection status is the primary prevention and control strategy for most NTDs. In 2024, **1.8 billion tablets of NTD medical products were supplied to endemic countries,** with 910 million facilitated through WHO, representing one of the greatest achievements in modern global public health. [13] This scale of drug delivery has been made possible through unprecedented public-private pharmaceutical philanthropy, with companies donating medicines valued at billions of dollars annually.

For Nigeria specifically, MDA campaigns targeting onchocerciasis, lymphatic filariasis, schistosomiasis, trachoma, and soil-transmitted helminthiasis (STH) are ongoing across numerous states. Effective implementation requires robust microplanning, community mobilisation, trained drug distributors, and rigorous monitoring. Lessons from Nigeria's first large-scale MDA for schistosomiasis in Lagos State highlight the importance of community engagement and financial management in achieving high treatment coverage. [14]

Disease-specific strategies

The NTD landscape is evolving with notable divergence by disease. Programmes for **lymphatic filariasis** and **trachoma** are scaling down in several countries that have achieved elimination targets, with some projected to require few or no further MDA rounds by 2027. [15] In contrast, **schistosomiasis** and **soil-transmitted helminths** continue to demand wide-scale annual MDA in 41 and 38 countries respectively, with no near-term elimination in sight. [15]

Beyond MDA, integrated vector control (snail control for schistosomiasis), WASH improvements, and health education are essential components of sustained NTD control. WHO's 2025 R&D blueprint **'R&D for the Overlooked: Restoring Hope One Research Question at a Time'** identifies emerging priorities including new diagnostics, point-of-care tests, and novel drug targets for resistant NTD strains. [16]

Coverage gaps and hard-to-reach populations

Despite significant global progress, coverage gaps remain a critical challenge. Mobile populations, internally displaced persons, nomadic commnities.

and residents of conflict-affected areas are systematically excluded from routine MDA campaigns. WHO estimates that tens of millions of eligible individuals are missed annually. [17] Addressing these gaps requires adaptive delivery strategies such as community-directed treatment, door-to-door distribution, and school-based programmes combined with improved mapping of underserved communities.

By end-2024, 54 countries had eliminated at least one NTD, and seven NTDs had been eliminated as public health problems globally. [18] These milestones demonstrate that elimination is achievable but sustained financing, political commitment, and community ownership are non-negotiable prerequisites.

Cholera and waterborne disease prevention

WASH as the foundation

Cholera is fundamentally a disease of inadequate water, sanitation, and hygiene (WASH). *Vibrio cholerae* is transmitted through ingestion of water or food contaminated with faecal matter, making WASH infrastructure the foundational prevention strategy. Addressing cholera sustainably requires prioritising **clean water supply, improved sanitation, and community hygiene education**, alongside strengthening healthcare systems, implementing climate-resilient water infrastructure, and pursuing policies that address the underlying determinants of poverty and gender inequality. [19]

Despite this clear evidence base, cholera outbreaks continue to devastate sub-Saharan Africa. From January to July 2024, 14 sub-Saharan African countries reported 112,301 cases and 1,900 deaths, with a case fatality rate (CFR) of 1.7% above the WHO-recommended threshold of 1%. [4] Between January 2024 and March 2025, over 178,000 cases and 2,900 deaths were recorded across 16 Eastern and Southern African countries. [20] These figures reflect a health system that remains poorly equipped to prevent, detect, and respond to outbreaks.

Oral cholera vaccines

Oral cholera vaccines (OCVs) provide a reactive and preventive tool to complement WASH interventions. Two WHO-prequalified OCVs which are Shanchol and Euvichol-Plus are currently deployed in outbreak response and pre-emptive vaccination campaigns in high-risk areas.

However, OCVs are not readily available or affordable in most low-income settings, and global vaccine stockpiles have frequently been insufficient to meet outbreak demands. [21] Innovative approaches, including **plant-derived edible vaccines** and single-dose OCV schedules, are under investigation as cost-effective alternatives for low-resource settings.

Surveillance and outbreak response

Africa CDC's **Continental Cholera Elimination Plan 2025–2030** sets ambitious targets: reducing cholera deaths by 90%, eliminating the disease in more than 20 countries, and maintaining a CFR below 1% across the continent. [22] However, as of June 2025, no country in the WHO African Region demonstrated adequate cholera response readiness, about 21 countries had only moderate capacity, and 11 had limited capacity. [23] Strengthening real-time surveillance, rapid response teams, and community alert systems is essential to close this gap.

Cross-cutting themes

Financing and sustainability

The sustainability of endemic disease control in resource-limited settings is fundamentally threatened by financing fragility. The Eighth Replenishment of the Global Fund attracted pledges totalling only $11.3 billion which is significantly below its $18 billion target and lower than the previous cycle. [1] This shortfall jeopardises the continuity of malaria, NTD, and HIV programmes across Africa. Increasing domestic health financing, reducing aid dependency, and integrating endemic disease programmes into national health budgets are critical long-term imperatives for governments across the region.

Digital health and surveillance innovation

Climate change is altering the epidemiology of vector-borne and waterborne diseases, expanding transmission zones, intensifying rainfall patterns that drive cholera outbreaks, and exposing new populations to malaria. [7] Digital health tools like geographic information systems (GIS), predictive modelling, mobile health applications, and AI-powered outbreak detection systems offer powerful opportunities to enhance surveillance, target interventions, and optimise resource allocation in settings where traditional health systems are stretched thin.

Community engagement

Community health workers (CHWs) are the backbone of endemic disease prevention in resource-limited settings. From LLIN distribution and malaria case management to NTD drug distribution and cholera community education, CHWs bridge the gap between formal health systems and underserved populations. Sustained investment in CHW training, supervision, remuneration, and supply chains is arguably the single most impactful action that governments and health ministries can take to accelerate progress against all three disease categories discussed in this review.

Challenges and controversies

Several cross-cutting challenges impede progress. **Drug and insecticide resistance** threatens the longevity of both malaria chemoprevention and NTD MDA programmes, requiring continuous surveillance and pipeline investment in new compounds. **Implementation gaps** as typified by Nigeria's 25% IPTp uptake despite WHO-mandated policy which illustrate that tool availability does not translate to tool use, and that health system strengthening must accompany any technical intervention. [8]

Vaccine hesitancy poses an emerging threat to malaria vaccine rollout, particularly in communities with prior negative experiences of healthcare systems or misinformation exposure. [12] The question of **domestic financing** remains unresolved whether African governments can and will sustainably fund endemic disease control without perpetual external dependency is a political and economic challenge as much as a public health one. Finally, the systematic exclusion of **displaced and hard-to-reach populations** from prevention programmes represents both a humanitarian and an epidemiological failure, as uncontrolled transmission in these groups fuels community-wide burden. [17]

Conclusion and recommendations

Malaria, neglected tropical diseases, and cholera remain major preventable causes of death and disability in resource-limited settings. The tools to control them exist and have proven effective at scale but coverage gaps, implementation failures, financing shortfalls, and emerging resistance threaten the gains achieved. Nigeria, as the country with the world's highest individual burden of both malaria and NTDs, sits at the epicentre of this challenge.

Priority actions include integrating the R21 vaccine into routine immunisation with investment in cold-chain infrastructure; redesigning antenatal care delivery to close the IPTp coverage gap through task-shifting and pharmacy-based provision; deploying adaptive MDA strategies to reach displaced and hard-to-reach populations; and prioritising WASH infrastructure as the foundational response to cholera. Alongside these, African governments must increase domestic health financing to reduce aid dependency, harness GIS-based surveillance and digital health tools for outbreak prediction and resource optimisation, and invest sustainably in community health worker capacity as the primary delivery mechanism for all prevention interventions.

Progress against endemic diseases in resource-limited settings is possible the evidence proves it. What is required now is the political will, financial commitment, and implementation science expertise to translate that evidence into universal coverage.

A key limitation of this review is its narrative design, which is vulnerable to confirmation bias — without a formal study quality appraisal tool, the synthesis risks over-representing positive findings from well-funded programmes while under-representing implementation failure, however the author explicitly incorporated a dedicated section on challenges and controversies that confronted unfavourable data directly, including Nigeria's critically low 25% IPTp uptake despite WHO policy mandates, the growing threat of insecticide and drug resistance, documented vaccine hesitancy, and the systematic exclusion of displaced populations from mass drug administration coverage, thereby self-correcting against the optimism bias that commonly characterises narrative reviews.

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KNOWLEDGE AND PRACTICE OF HEALTHCARE WORKERS ON PREVENTIVE HEALTH.

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ABSTRACT:

Introduction: The limited resources in low- and middle-income countries make preventive health an indispensable asset. With many patients often presenting with debilitating advanced disease, the best healthcare plan is one which targets diseases through risk reduction and early intervention. Despite substantial global disease burden, including the impact of COVID-19 and rising non-communicable diseases, healthcare workers (HCWs) play a critical role in prevention through knowledge and practice. This review explores the level of knowledge of healthcare with respect to preventive health while evaluating the gap between their knowledge and their day-to-day practices.

Methods: This narrative review derived data from cross-sectional studies, systematic reviews, and scoping reviews assessing Healthcare workers' knowledge, attitudes, and practices (KAP) regarding infection prevention, disease control, and health promotion**.**

Results: The findings of this review indicate that healthcare workers generally demonstrate moderate to good knowledge of preventive health measures, with emphasis on infection prevention and control, vaccination, and routes of disease transmission/spread. Despite their level of knowledge, significant gaps exist in the relay of this knowledge into everyday clinical practice. A key example of this can be seen in the gap between the high awareness about needle-stick injury and the consistent disregard for the protocols that are protect them from it. Adherence to post-exposure prophylaxis and safety practices remains low. Similar discrepancies are observed in COVID-19 prevention, HIV biomedical prevention, and vector-borne diseases such as dengue. Several contributing factors have been identified and these include inadequate resources, lack of training, and infrastructural limitations.

Conclusion: As much as healthcare workers have a decent foundation with respect to preventive health, significant gap exists between how much they know and how much they translate in their clinical practice. Major driving factors for this knowledge-practice mismatch are systemic and contextual factors. Strengthening training programs, improving resource availability, and reinforcing institutional policies are essential to bridge these gaps and enhance preventive healthcare delivery.

Introduction:

Diseases siphon human resources at every level of organization, affecting individuals, societies and even whole economies. The 2023 Global burden of disease reported that before ceasing being the major cause of death, COVID 19 had killed a total of 18 million people globally(1). Non-communicable diseases remain an ever growing challenge especially in low-income settings. Preventive health involves strategies to reduce infection spread in communicable diseases such as Coronavirus, and to address risk factors in non-communicable diseases..

The World Health Organization (WHO) defines the meaning of prevention as: "approaches and activities aimed at reducing the likelihood that a disease or disorder will affect an individual, interrupting or slowing the progress of the disorder or reducing disability"(2). Preventive health is a core public health strategy. In addition to being cost effective, it greatly reduces the disease burden allowing the diversion of resources to already established illnesses. .

Healthcare workers stand in a strategic position in the triangulation involving him/her, the patient and their health. Healthcare workers play a vital role in disease prevention as regards both themselves and the patients, therefore, adequate knowledge on various diseases and preventive measures is required.

The extent to which knowledge translates into practice remains a major concern. This highlights the importance of examining not only what health workers know, but also how they perceive and apply that knowledge. Several factors, including educational exposure, socio-cultural norms, and access to health information, have been identified as key determinants influencing knowledge, attitudes and practices related to preventive health.

This literature review aims to critically examine existing evidence on health workers' knowledge and knowledge-practice gaps in preventive health, thereby providing a foundation for future studies.

Knowledge And Practice **Of Healthcare Workers On Preventive Health:**

Adequate knowledge on the part of health workers is fundamental for effective Infection Prevention and Control (IPC). HCWs' awareness should include issues related to hand hygiene, wearing personal protective equipment (PPE), immunization for prevention of communicable diseases, modes of infection transmission, assessment of patients for infection, medical instrument decontamination, healthcare waste handling, and needle-stick and sharp safety policy (3). A systematic review assessing the knowledge of infection prevention and control among healthcare workers found that the level of knowledge among healthcare workers varied considerably, being affected by various factors (4).

A study exploring the Needle-stick injuries (NSI) among health workers in Abha city, Saudi Arabia reported that 94.7% knew about the definition of NSI, and 82.4% of them were aware of sharps disposal containers recommendation, whereas 61.2% recognized that the recap of the needle was not recommended. The majority of respondents (78.9%) gave a correct answer regarding the doses of the Hepatitis B vaccine, while 43.5% knew that there is no vaccine for Hepatitis C (5). About 76.9% of HCWs who sustained NSIs washed the injury site with soap and water, 38.5% identified the source patient, 44.0% got tested for HIV, hepatitis B, hepatitis C, and only 23.1% got post-exposure prophylaxis (5). The study highlights a significant decline in positive responses as regards disease preventing practices, despite good knowledge of needle-stick injuries.

A cross sectional study involving 54 countries in Europe and central Asia, assessing the knowledge about biomedical HIV prevention among health workerrs found that correct knowledge of U=U (undetectable equals untransmissible) was reported by 61.25%, PEP by 55.70% and PrEP or HIV patients and previous training on HIV infection and control. This study exposed substantial knowledge gaps in HIV prevention and care although the non-representative nature of sample used limits the generalizability of the findings. (7)

A 2021 study which investigated practices towards prevention of Coronavirus among 334 healthcare workers inEthiopia found that 114 (35.1%) respondents used a face mask and 97 (29.8%) used gloves for every patient. Among the participating healthcare workers, only 46 (14.2%) practiced hand washing (among those only 47.2% use soap to wash their hands) and 89 (27.4%) used antiseptics/sanitizer every time. One hundred and three (31.7%) healthcare workers refrained from touching their face and only 16.3% of the respondents were practicing social distancing every time (6). The study also evaluates the possible reasons for these findings and reported that the majority (87.5% and 88.24%) of the HCWs who did not wear facemasks and gloves, respectively, stated that shortage was a reason for not using these items. Also, the majority (95.29%) of the HCWs, from those who did not wash their hands, claimed the absence of a hand washing facility as a reason for not washing their hands. (6).

The role of healthcare workers in monitoring and encouraging patients' "health behaviours" is an important cornerstone in preventive health. This is however, complicated by the challenges of real-life clinical practice. A paper on preventive cardiology investigating health workers' knowledge, attitudes and practices towards cardiovascular disease (CVD) in the Asia-pacific region found that across 25 nations, 74.9% of HCWs routinely assessed patients' lifestyle-related CV risk profiles in clinical practice. About 65.7% of HCWs counseled patients who were asymptomatic for CVD on lifestyle changes to improve their CV risk profiles, while 68.2% of HCWs did so when patients were overweight. Approximately half (51.3%) of the HCWs surveyed implemented comprehensive smoking cessation interventions for their patients. Attitudes towards CVD prevention were generally positive with 90.3% of HCWs rating CV risk factor counseling as important in the prevention of CVDs (8). The study also dissected the disparities in CVD risk assessment between low- and high-income countries in the region. Lower middle income (LMI) nations demonstrated significantly better outcomes than high income (HI) nations in terms of their CVD prevention attitudes and clinical practices. HCWs from LMI nations rated themselves to be more effective in promoting CVD preventive lifestyle changes as compared to their HI counterparts. They also rated CV risk factor counseling to be important in CVD prevention. In terms of clinical practice, HCWs from LMI nations were more likely to assess the CV risk profile of their patients routinely. They were more likely to counsel asymptomatic and overweight patients on lifestyle modifications to reduce

CV risk. LMI nation HCWs were also more likely to implement extensive interventions to promote smoking cessation amongst their patients when compared to their HI counterparts. (8) .

Re-emerging diseases are difficult to prevent and control partly because of the paucity of knowledge and experience even among healthcare personnel. These diseases are mostly vector-borne and their emergence can be attributed to the global change in climate. A cross sectional study appraising the knowledge, attitudes and practices towards dengue fever prevention and treatment among healthcare workers in Somalia revealed concerning findings with greater than 66.6% of the participants demonstrating poor knowledge of the disease and its vector(9).Practice assessment of dengue prevention and control revealed concerning patterns with 61.6% demonstrating poor practices. Water management practices showed variable compliance: 69.53% regularly closed water containers, and only 37.24% used proper water treatment methods. Vector control practices revealed implementation gaps: 65.10% were disposed of stagnant water, but only 35.42% were actively checked for mosquito larvae. Personal protection measures, including mosquito net usage (33.07%), protective clothing (32.29%), and mosquito coils (24.48%), showed particularly low adoption rates (9).

A cross-sectional study assessing the knowledge of local snakes, first-aid and prevention of snakebites among community health workers and community members in rural Malawi found that 62.7% of the respondents had inadequate knowledge of snake identification, first aid, and prevention practices. There was no significant difference between community members and community healthcare workers (10). Regarding prevention practices over 90% of the participants reported cleaning debris, clearing bushes, filling holes, avoiding marshy and bushy areas, and using a torch at night as effective methods to prevent snakebites. However, a majority of the participants incorrectly deemed the use of snake deterrents, including spraying garlic or onion syrup soup, snake repellent, or topical application of herbs as effective prevention measures (10). This reveals that there is a deficiency in formal education on snake bite prevention even among the health workers in the community.

A scoping review mapping healthcare workers' knowledge, attitudes, practices and influencing factors in the prevention of medical device-related pressure injuries (MDRPI) in mine countries found that most studies reported insufficient understanding of MDRPI concepts, staging classification, and preventive measures (11). Practice evaluation revealed varying levels of implementation of preventive measures. While some studies reported satisfactory practice levels in device fixation and skin monitoring, others identified significant gaps in preventive interventions, particularly in device repositioning, protective dressing application, and documentation of prevention strategies. The review proceeded to evaluate the factors affecting healthcare workers' knowledge, attitudes, and practices in MDRPI prevention. It categorised these factors into individual and institutional dimensions. At the individual level, both demographic and professional characteristics demonstrated significant influence. Among demographic factors, age and educational attainment emerged as a significant predictors of better results. Professional characteristics significantly influenced prevention outcomes: higher job positions/titles, increased years of clinical experience and greater patient care exposure were linked to improved knowledge levels. At the institutional level, hospital grade and department type emerged as primary determinants of prevention knowledge and practices, while the presence of prevention protocols and hospital size significantly impacted MDRPIs prevention practices (11).

The Nigerian situation:

In Nigeria, 84.9% of primary healthcare workers in Osun State practice IPC to prevent monkey pox disease (Mpox). Female HCWs were significantly more likely to have good Mpox (aOR= 25.2; 95%CI: 12.6-50.2) and IPC knowledge (aOR= 1.8; 95%CI: 1.1-3.0) compared to males, while HCWs who were above 35 years were least likely to have good Mpox (aOR= 0.1; CI: 0.02-0.24) and IPC knowledge (aOR=0.28; 95%CI: 0.09-0.9) compared to their younger counterparts. HCWs with previous training were more likely to have twice as good IPC knowledge (aOR= 2.39; 95%CI: 1.45-3.93) than those without training (12). Community health workers (CHWs) in the state, in an interventional study, demonstrated a significant improvement in knowledge and prevention of rheumatic heart disease with post-test evaluation revealing that 100% of the CHWs had good knowledge on diagnosis and prevention (13).

A study in Enugu revealed 72.7% of these healthcare workers had poor knowledge (i.e< 50% of the knowledge scores) of IPC. 90.3% did not know that considering the potential for transmission of infectious agents in patients constitutes part of the concept of standard precautions. Similarly, 95.0% had poor knowledge of the use of puncture-resistant containers as a standard precaution practice.Gaps in knowledge and practice were documented as regards handwashing and standard precautions with body fluids (14).

A cross-sectional study among 180 randomly selected healthcare workers who took part in a larger study on the design and pretesting of vaccine cold chain (VACOC) coolers found that 87 (48.3%) could correctly explain the vaccination logistic management system, 132 (73.3%) had been trained on the system. Overall, 83.9% and 81.1% were found to have good knowledge and attitude to the management systems, respectively (15). Adequate knowledge on vaccination for disease prevention was reported in this study. In Enugu, it was found that 56.3% of healthcare workers had received the COVID-19 vaccines partially or fully (18). Major reasons for vaccine refusal/hesitancy were fear of side-effects (66.7%), concern about efficacy of the vaccines (64.4%) and lack of adequate information on the available vaccines (40%). Interestingly, few of the respondents (11%) who refused the vaccine indicated that they may be willing to vaccinate if the vaccines were paid for, implying financial constraints (18).

A 2022 paper on the Lassa fever (LF) outbreak in the northern part of the nation reported that the level of LF knowledge and its PC measures among the study participants was low (11.60±8.14, 64.4%) and predicted by participants' LF training status (OR 2.06; 95% CI: 1.19-3.57; p = 0.009), place of work (OR 1.82; 95% CI: 1.07-3.08; p = 0.03) and their designations (OR 2.40; 95% CI: 1.10-5.22; p = 0.03) (16).

A survey of doctors in the country exposed that hand hygiene and gloves were the most common infection prevention equipment available for the prevention of infection for the respondents in the healthcare settings followed by other types of medical facemasks, N95 respirator facemasks and eye protection equipment like goggles. None of the respondents had access to a fluid-resistant gown; 53.1% were confident that they can don and doff PPE correctly (17).

Conclusion:

Particularly in the frontiers of infection prevention and control, vaccination, and disease transmission, healthcare workers demonstrate substantial knowledge of preventive health However, a consistent gap persists between this knowledge and its translation into routine clinical practice. Across diverse settings and disease areas, including needle-stick injuries, COVID-19, HIV prevention, and vector-borne diseases, adherence to recommended preventive measures remains suboptimal despite high awareness. This knowledge–practice agap is largely driven by systemic constraints such as inadequate infrastructure, limited resources, insufficient training, and weak enforcement of institutional protocols. Bridging this gap requires strengthened continuous professional education, improved availability of essential preventive resources, and reinforced institutional policies that support compliance. Addressing these barriers is essential to improving preventive healthcare delivery and reducing overall disease burden. A key limitation of this study is the lack of generalizability due to the variations in the included studies, including differences in study size, study population, measurement tools which may limit application to a larger population. In addition, there is a degree of subjectivity in study interpretation which could introduce researcher bias.

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Beyond Funding: Policy and Financing Reforms for Strengthening Primary Healthcare in Low- and Middle-Income Countries

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ABSTRACT

Background: Strengthening primary healthcare (PHC) in low- and middle-income countries (LMICs) requires deliberate policy reform that goes beyond resource availability to address governance structures and financing models. In Nigeria, chronic underinvestment, weak accountability, and heavy reliance on out-of-pocket payments continue to undermine PHC delivery. This narrative review aims to explore the role of policy and financing reforms in strengthening primary healthcare in low- and middle-income countries, with emphasis on governance, accountability, and innovative financing strategies necessary for achieving equitable and resilient health systems.

Methods: A narrative review was conducted using an electronic search of PubMed, DOAJ, ScienceDirect, and Google Scholar for peer-reviewed articles published between January 2010 and December 2025.

Results: Key findings highlight the critical role of governmental accountability and public-private partnerships (PPPs) in advancing PHC governance. Nigeria allocates only 5.18% of its national budget to healthcare, far below the 15% Abuja Declaration target. Out-of-pocket payments constitute approximately 74.68% of total healthcare expenditure. The National Health Insurance Authority (NHIA), established in 2022, represents a positive reform step, though implementation remains constrained by low enrolment and inadequate funding. The diagonal investment approach, as demonstrated in Ethiopia, offers a pragmatic framework for simultaneously targeting specific diseases and strengthening the broader health system. Conclusion: Achieving resilient and equitable PHC in LMICs demands sustained political commitment, strengthened regulatory frameworks, institutionalised community engagement, and financing reforms that reduce out-of-pocket burden and expand risk pooling. Universal health coverage will remain aspirational without these foundational reforms.

Keywords: primary healthcare, out-of-pocket payments, public-private partnerships, health financing, healthcare expenditure, universal health coverage, community health workers, low- and middle-income countries.

Introduction

Policy reform is the deliberate, systematic process of changing or refining existing laws and policies with the aim of improving the effectiveness of the current system in addressing specific problems and, producing better outcomes.

Constant, positive, policy reforms in primary healthcare is the hallmark of a truly advancing economy, especially when designed to meet progressively greater goals and standards.

In Nigeria, and comparable LMICs, effective policy reforms typically involve, restructuring governance frameworks and redesigning how PHC services are financed at the community level. Such reforms must be intentional and goal-directed, functioning simultaneously on multiple levels including national policy and institutional rules and must be allowed adequate time for effective implementation.

This is especially important given that the WHO has described PHC as the key to achieving an acceptable level of health throughout the world. And, in the Alma-ata declaration, recognized that existing inequalities in health status across countries are unacceptable, further stating that governments bear responsibility for providing adequate healthcare to all peoples, a milestone that PHC is central to attaining [1].

Addressing this responsibility in the Nigerian and LMIC context requires a critical examination of the role of governance in the advancement of PHC, and finance frameworks specifically tailored to Nigeria and other LMICs. This review therefore explores the need for attention to governance and financing.

positive policy reforms in strengthening primary healthcare practice, with particular.

Literature review

A narrative review was conducted on the need for positive policy reforms in ensuring a stronger primary healthcare practice in low- and middle-income countries. An electronic search of published articles was performed across four databases: PubMed, Directory of Open Access Journals (DOAJ), ScienceDirect, and Google Scholar for articles between January 2010 and December 2025, using the following search terms in combination: 'policy reforms,' 'primary healthcare,' and 'low- and middle-income countries.' Boolean operators were used to narrow and broaden search results as needed. Grey literature, including World Health Organization (WHO) documents were consulted where necessary. Studies were included if they addressed governance, and financing in Nigeria and comparable low- and middle-income countries. Studies were excluded if they were outside the timeframe, or were not specific to low- and middle-income countries (LMICs) or primary healthcare (PHCs). Titles and abstracts were screened, followed by a full text review of eligible articles. A total of twelve articles met the criteria and were included in the final review. Data were extracted on reform types and policy implications, and a narrative synthesis was conducted to identify patterns and gaps.

The role of accountability in governance in advancing primary healthcare

Governance, and the adoption of policies relevant for growth are very crucial for long-lasting primary healthcare systems in LMICs. An evidence gap map employed by Ur-Rahman et al. identified key elements of good PHC governance in LMICs namely: accountability, social responsibility, public-private partnerships, and communication between patients and healthcare providers. The study further identified knowledge gaps in the importance of social accountability, intersectoral collaboration, and public-private partnerships in PHC governance [2].

A useful measure of how seriously a country prioritises its public healthcare is the proportion of its total budget or Gross Domestic Product (GDP) allocated to the health sector. In an effort to combat communicable diseases, member states of the African Union (AU) convened in Abuja and pledged to allocate at least 15% of their annual national budgets to healthcare. However, this commitment has rarely been fulfilled — a reflection of the tangible impact that weak governance and inadequate policy reform have on particularly within LMICs [3].

Nigeria's 2025 national budget totalled approximately $29.9 billion USD, against a GDP of $285 billion USD, yet only 5.18% of this budget was allocated to healthcare [4, 5].

By contrast, Singapore allocated approximately 16.8% of its $93.2 billion USD national budget to health in the same fiscal year [6] — more than three times Nigeria's share. Given that PHC in LMICs operates under significantly more constrained resources than in high-income countries, ensuring the proper and equitable allocation of these limited resources demands robust government accountability as a matter of policy priority.

The role of public-private partnerships in advancing primary healthcare

A public-private partnership (PPP) is a formal arrangement where the government works together with the private sector to fund services or deliver infrastructure would typically be the sole responsibility of the state. In LMICs, where public health systems face chronic underfunding and infrastructural deficits, PPPs are especially critical and can take many forms, including partnerships with faith-based organisations, nongovernmental organisations, development partners, and financial institutions.

In Nigeria and comparable LMICs, PPPs have played a significant role in expanding healthcare coverage, filling workforce gaps, and introducing digital innovation into PHC delivery. Historically, a substantial proportion of Nigeria's healthcare funding has come from external PPP arrangements — between 2022 and 2025, USAID alone allocated approximately $1.6 billion specifically to health in Nigeria [7], while the World Bank approved $570 million for PHC strengthening in 2024 [8]. These figures underscore both the value and the fragility of PPP-dependent health financing, particularly in light of recent reductions in international development assistance.

Despite their benefits, PPPs present governance challenges that must be carefully managed. The profit motive of private partners can conflict with the public health mandate of equitable service delivery, particularly in underserved communities. Without robust regulatory frameworks and clear accountability structures, PPPs risk deepening inequities rather than addressing them. Studies have further shown that the fragmentation arising from multiple parallel PPP arrangements can undermine the coordination of PHC delivery in Nigeria specifically [9], reinforcing the need for deliberate, policy-driven governance of these partnerships.

Financing tailored to LMICs

Adequate and sustainable financing is fundamental to the delivery of effective primary healthcare in low- and middle-income countries. In Nigeria, however, the current financing landscape is characterised by a heavy dependence on out-of-pocket payments, fragmented external funding, and chronic underinvestment by the government — a combination that places an enormous burden on individuals and households, and undermines the consistency and quality of PHC delivery.

Out-of-Pocket Payments and Their Burden

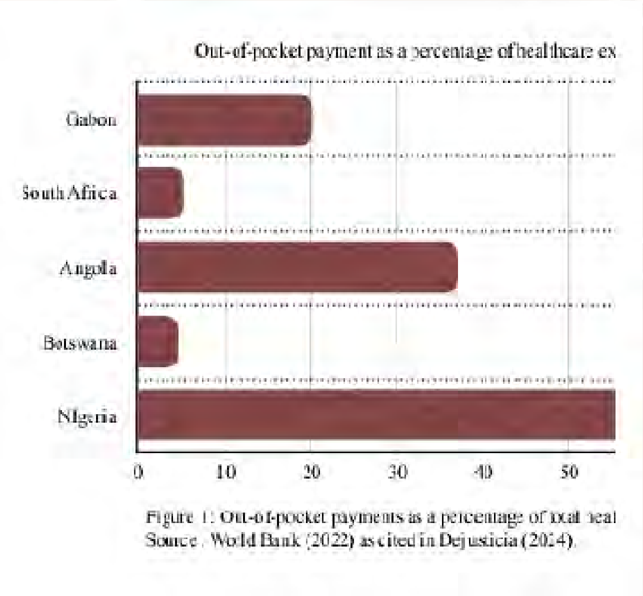

Figure 1: Out-of-pocket payments as a percentage of total health expenditure across selected African countries. Source: World Bank (2022) as cited in Dejusticia (2024).

Out-of-pocket payments remain the dominant mode of healthcare financing in Nigeria, representing approximately 74.68% of total healthcare expenditure — one of the highest proportions in Sub-Saharan Africa, and a stark indicator of the failure of public financing systems to protect citizens from catastrophic health costs [10]. By contrast, public funds account for only 25% of total health spending, with the private sector — overwhelmingly driven by direct household payments — contributing the remaining 75% [11]. This financing structure is deeply inequitable, as it disproportionately burdens low-income households, pushes families into poverty, and deters vulnerable populations from seeking care altogether. Meaningful policy reform in healthcare financing must therefore prioritise reducing the out-of-pocket burden as a matter of urgency.

The National Health Insurance Authority and Insurance Reform

One of the most significant recent policy reform efforts in Nigeria's PHC financing landscape is the establishment of the National Health Insurance Authority (NHIA) under the National Health Insurance Authority Act of 2022, which replaced the former National Health Insurance Scheme (NHIS). The NHIA was designed to accelerate progress toward universal health coverage by expanding insurance enrolment, accrediting private health maintenance organisations (HMOs) to deliver PHC services, and channelling funds through the Basic Health Care Provision Fund (BHCPF) to both public and private PHC providers [11]. While the NHIA represents a positive policy reform, its implementation has been constrained by low enrolment rates (about 5% of Nigerians are currently enrolled), limited public awareness, and inadequate funding — challenges that reflect broader governance deficits in Nigeria's health system [11]. For health insurance reform to meaningfully reduce out-of-pocket payments and strengthen PHC, it must be accompanied by deliberate investment in enrolment drives, provider accreditation, and accountability mechanisms.

Alternative approaches to adequate publicly funded primary healthcare

In global health, there have historically been two competing approaches to funding and building health systems:

Vertical approach: funding flows to one specific disease or program at a time. For example, a dedicated HIV program, or a dedicated malaria program. Money is ring-fenced, results are measurable, but the broader health system is neglected.

Horizontal approach: funding goes to strengthening the entire health system broadly — training all workers, building all facilities, improving all services. More comprehensive, but harder to measure results and slower to show impact. Both approaches have serious limitations when used alone, which can be mitigated by using the **diagonal approach**. This essentially combines the best of both worlds, using the focused funding and measurable targets of vertical programs as a vehicle to simultaneously strengthen the broader health system. A specific disease program is used as an entry point, but intervention is deliberately designed so that the infrastructure, workforce, and systems built around it benefit all of PHC instead.

Assefa et al. [12] documented how Ethiopia, beginning in 2005, implemented the diagonal investment approach by using its HIV/AIDS disease control programme as a strategic entry point for broader PHC system strengthening. Investments in laboratory infrastructure, community health worker training, and drug supply chains — initially made for HIV — were deliberately designed to serve the entire PHC system across four delivery platforms: community-based care, health centres, first-level hospitals, and population-based interventions. Central to the approach's success was committed government leadership that coordinated development partners, including the Global Fund and Gavi, toward shared PHC goals rather than fragmented vertical programs. As external funding declined after 2013, Ethiopia compensated by increasing domestic resource mobilisation — a critical lesson for Nigeria, where over 74% of healthcare funding currently depends on out-ofpocket payments and external partnerships [11].

Conclusion

Strengthening primary healthcare in Nigeria and other low- and middle-income countries is fundamentally a question of governance quality and financing design, rather than resource availability alone. This review highlights that weak accountability structures, fragmented publicprivate partnerships, and heavily out-of-pocket–driven financing systems continue to undermine the effectiveness, equity, and sustainability of PHC delivery.

Addressing these challenges requires deliberate and sustained policy reform across multiple levels. First, improving regulatory frameworks is essential to ensure that both public institutions and private partners operate within clearly defined accountability structures. Stronger regulation will reduce fragmentation, align incentives, and ensure that partnerships contribute meaningfully to equitable service delivery rather than exacerbating disparities.

Second, community engagement must be institutionalised as a core component of PHC governance. Policies that incorporate community participation in planning, monitoring, and evaluation improve service responsiveness, enhance trust in the health system, and strengthen social accountability. Without this bottom-up engagement, even well-designed reforms risk poor uptake and limited impact.

Third, adequate support for community health workers (CHWs) is critical to bridging the gap between health systems and underserved populations. Investment in CHW training, remuneration, and integration into formal health systems can significantly where PHC services are most needed. improve access to care, particularly in rural and resource-constrained settings where PHC services are most needed.

In parallel, financing reforms must prioritise reducing out-of-pocket expenditure through expanded risk pooling mechanisms such as the National Health Insurance Authority, alongside increased domestic resource mobilisation. The adoption of a diagonal investment approach offers a pragmatic pathway for LMICs, allowing targeted disease funding to simultaneously strengthen broader health system capacity.Ultimately, achieving resilient and equitable primary healthcare systems in LMICs will depend on sustained political commitment, coherent policy implementation, and a shift toward financing models that protect populations rather than burden them. Without these reforms, the goal of universal health coverage will remain aspirational rather than attainable. Study is limited by inclusion of only twelve LMIC-focused studies and heterogeneous governance-financing evidence, thematic synthesis was used; publication bias was reduced via grey literature, while causal claims were avoided through contextual policy comparison

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Digital innovation in low-income communities

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Abstract

Background: Persistent health-system weaknesses in low-income communities — including health workforce shortages, geographic barriers, fragmented records, and weak financing — have created urgent demand for innovative solutions. Nigeria, with its large population, marked rural-urban disparities, and rapidly expanding mobile connectivity, represents an important setting for examining how digital health innovation is implemented and constrained in resource-limited contexts [1,2].

Aims: This review aims to synthesize evidence on the historical development of digital health in Nigeria, the health-system drivers that necessitated digital innovation, the major forms it has taken, its demonstrable impact, and the structural barriers that continue to limit scale-up.

Methods: A narrative literature review was conducted using PubMed/MEDLINE, Google Scholar, and the WHO Global Health Library. Search terms included 'digital health Nigeria,' 'mHealth low-income communities,' 'telemedicine sub-Saharan Africa,' 'electronic health records Nigeria,' and 'digital innovation resource-limited settings.' Peer-reviewed articles, systematic reviews, and grey literature from WHO, Nigeria's Federal Ministry of Health, and the Nigerian Communications Commission published between 2013 and 2026 were included [1–6].

Results: Mobile health, telemedicine, electronic health records, digital training systems, and emerging artificial intelligence applications have all demonstrated measurable benefits in access, adherence, coordination, and efficiency. Gains are strongest in process indicators like communication, patient tracking, and data management, rather than broad population-level outcomes. However, these improvements remain fragile, constrained by electricity deficits, internet instability, financing gaps, low digital literacy, interoperability problems, and weak governance frameworks. Digital innovation is most effective when embedded within broader health-system reform rather than deployed as a standalone technological fix [1,3,5–8].

Keywords: digital innovation, digital health, low-income communities, Nigeria, mHealth, telemedicine, electronic health records, literature review

Introduction

Digital innovation in health refers broadly to the use of information and communication technologies to improve prevention, diagnosis, treatment, training, monitoring, financing, and management of health services. In low-income communities, the appeal of digital innovation lies in its potential to stretch limited resources, connect underserved populations to services, and reduce inefficiencies that are common in paper-based and highly centralized systems [6,9]. The global policy environment has increasingly framed digital health as a core enabler of stronger health systems, with the World Health Organization's global strategy emphasizing person-centered, interoperable, secure, and scalable digital transformation [6].

Nigeria is especially important in this discussion because it illustrates both the urgency and the complexity of digital transformation in low-resource settings. It has one of Africa's largest healthcare markets, a large rural population, substantial maternal and child health burdens, a double burden of infectious and non-communicable diseases, and persistent workforce shortages. At the same time, Nigeria has seen major expansion in mobile connectivity. According to the Nigerian Communications Commission, broadband penetration reached 44.43% in 2024, with population coverage of 95.31% for 2G, 89.42% for 3G, 84.60% for 4G, and 13.28% for 5G [2]. These conditions make Nigeria an appropriate central case through which to examine how digital innovation is being imagined, implemented, and contested in low-income communities [1,2].

This review aims to provide a layered discussion of why digital innovation became necessary, how it developed historically, what forms it has taken, what benefits the literature reports, and why scale remains difficult despite obvious need .

Methods

This narrative literature review was conducted using a structured search of peer-reviewed and grey literature. Three electronic databases were searched: PubMed/MEDLINE, Google Scholar, and the WHO Global Health Library. In addition, institutional reports and strategic documents from the World Health Organization (WHO), Nigeria's Federal Ministry of Health (FMOH), the Nigerian Communications Commission (NCC), and the World Bank were reviewed.

Search terms used included: 'digital health Nigeria,' 'mHealth low-income communities,' 'telemedicine sub-Saharan Africa,' 'electronic health records Nigeria,' 'digital innovation resource-limited settings,' 'health information systems Africa,' 'artificial intelligence health Nigeria,' and 'digital health workforce Nigeria.' Boolean operators (AND, OR) were used to combine terms and broaden or narrow results as needed. Searches were limited to publications in English from 2013 to 2026, with earlier seminal sources included where relevant. Titles and abstracts were screened for relevance to digital health innovation in Nigeria and other low-income settings, and full texts were retrieved for included sources. Reference lists of key articles were also scanned for additional relevant literature.

Digital innovation in low-income communities

In the literature, digital innovation in low-income communities is not limited to smartphone apps. It includes basic SMS reminders, call-based teleconsultation, offline data systems, digital patient identifiers, electronic medical records, remote training platforms, health insurance enrollment tools, supply-chain dashboards, and AI-assisted decision support [6-8,10]. This distinction is important because low-income communities often operate under technological constraints that make high-end solutions impractical. In such settings, low-bandwidth, low-cost, and offline-capable systems may be more valuable than sophisticated but infrastructure-dependent platforms [1,5,8].

The phrase "low-income communities" should also be interpreted broadly. It refers not only to poor households, but also to structurally underserved communities where income poverty overlaps with weak public infrastructure, sparse health facilities, poor transport networks, low literacy, and limited digital access. In Nigeria, such communities are found in rural areas, urban informal settlements, conflict-affected regions, riverine settlements, and border communities [1,3,11]. The digital divide therefore operates across geography, gender, education, and class, and this has major implications for the adoption of digital health innovations [5,11].

Historical background of healthcare delivery in Nigeria

To understand digital innovation in a low resource community such as Nigeria, it is necessary to locate it within the longer history of the country's health system. Nigeria's health sector inherited deep urban bias from the colonial period, when services were concentrated in administrative and commercial centers. After independence, health expansion efforts increased the number of facilities, but service quality and distribution remained uneven. The adoption of primary health care after the Alma-Ata era aimed to correct these imbalances, yet implementation was weakened by inadequate financing, poor coordination among federal, state, and local actors, and recurring governance failures [1,3].

Over time, these structural weaknesses produced a health system marked by uneven facility readiness, dependence on paper records, low referral efficiency, and frequent disruptions in the delivery of essential services. Rural communities often had nominal access through primary healthcare centers, but these facilities were frequently under-equipped, understaffed, and poorly linked to secondary and tertiary levels of care [1,3,11]. In this context, digital innovation emerged not as a luxury add-on, but as a response to long-standing system fragmentation.

Historical evolution of digital health in Nigeria

Nigeria's digital health trajectory became more visible in the 2000s and 2010s, as mobile telephony expanded rapidly and development partners increasingly supported technology-enabled service delivery. Early efforts were often donor-driven and program-specific, especially in HIV, maternal health, and health information management. These interventions demonstrated that digital tools could support data capture, case tracking, adherence monitoring, and decentralized service delivery even in resource-constrained settings [1,12].

A major policy milestone was Nigeria's National Health ICT Strategic Framework 2015-2020, which articulated a national vision for using health ICT to support universal health coverage and strengthen the health system [1]. The framework acknowledged critical gaps in governance, standards, architecture, infrastructure, workforce, and interoperability, and it called for more coordinated national action. This was significant because the literature repeatedly identifies fragmentation as a central challenge in African digital health ecosystems: pilot programs often succeed locally but fail to scale because they are isolated, donor-dependent, and not integrated into national systems [1,13].

Thus, the history of digital innovation in Nigeria is not just a story of technological arrival. It is a story of gradual institutional recognition that health-system problems such as workforce scarcity, poor data quality, weak continuity of care, and rural exclusion require information-based solutions, but also governance reforms to sustain them [1,6,13].

Why digital innovation became necessary in Nigeria

Health workforce shortages

Nigeria's shortage of healthcare workers is one of the most frequently cited reasons digital innovation became urgent. WHO and World Bank datasets show persistently low physician density in Nigeria relative to population need [3,4]. Low worker density becomes even more problematic when combined with internal maldistribution and outward migration. In practice, many low-income and rural communities depend on a small number of frontline workers who must manage large caseloads with minimal supervision or specialist support [3,4,11].

Geographic inequality and poor physical access

Distance remains a major barrier to care in low-income communities When patients must travel long distances over poor roads to reach a facility, service utilization drops and delays increase. This affects antenatal care, chronic disease follow-up, specialist referral, and emergency response [7,8,15]. Teleconsultation, SMS triage, and remote support systems became attractive in this environment because they reduce the need for repeated physical travel and allow some services to move closer to the household [7,8].

Weak health information systems

A recurring theme in thus revure is that paper-based record systems create duplication, delays, data loss, poor continuity of care, and weak accountability [9,10,12]. In low-income settings, where supply chains are fragile and there is poor staffing, the absence of usable data has direct clinical and managerial consequences. Electronic records and digitized reporting systems became important because they can improve patient tracking, support monitoring, and make decision-making less dependent on incomplete paperwork [9,10,12].

Maternal and child health gap

Nigeria's maternal and child health burdens have also pushed interest in digital innovation. Studies on maternal-health interventions show that SMS reminders, call-based support, digital referral coordination, and remote provider training can improve awareness, care-seeking, and service responsiveness in rural communities [7,15,16]. Because maternal outcomes are sensitive to delay, communication, and continuity, digital systems have been seen as especially useful in this field [7,15,16].

Burden of chronic infectious and non-communicable disease

Nigeria's disease profile creates further need for continuity-oriented digital systems. HIV, tuberculosis, hypertension, and diabetes all require repeated contact, monitoring, adherence support, and reliable longitudinal records. The move toward electronic records in HIV programs in Nigeria is a good example of how digital innovation can emerge from the practical need to manage large treatment cohorts over time [12].

Major forms of digital innovation

Mobile health (mHealth)

mHealth is the most widely discussed form of digital innovation in low-resource settings because it works with relatively simple technologies. Systematic reviews show that mobile-phone interventions can improve service delivery processes, treatment adherence, and maternal-child health outcomes, especially when they rely on reminders, education, and basic two-way communication [7,17]. In Nigeria, mHealth is attractive because mobile access is wider than access to formal care, even though smartphone ownership and internet quality remain unequal [2,5].

Within Nigeria-focused literature, maternal-health mHealth interventions such as Text4Life and similar communication systems are repeatedly highlighted. These interventions improve emergency communication, increase awareness, and can strengthen links between pregnant women, transport options, and providers. However, studies also show that acceptability depends on language, network reliability, gender norms, phone ownership, cost of charging devices, and trust in the system [15,16]. This means mHealth is not universally accessible simply because mobile phones exist.

Telemedicine and remote consultation

Telemedicine addresses the problem of specialist scarcity and geographic isolation. Reviews show that telehealth can improve access and patient satisfaction when implemented effectively [8]. In Nigeria, telemedicine has particular relevance for rural communities, conflict-affected areas, and settings where specialist distribution is heavily urban [8,18]. Thus we regard telemedicine as both a service-delivery tool and a workforce-support tool, since it can link lower-level providers with specialists for supervision and case management [8,18].

Yet It is equally clear that telemedicine's success depends on infrastructure. Audio-only or low-bandwidth models may be more viable in many Nigerian low-income communities than video-heavy approaches.

approaches. The most realistic telemedicine models in these settings are often hybrid, mixing phone calls, asynchronous messaging, and selective referrals rather than fully digitized virtual hospitals [2,8,18].

Electronic health records and digitized data systems

Electronic health records are central to the literature because they represent the shift from episodic, paper-based care to coordinated, data-driven care. Systematic reviews suggest that EHRs can improve quality, reduce some errors, and support continuity when properly implemented [9,10]. Nigeria-specific studies show both interest and difficulty. Among nurses and frontline workers, awareness of EHR benefits may be high, but actual use is shaped by training, availability of devices, management support, and previous exposure [19-22].

The HIV sector offers one of the strongest Nigerian examples of digital record implementation at scale. Chaplin and colleagues described the creation of an integrated electronic medical records system for networked HIV treatment in Nigeria, showing how digital systems can support large decentralized treatment programs [12]. This experience is important because it demonstrates that digital systems can work in resource-limited environments when aligned with workflow, funding, training, and programmatic need.

Digital training, supervision, and health worker support

Digital innovation in low-income communities is not only patient-facing. It also includes digital training and supervision tools for health workers.

The Nigerian maternal-health literature includes examples of video training and digitized data support for frontline workers, enabled through satellite communications and mobile networks [14]. This is a significant innovation because one of the biggest limitations in low-income communities is not merely lack of workers, but also lack of regular in-service training and supervisory feedback.

Digital systems for health financing and enrollment

Here, we also identifies digital systems in health financing, including insurance management, enrollment support, payment systems, and beneficiaryidentification. These are less visible in popular discussion than telemedicine or apps, but they are crucial because affordability is one of the main barriers to access in low-income communities. Nigerian scholarship notes that digital technologies can help expand insurance administration and improve the functioning of financing mechanisms aimed at universal coverage [23].

Artificial intelligence and emerging tools

AI remains less mature in Nigeria's digital health literature, but interest is growing. Broader digital-health scholarship suggests AI may improve diagnosis, prediction, and triage, especially where specialists are scarce [24]. Nigerian-focused reviews describe AI as promising but still constrained by infrastructure, governance, data quality, and workforce preparedness [5,8,13]. In low-income communities, AI is unlikely to be transformative unless the more basic foundations of connectivity, digitized records, and data quality are first established.

Impact of digital innovation on health outcomes and service delivery

Even though we are generally positive, We are cautious Systematic reviews on mHealth find improvements in care processes and some health behaviors, especially medication adherence and appointment attendance [7,17]. Reviews focused on maternal and child health similarly report that digital interventions can improve service utilization and information flow, though outcomes depend heavily on implementation context [16].

Nigeria-specific literature supports these broader findings. Maternal-health communication tools have improved emergency linkage and acceptability in some rural settings [15,16]. Digital training and data systems have helped strengthen frontline service delivery [14]. HIV electronic record systems have improved the management of large patient populations [12]. EHR studies from Nigerian facilities show that staff often recognize the value of digital records for standardization, continuity, and efficiency, even while reporting serious implementation barriers [19-22]

At the same time, It is important to warn against technological determinism. Improvements are often strongest in process indicators such as communication, tracking, documentation, and follow-up rather than in broad population-level outcomes. This does not make digital innovation unimportant; rather, it means its contribution is often indirect, working through better coordination, better adherence, and better information [7-10,12,16].

Major challenges limiting digital innovation in low-income communities

Infrastructure deficits

Infrastructure is the single most persistent barrier in the literature. Digital systems require electricity, device availability, network stability, maintenance capacity, and technical support. Nigeria's telecom expansion is real, but broadband penetration and 5G reach remain incomplete, and national averages conceal stark local inequalities [2,5].

In many low-income communities, phones may be available but charging them regularly is difficult, data costs are burdensome, and network performance is inconsistent.

Cost and sustainability

Many digital initiatives begin as externally funded pilots. The literature repeatedly notes that pilot success does not guarantee sustainability. Once donor support ends, systems may suffer from hardware failure, unpaid subscriptions, expired software support, or staff disengagement [1,5,13]. Sustainable financing therefore remains one of the central unresolved issues in Nigeria's digital health trajectory.

Digital literacy and workforce readiness

Low digital literacy affects both patients and providers. Studies from Nigerian settings show that healthcare workers may support EHR adoption in principle while lacking sufficient training for effective use in practice. This creates partial adoption, workarounds, and in some cases duplication of paper and digital systems, which undermines efficiency gains [19–22]. Among patients, especially in rural and low-income communities, literacy barriers, language diversity, and unfamiliarity with digital interfaces can limit uptake of even simple mHealth interventions [5,11].

Interoperability and system fragmentation

A persistent theme across the literature is the lack of interoperability between digital systems. Many digital health interventions in Nigeria have been developed as stand-alone solutions targeting specific diseases or programs, particularly donor-funded initiatives in HIV, tuberculosis, or maternal health [1,12,13]. While these systems may perform well within their narrow scope, they often do not communicate effectively with other platforms.

This fragmentation leads to duplication of data entry, inefficiencies in workflow, and missed opportunities for integrated care. The absence of unified standards, national data architecture, and enforcement mechanisms further complicates efforts to build cohesive digital ecosystems [1,13]. As a result, digital innovation risks reproducing the same fragmentation that exists in the broader health system..

Governance and policy limitations

Although Nigeria has made progress through frameworks such as the National Health ICT Strategic Framework, governance challenges remain significant.

The literature highlights issues such as unclear regulatory authority, weak enforcement of standards, data privacy concerns, and limited institutional capacity to coordinate digital health initiatives at scale [1,5,13]. Effective digital transformation requires not only policy documents but also sustained political commitment, institutional alignment across federal and state levels, and accountability mechanisms. Without these, digital health initiatives may remain fragmented, unevenly implemented, and vulnerable to collapse after initial deployment.

Sociocultural and trust barriers

Digital innovation does not operate in a social vacuum. Trust plays a critical role in adoption. In some Nigerian communities, skepticism toward new technologies, concerns about data misuse and cultural preferences forface-to-face interaction can limit acceptance of digital health services [5,11].

Gender dynamics also shape access. In certain settings, women may have less access to mobile phones or less autonomy in their use, which directly affects the reach of mHealth interventions, particularly in maternal and child health programs [11]. These sociocultural factors underscore the importance of designing digital interventions that are context-sensitive and community-informed.

Conclusion

This literature review demonstrates that digital innovation has become an important component of health-system strengthening in low-income communities, particularly in Nigeria. It has shown promise in addressing key barriers such as geographic access, workforce limitations, weak data systems, and fragmented service delivery.

However, the evidence also highlights that these gains remain uneven and fragile. Infrastructure deficits, financing challenges, low digital literacy, interoperability issues, governance weaknesses, and sociocultural barriers continue to limit the scalability and sustainability of digital health interventions.

The Nigerian experience provides a broader lesson for other low-income settings: digital innovation is most effective when it is embedded within comprehensive health-system reform.

This includes investments in infrastructure, workforce development, governance, financing, and community engagement. Future research should focus not only on the effectiveness of specific technologies but also on implementation strategies, system integration, and long-term sustainability.

Heterogeneous digital health evidence (mHealth, EHRs, telemedicine, AI) was synthesized via thematic analysis;

publication bias was reduced using PubMed, Google Scholar, WHO, and Nigerian grey literature; causal inference was avoided through triangulation and contextual interpretation.

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HEALTH EDUCATION AND PUBLIC AWARENESS AS STRATEGIES FOR BRIDGING THE KNOWLEDGE GAP OF THE POPULACE.

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Abstract:

Background The public health landscape in Nigeria is significantly challenged by an overwhelming burden of communicable and non-communicable diseases. Additionally, a significant gap persists between the knowledge of individuals and the practical application of this knowledge in their day-to-day life. Limited health literacy contributes significantly to poor health outcomes, highlighting the need for effective and inclusive health education strategies.

Methods

This narrative review draws evidence focusing on three major concepts: digital and social media strategies, traditional media strategies, and community-based interventions. It also highlights variations in the degree of health literacy across demographic groups, with the aim of identifying the key barriers faced in health awareness.

Results

Digital and social media created platforms for scalable, interactive, and personalized platforms for health education, with the younger and urban populations being the primary beneficiaries. However, disparities in access to these resources have limited their availability to other individuals who could benefit substantially from them. For the older and more rural population, traditional media (radio and print media) still remain vital in their interactions with helpful educational resources. Community-based interventions demonstrate high levels of trust and cultural relevance, making them effective for sustained behavior change despite challenges in scalability and workforce capacity. Health literacy varies significantly by age, education, and geography, with notable differences between youth and elderly populations, as well as urban and rural communities.

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Conclusion:

A dual-track engagement strategy that integrates the broad reach of digital media with the trust and cultural relevance of traditional and community-based approaches is essential. Addressing socioeconomic, cultural, and educational barriers will be critical to improving health literacy and translating awareness into meaningful health outcomes.

Introduction:

Public health remains a major concern in Nigeria due to the country's large population, diverse socioeconomic conditions, and the continued prevalence of communicable and non-communicable diseases [1]. Despite rapid advancement in modern medicine, a significant "knowledge to action" gap persists between the medical practitioners and the public at large.

Health illiteracy has, no doubt, caused more harm than we know it, directly linked to lower medication adherence and poor management of chronic conditions [2]. Public health education plays a crucial role in equipping communities with the knowledge needed to mitigate health crises [3]. Literature shows that people with high level of health literacy have significant lower hospitalization rates, good health outcomes and lower mortality [3]. Health education and promotion are collaborative endeavors involving patients, healthcare providers and society, crucial for preventing and managing disease outbreaks [4].

Nigeria faces a wide range of health challenges, including infectious diseases such as malaria, tuberculosis, and HIV/AIDS, which highlights the need for effective public health communication strategies that can educate the population about disease prevention, healthy lifestyles, and the importance of seeking timely medical care [1]. The conventional standardized approach of information sharing, a strategy that disseminates a single piece of information to a broad audience without accounting for individual difference, is now evolving towards targeted, digital driven and culturally tailored interventions [5].

This review explores current strategies in health education and public awareness to evaluate their effectiveness in bridging the knowledge gap across diverse populations. This will help draw our attention towards gold standard strategies and assess how the information was received and implemented.

Methods:

Study Design

This study is a narrative review aimed at exploring and synthesizing existing literature on health education and public awareness strategies used to bridge health literacy gaps among populations, particularly within Nigeria and similar low- and middle-income settings.

Search Strategy

A broad and flexible literature search was conducted to identify relevant studies on health education and awareness strategies. Electronic databases searched included PubMed, Google Scholar, Scopus, and ResearchGate. The search focused on literature published between **2010 and 2026**, with priority given to more recent studies to reflect current trends in digital and community-based health communication. A combination of keywords and Boolean operators (**AND, OR**) was used to capture relevant themes.

.Search Query

("health education" OR "health promotion" OR "public health awareness") AND ("health literacy" OR "knowledge gap" OR "health knowledge translation") AND ("digital media" OR "social media" OR "mHealth" OR "eHealth" OR "traditional media" OR "radio" OR "print media" OR "mass media" OR "community-based intervention" OR "community health workers") AND ("Nigeria" OR "sub-Saharan Africa" OR "low- and middle-income countries")

Study Selection

Studies were selected based on their relevance to the key themes of the review. Emphasis was placed on literature addressing:

Digital and social media strategies
Traditional media approaches
Community-based interventions
Determinants and disparities in health literacy

Both empirical studies and high-quality reviews were considered. Selection was guided by the relevance of the study to the topic rather than strict inclusion or exclusion criteria, consistent with the narrative review approach.

Data Synthesis

Findings from the selected literature were analyzed and organized using a thematic approach. Evidence was grouped into three major domains:

Digital and social media strategies
Traditional media strategies
Community-based interventions

Key insights regarding effectiveness, target populations, strengths, and limitations were synthesized descriptively. Additional themes, including demographic variations in health literacy and barriers to awareness, were integrated into the analysis.

Keywords

Health education; Public awareness; Health literacy; Knowledge gap; Digital health; Social media; Traditional media; Community-based interventions; Nigeria; Sub-Saharan Africa

Health Education And Public Awarenss Strategies:

Digital and Social Media Strategy

Digital media have become an increasingly important tool for public health communication in Nigeria, particularly in context where mobile technology and internet access continue to expand [1]. Digital campaigns often use multimedia formats such as infographics, videos, and interactive contents to simplify complex medical information and make it more accessible to diverse populations [6]. The rapid growth of digital health technologies including telehealth, mobile health apps, and remote monitoring, has the potential to bridge the gaps of health disparities by increasing healthcare access, enhancing patient engagement and enabling personalized care [7].

The growth of digital media has opened new opportunities for public health campaigns to reach broader audience quickly and efficiently [1,7]. Effective health communication aims not only to inform citizens but also to influence attitudes and behaviors that support healthier lifestyles [8].

Digital health technologies show considerable promise for reducing health disparities by overcoming traditional barriers to care access [7]. They overcomes the geographical constraints, reduce costs, provide 24/7 accessibility and offer culturally tailored interventions [7,9]. However, they possess significant barriers including, physical access to technology, digital literacy requirement or privacy concerns in small dwellings or public settings [7].
Digital health literacy, the ability to seek, understand, evaluate and apply health information using digital technologies, has emerged as a vital determinant of preventive health behavior [10]. With increased implementation of digital tools to deliver healthcare, digital health literacy is becoming a critical social determinant of health [10,11]. Results indicate that improved digital health literacy correlates with up to a 25% increase in preventive health uptake [10].

Digital platforms provide a scalable means of delivering health content in communities with little to no formal health education and inconsistent outreach [12]. The usefulness of such platforms depends on whether the users possess the digital health literacy that is necessary to interpret, assess, and transfer the information into their context [13].

Traditional Media Strategy

Traditional media strategies refer to the established non-digital channels used to broadcast health information to mass audience. They rely on a unidirectional flow of information, from public health experts to the general population, without a built-in mechanism for real time interaction. They include: Broadcast media (Radio and Television), Print media (Posters, Flyers and Newspapers) and Outdoor advertising (Billboards and signage) [14].

Traditional health promotion media is effective as a media channel for health promotion especially among adults [15]. Intervention for the use of traditional health promotion media (leaflets and posters) are more often applied as a form of primary or secondary prevention [15,16]. An analysis of countries still using traditional health promotion media was carried out in an article "The effectiveness of traditional media to promote help in a community setting in the digital era" [`16]. The result showed that amost developed countries still use traditional media as the chosen health education media format in their community [15]. This is because developed countries have a high reading habit. The analysis of the article shows that they will be more effective when combined with other media [15].

Although digital media is faster, populations consistently rate traditional news outlets and national radio as more credible and authoritative sources of medical truth. This explains its effectiveness in the digital era, especially for adult respondents [15,17].

Community-based Intervention

Community-based interventions is a strategy where health education and awareness programs are delivered within specific social environments. This strategy works with the general population by leveraging existing local structures, leaders and social networks to drive behavior change.community based programs are based on the fact that human behavior is molded through the interactions occurring in the social environment [18]. Their intervention strategies are targeted at individuals, groups, communities and policy levels. These intervention programs engage the population through multiple activities conducted over time of the program which tend to be more successful than the one based on a single activity [19]. Barriers at the individual level include privacy concerns, misconceptions about community health workers roles and a preference for traditional medicine at the individual level [20].

It is greatly facilitated by strong community health worker motivation and community level support, particularly from local leaders and sensitization events [21]. Barriers at the health system level include, excessive workload and insufficient infrastructure. Training quality and role recognition of community health workers are critical in facilitation [20]. There is a dire need to harmonize efforts and coordination mechanism to ensure the scalability and sustainability of community health workers programs in Africa [22]. According to the WHO data, there were about 1 million community health workers in Africa, just half of the number required to meet the Africa head of state and government target of 2 million community health workers in Africa [22]. The community-based screening strategy has the potential to reach a high-risk population. This is carried out through awareness campaign, screening, referral and treatment [23].

Health Education And Public Awarenss Among Population Group:

Health education and public awareness is aimed at causing a surge in health literacy in the population. Health literacy is a dynamic interaction between an individual's skills and the complexity of the health system [24]. Functional Health Literacy is defined as the ability of individuals to understand, to obtain, process and understand the basic information and services they need to make appropriate decision about their health and healthcare. It is a major social determinant of health and has been reported to affect health outcomes, as well as health promotion, disease prevention and health care utilization. Health literacy skills are therefore necessary to maintain and properly manage health [25]. Health literacy level varies significantly across population groups, often dictated by intersecting social determinants such as education, age and geography.

Youth versus Elderly

Youths conceptualize health literacy across multiple interconnected dimensions, they treat health literacy as a tool for efficiency seeking hacks to solve immediate problems, while older adults approach it more holistically, which shifts from "how to do it" to "how it fits into their life".

Due to the rapidly aging populations worldwide, evaluating factors influencing health literacy and implementing policy efforts specific to the elderly is required to improve their health management capability and quality of life [25]. The youth often trust health information from relatable influencers while the elderly trust is more inclined to institutional figures, such as Doctors, religious leaders, pharmacists, and mass media (newspaper) [26]. This limits health awareness among the elderly and increases distribution of wrong information amongst the youths.

Rural versus Urban

Research indicates that urban residents generally have higher functional literacy but rural residents often have higher social trust in local health workers. Awareness is often blocked by system overcrowding leaving people aware of the solution but deterred by the process in Urban settings. In rural settings, it is blocked by physical distance and infra structure deficits [27]. Access to public health awareness in terms of availability, affordability and effectiveness was consistently better in urban facilities compared to rural facilities. In a study conducted by Abdulraheem et al. (2012), "the rural populations in Nigeria continue to be significantly underserved compared to their urban counterparts as regards to Public healthcare"[28].

A study carried out revealed the growing influence of social media platform in shaping health related awareness and behaviors among youths in urban settings. Results revealed a significant positive association between social media engagement, health knowledge, and the adoption of preventive health practices. Participants with higher levels of social media activity demonstrated greater awareness of health information and exhibited stronger tendencies towards adopting preventive measures [29].

This gives those in urban environments a greater advantage over those in rural settings. Poor network connectivity in remote areas makes digital based awareness nearly inaccessible, reinforcing the need for mass media (Radio) and cooperate/ non - governmental organization (NGO) outreach.

Barriers To Awareness:

Identifying barriers to health awareness is essential for understanding why high-quality medical information often fails to reach or influence the public. These obstacles typically exist as an interconnected web of social, structural and individual challenges that prevent effective translation of health education into improved outcomes [30].

Socio Economic Factors

Financial constraints are the most pervasive hurdle in bridging the gap between health awareness and improved outcomes. Lack of sufficient finance often limits access to tools of awareness [29].

Limited financial resources can prevent individuals from seeking preventive care or timely management of chronic disease [31]. Establishment of National Health Insurance Authority (NHIA) under the National Health Insurance Scheme (NHIS) Act 35 of 1999, is to ensure widespread access to cost-effective, high-quality health care services for insured individuals and their beneficiaries . The aim is to prevent excessive medical expenses while regulating the rising cost of healthcare services in Nigeria [29].

Nevertheless, several factors contribute to the low uptake of health insurance, including weak legal frameworks, poor policy implementation, inadequate government fundings and a lack of political commitment to making health insurance mandatory for all citizens [29].

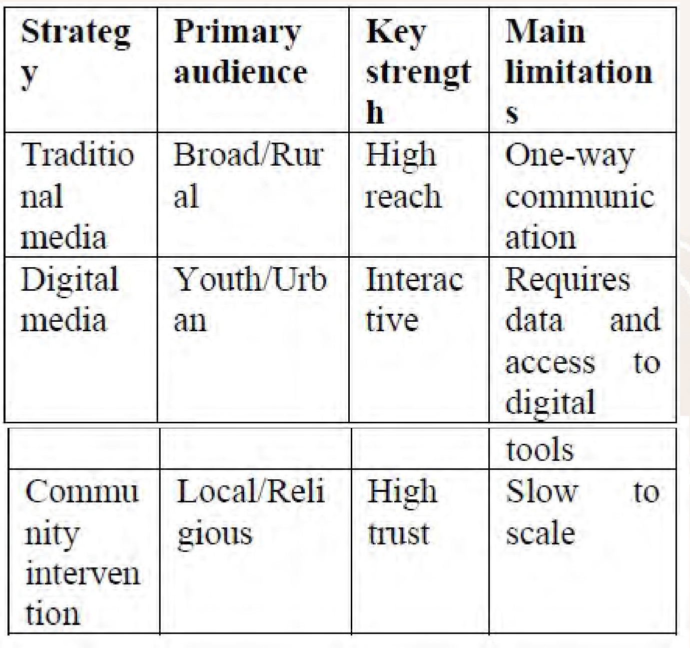
Socioeconomic status significantly influences treatment quality and hospital length of stay. Clinicians typically spend less time, provide fewer explanation as and build less rapport with low socio-economic status patient than higher socio-economic status patients. This is compounded by limited patient engagement, possibly due to perceived discrimination or financial strains, which negatively influence patient care perception [19].

Cultural and Religious Beliefs:

Religion is a powerful structure that improve the condition of man and the health system in many ways [19]. Religion and culture cannot exist apart from one another. No culture has appeared or developed except together with a religion [32]. Culture beliefs and practices have a considerable influence on the health behavior of Nigerians in spite of the numerous campaigns carried out by government and other public and private organizations. The most pressing issue in the intersection between religion and healthcare remains the conflict between religious doctrines and evidence-based medical practices, particularly in areas such as reproductive health and blood transfusion. Islamic scholars' interpretation of family planning as contrary to religious teaching has led to significant resistance against contraception use, contributing to Nigeria's high fertility rate [33]. Similarly, Jehovah witnesses' refusal of blood transfusions has resulted in numerous medical dilemmas [33]. As of March 2026, Jehovah's witnesses announced a significant change in their blood doctrine, allowing autologous blood transfusion amongst members. This has brought a relief to the numerous dilemmas but still limits the intervention of the healthcare system.

Cognitive and Educational Barriers:

In Africa, low education and health literacy impede efforts to prevent and manage chronic diseases. A lack of awareness about risk factors, healthy lifestyles choices, and the importance of regular screenings can lead to delayed diagnosis and inadequate self-care among individuals [31].



Strategy	Primary audience	Key strength	Main limitations
Traditional media	Broad/Rural	High reach	One-way communication
Digital media	Youth/Urban	Interactive	Requires data and access to digital tools
Community intervention	Local/Religious	High trust	Slow to scale

Conclusion:

To effectively bridge the knowledge gap, healthcare policy makers must adopt a Dual Track Engagement Strategy. This represents a blend of the "speed and reach" of digital media with the "trust and depth" of traditional and community-based education. Only by addressing the social and digital determinants of health can we move from a state of passive awareness to proactive, life saving health behavior across all generations. A key limitation of this review is its reliance on a narrative synthesis approach without formal inclusion or exclusion criteria, which introduces the risk of selection bias and limits the reproducibility of the literature search,however the author organised findings into a structured thematic framework across three defined domains — digital media, traditional media, and community-based interventions and supplemented the narrative with a comparative summary table delineating each strategy's primary audience, key strengths, and main limitations, thereby providing a degree of analytical structure that partially compensates for the absence of a systematic review protocol.

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ATTITUDES TOWARDS FAMILY PLANNING AMONG SOLDIERS' WIVES IN A MILITARY BARRACKS IN ENUGU STATE, NIGERIA: A HISTORICAL CROSS-SECTIONAL SURVEY (1988)

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Abstract

Background: In 1988, Nigeria introduced its first National Population Policy, marking a shift toward formal integration of family planning (FP) into national health strategy. However, attitudes toward FP among specific subgroups, particularly those in institutionally structured settings such as military barracks, were not well documented.

Soldiers' wives represent a distinct population shaped by communal living and military social structures. Assessing their attitudes at this time provides a useful historical baseline.

Objectives: To assess attitudes toward FP among soldiers' wives in the 82 Division, Abakpa-Nike Barracks, Enugu State, and examine associations with selected socio-demographic characteristics.

Methods: A descriptive cross-sectional study was conducted in 1988. Using systematic random sampling, 300 soldiers' wives were recruited. Data were collected using an interviewer-administered, pre-tested questionnaire. Attitudes were classified as approval, indifference, or opposition. Data were analyzed using frequency distributions and chi-square tests, with significance set at $p < 0.05$.

Results: Of 300 participants, 265 completed the study (response rate: 88.3%). The mean age was 30.0 years (range: 15-49). Most respondents were Pentecostal Christians (46.8%), had primary education or less (48.3%), and were housewives (44.2%). Overall, 80.0% approved of FP, while 10.6% opposed and 9.4% were indifferent. No statistically significant associations were found between FP attitudes and socio-demographic variables examined (all $p > 0.05$).

Conclusion: This study suggests a high level of FP approval among soldiers' wives in this barracks in 1988. No socio-demographic predictors of attitude were identified. These findings provide a historical reference point for understanding FP attitudes within military communities and may inform comparisons with more recent data.

Keywords: *attitude, family planning (FP), military community, reproductive health, soldiers' wives, historical study, Nigeria*

Introduction

Family planning (FP) is a key public health intervention that enables individuals and couples to determine the number and spacing of their children. Its use reduces pregnancy-related risks, particularly those linked to high parity, short birth intervals, and extreme maternal age [1]. It has also been estimated that effective FP programs could prevent millions of infant deaths and substantially reduce global mortality [2].

In Nigeria, 1988 marked a major policy shift with the introduction of the first National Population Policy, which formally recognized FP as a national priority and set fertility reduction targets [3]. This represented a departure from earlier pronatalist positions and placed responsibility for FP promotion within government health services [4]. However, the impact of such policies depends on population-level attitudes, which may vary across social groups and settings.

Attitudes play an important role in shaping health behaviors [5], and FP behavior is no exception. Positive attitudes are associated with contraceptive uptake, while negative or ambivalent views can limit use [6]. Contemporary studies show wide variation in FP attitudes across settings. For example, high levels of positive attitudes have been reported in Kashmir (80.1%) [7], while lower levels have been observed in parts of Ethiopia (52.3%) [2]. Within Nigeria, findings are similarly mixed. Opposition to FP has been reported among rural women in Cross River State [8], while 33.8% of women in Akwa Ibom expressed negative attitudes [9]. In Edo State, 72% approved of FP [10]. In Enugu State, only 40.3% of antenatal clinic attendees expressed positive attitudes, with concerns related to morality and promiscuity [11]. These studies, although conducted in later periods, highlight the variability of FP attitudes across populations. Multiple factors have been associated with FP attitudes, including education, religion, cultural beliefs, and knowledge [6]. Evidence from Turkey identified education, parity, and contraceptive awareness as significant predictors [12]. In Nigeria, education has been linked to FP attitudes in Katsina State [13], while religion and culture have been emphasized in Cross River State [8]. In Enugu State, religion and spousal opposition have also been reported as key influences [14].

Beyond individual characteristics, social context may shape reproductive health attitudes. Military barracks represent a distinct setting characterized by structured organization, shared living conditions, and institutional norms. Soldiers' wives in these environments may experience similar exposures to health services, social networks, and information channels, which could influence FP attitudes. Access to military healthcare services and the periodic absence of spouses may also affect reproductive decision-making.

Despite these considerations, there was little documented evidence on FP attitudes among soldiers' wives in Nigerian military barracks at the time this study was conducted. This study, carried out in 1988, aimed to assess attitudes toward FP among soldiers' wives in the Abakpa-Nike Barracks, Enugu State, and to examine associations with selected socio-demographic characteristics. The findings are presented as a historical account and baseline for future comparison.

Methods

Study design and study area:

This study employed a descriptive and cross-sectional design. It was conducted in 1988 at Abakpa-Nike Barracks of the 82 Division of the Nigerian Army, located in Enugu, South-East Nigeria. Abakpa-Nike Barracks is one of two army barracks in Enugu, the other being Awkunanaw (Gariki) Barracks. Gariki is situated approximately 14 km from Abakpa-Nike Barracks and both lie within Enugu metropolis. Enugu is historically significant as the former capital of the Eastern Region of Nigeria and a major administrative and military center during the colonial and post-colonial periods. Abakpa-Nike Barracks was selected because it housed a large population of soldiers and their families and provided a stable residential setting suitable for community-based research.

Given the cross-sectional nature of the study, data were collected at a single point in time. Therefore, causal relationships between socio-demographic factors and FP outcomes cannot be inferred

Study population and sample size:

The study population comprised wives of soldiers residing in Abakpa-Nike Barracks at the time of the study. Barracks records and discussions with military authorities indicated that approximately 1,520 soldiers were accommodated in the barracks, of whom an estimated 1,200 were married. Following a review of available records, women who were currently married and within the reproductive age group were considered eligible and invited to participate in the study.

The sample size for this study was determined using the Cochran formula,
$n = Z\alpha 2 \times P (1 - P) / D2$
Where:
n = minimum sample size
$Z\alpha = 1.96$ at 95% confidence limit
P = 0.5 prevalence
D = 5% margin of error
$n = (1.962 \times 0.5 \times 0.5) / 0.052 = 384$
Since the population was finite and $N < 10{,}000$, the finite population correction was applied,
$nf = n / (1 + (n-1)/N)$
Where:
*n*f = Adjusted sample size based on finite population correction
n = calculated sample size, 384
N = total population, 1200
$nf = 384 / (1 + 383/1200) = 291$

Thus, the minimum sample size was estimated at 291, and then rounded up to the nearest hundred, 300.

Sampling method and potential source of bias:
A systematic sampling method was initially employed to recruit eligible respondents from residential housing units within the barracks. Housing units were visited sequentially, and women who met the inclusion criteria were invited to participate. Where an eligible respondent was unavailable, declined participation, or could not communicate in English or Igbo, the next eligible household was approached.
Strict probability sampling could not be maintained due to non-response (11.7%), language barriers, and refusals. The final sample included 265 respondents (response rate 88.3%).

In addition, in some instances, husbands showed interest in their wives' participation. Although participation remained voluntary, this may have influenced inclusion patterns.
These factors may have introduced selection bias. Women with lower autonomy, those absent during visits, or those unable to communicate in English or Igbo may be underrepresented. Therefore, the findings may not be fully generalizable to all soldiers' wives or to women in other military or civilian settings.

Data collection:
Data were collected using a pre-tested, interviewer-administered questionnaire. To reduce the likelihood of prior sensitization or discussion of family planning topics within the barracks community, data collection was completed within two days. Entry into the community and cooperation of respondents were facilitated through collaboration with a senior nursing officer at the military hospital, who introduced the researchers to the soldiers' wives' leader (Magajia). Information about the study was subsequently disseminated to potential participants through sub-women leaders. Twelve trained medical and paramedical students served as interviewers.

Given the varying literacy levels among respondents, interviews were conducted in English or Igbo, depending on the respondent’s preference. Some questionnaires were excluded from analysis due to incomplete responses, inconsistent information, or withdrawal of consent during the interview process. Several challenges were encountered during data collection, including the absence of eligible women at the time of visits, initial reluctance by some respondents to participate, and some husbands’ insistence on their wives’ participation. Participation was strictly voluntary, and informed consent was obtained from all respondents prior to the interviews. Women were assured of confidentiality and informed that they could decline or withdraw at any stage without any consequences. Interviewers emphasized that participation was not mandatory and was independent of spousal or institutional authority. Only respondents who freely consented and met the inclusion criteria were interviewed.

Handling of missing and inconsistent data:
A total of 300 questionnaires were distributed, of which 265 were included in the final analysis. Thirty-five questionnaires (11.7%) were excluded due to non-response, incomplete data, inconsistent responses, or withdrawal of consent.
Analysis was conducted using complete-case analysis. Questionnaires with substantial missing or inconsistent data were excluded, and no imputation was performed.

Operational definitions:
Family planning attitudes were categorized as follows:

Approval referred to a positive disposition towards family planning, defined as agreement with the principle of limiting or spacing pregnancies, acceptance of at least one family planning method as personally or socially appropriate, and expressed willingness to use or support the use of family planning within marriage.

Indifference referred to a neutral or non-committal disposition towards family planning, defined as an absence of either clear agreement or clear disagreement with the practice of family planning, and characterized by a lack of expressed personal motivation to adopt or reject family planning methods. Indifference was distinguished from ignorance: respondents who were aware of family planning but expressed no definite opinion regarding its acceptability were classified in this category.

Opposition referred to a negative disposition towards family planning, defined as active disagreement with the principle or practice of limiting or spacing pregnancies through any family planning method, whether on religious, cultural, moral, spousal, or personal grounds.

Data analysis:

Data were entered and analyzed manually, and results were presented using tables and a figure. Descriptive statistics, including frequencies and percentages, were computed. Associations between family planning attitudes and socio-demographic variables were assessed using the chi-square test in Python (SciPy).

No multivariate analysis was performed; therefore, potential confounding variables were not controlled, and the findings should be interpreted as associations rather than causal relationships.

Results

Table 1: Socio-demographic characteristics of the soldiers' wives

Socio-demographic variable	Category	Frequency (N=265)	Percent (%)
Age in years	15 – 19	8	3.0
Mean = 30.0	20 – 24	49	18.5
	25 – 29	74	27.9
	30 – 34	67	25.3
	35 – 39	46	17.4
	40 – 44	18	6.8
	45 – 49	3	1.1
Religion	Roman Catholic	97	36.6
	Pentecostal	124	46.8
	Muslim	33	12.5
	Others	11	4.2
Tribe	Igbo	39	14.7
	Yoruba	43	16.2
	Hausa	27	10.2
	Others	156	58.9
Educational level	Primary	128	48.3
	Secondary	38	14.3
	Other	16	6.0
	None	83	31.3
Occupation	Farmer	10	3.8
	Housewife	117	44.2
	Housewife/Farmer	15	5.7
	Trader	99	37.4
	Teacher	7	2.6
	Civil Servant	8	3.0
	Others	9	3.4
Husband's rank	Corporal and below	130	49.1
	Sergeant/Staff Sergeant	101	38.1
	Warrant Officer/MWO/AWO	20	7.5
	Commissioned Officer	14	5.3
Husband's corps	Signals	33	12.5
	Medical	35	13.2
	Supply and Transport	32	12.1
	Infantry	20	7.5

	Education	20	7.5
	Military Police	14	5.3
	Finance	27	10.2
	Workshop	63	23.8
	Intelligence	9	3.4
	Ordnance	4	1.5
	Others	8	3.0

MWO: Master Warrant Officer, AWO: Army Warrant Officer

Table 1 shows that respondents' ages ranged from 15 to 49 years, with a mean age of 30.0 years. The modal age group was 25-29 years (27.9%, *n* = 74). The majority of respondents belonged to tribes other than Igbo, Yoruba, and Hausa (58.9%, *n* = 156), were Pentecostal Christians (46.8%, *n* = 124), and had attained at most a primary education (48.3%, *n* = 128), with 31.3% (*n* = 83) reporting no formal education. Most respondents were housewives (44.2%, *n* = 117), and their spouses were predominantly of the rank of Corporal and below (49.1%, *n* = 130) and belonged to the Workshop corps (23.8%, *n* = 63).

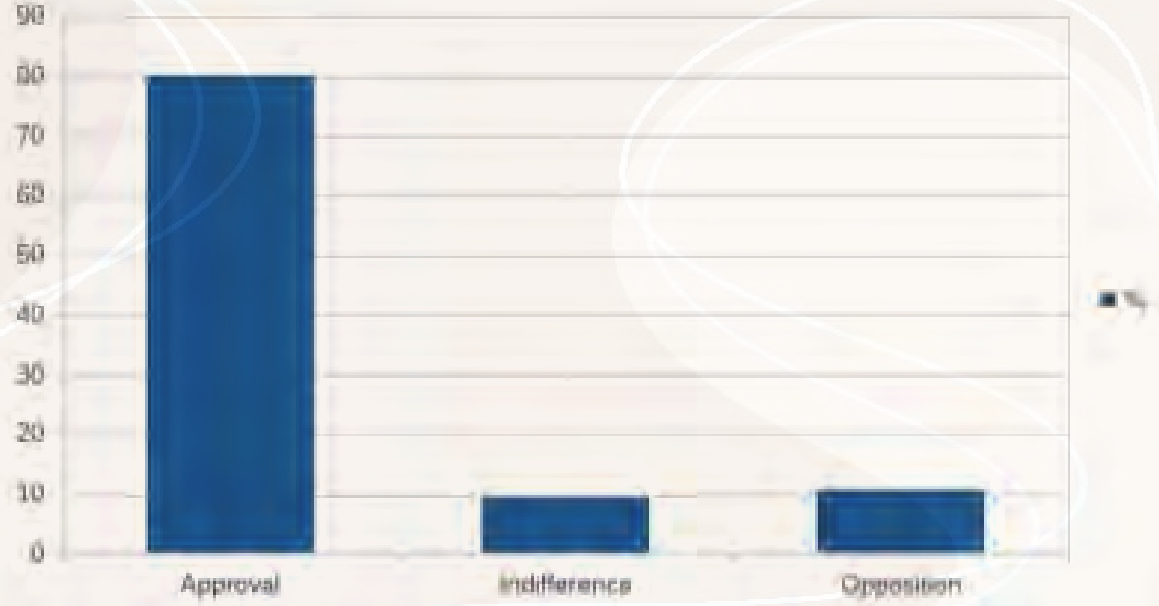

Figure 1: Attitude towards family planning among soldiers' wives

Figure 1 shows that a substantial majority of respondents (80.0%, *n* = 212) approved of FP. Opposition was expressed by 10.6% (*n* = 28), and indifference by 9.4% (*n* = 25).

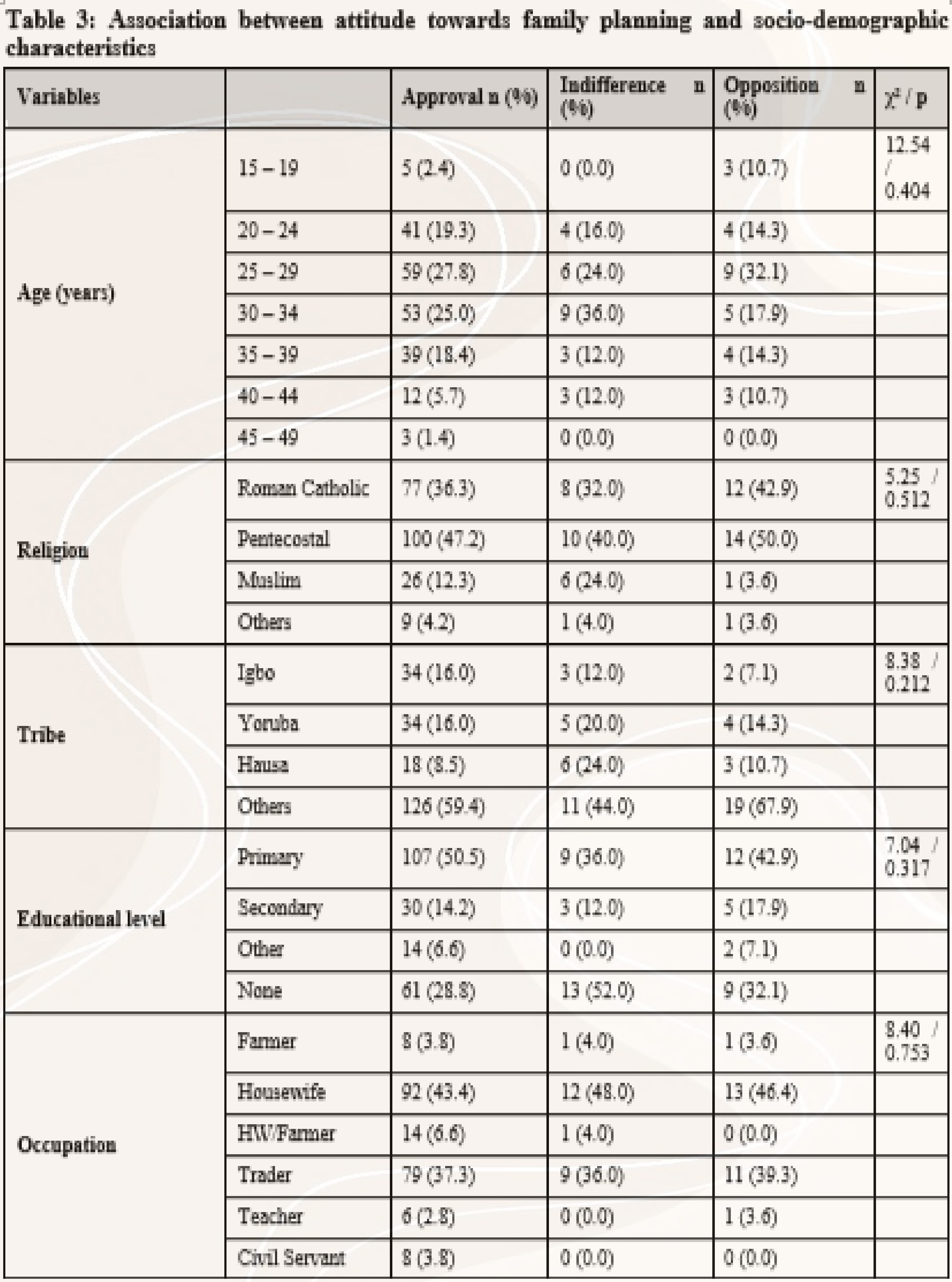

Table 3: Association between attitude towards family planning and socio-demographic characteristics

Variables		Approval n (%)	Indifference n (%)	Opposition n (%)	χ^2 / p
Age (years)	15 – 19	5 (2.4)	0 (0.0)	3 (10.7)	12.54 / 0.404
	20 – 24	41 (19.3)	4 (16.0)	4 (14.3)	
	25 – 29	59 (27.8)	6 (24.0)	9 (32.1)	
	30 – 34	53 (25.0)	9 (36.0)	5 (17.9)	
	35 – 39	39 (18.4)	3 (12.0)	4 (14.3)	
	40 – 44	12 (5.7)	3 (12.0)	3 (10.7)	
	45 – 49	3 (1.4)	0 (0.0)	0 (0.0)	
Religion	Roman Catholic	77 (36.3)	8 (32.0)	12 (42.9)	5.25 / 0.512
	Pentecostal	100 (47.2)	10 (40.0)	14 (50.0)	
	Muslim	26 (12.3)	6 (24.0)	1 (3.6)	
	Others	9 (4.2)	1 (4.0)	1 (3.6)	
Tribe	Igbo	34 (16.0)	3 (12.0)	2 (7.1)	8.38 / 0.212
	Yoruba	34 (16.0)	5 (20.0)	4 (14.3)	
	Hausa	18 (8.5)	6 (24.0)	3 (10.7)	
	Others	126 (59.4)	11 (44.0)	19 (67.9)	
Educational level	Primary	107 (50.5)	9 (36.0)	12 (42.9)	7.04 / 0.317
	Secondary	30 (14.2)	3 (12.0)	5 (17.9)	
	Other	14 (6.6)	0 (0.0)	2 (7.1)	
	None	61 (28.8)	13 (52.0)	9 (32.1)	
Occupation	Farmer	8 (3.8)	1 (4.0)	1 (3.6)	8.40 / 0.753
	Housewife	92 (43.4)	12 (48.0)	13 (46.4)	
	HW/Farmer	14 (6.6)	1 (4.0)	0 (0.0)	
	Trader	79 (37.3)	9 (36.0)	11 (39.3)	
	Teacher	6 (2.8)	0 (0.0)	1 (3.6)	
	Civil Servant	8 (3.8)	0 (0.0)	0 (0.0)	

	Others	5 (2.4)	2 (8.0)	2 (7.1)	
Husband's rank	Cpl & below	102 (48.1)	14 (56.0)	14 (50.0)	3.18 / 0.786
	Sgt/SSgt	82 (38.7)	10 (40.0)	9 (32.1)	
	WO/MWO/AWO	17 (8.0)	0 (0.0)	3 (10.7)	
	Comm. Officer	11 (5.2)	1 (4.0)	2 (7.1)	
Husband's corps	Signals	23 (10.8)	5 (20.0)	5 (17.9)	20.51 / 0.426
	Medical	25 (11.8)	6 (24.0)	4 (14.3)	
	Sup. & Trans.	27 (12.7)	3 (12.0)	2 (7.1)	
	Infantry	16 (7.5)	3 (12.0)	1 (3.6)	
	Education	18 (8.5)	0 (0.0)	2 (7.1)	
	Mil. Police	13 (6.1)	0 (0.0)	1 (3.6)	
	Finance	23 (10.8)	1 (4.0)	3 (10.7)	
	Workshop	52 (24.5)	6 (24.0)	5 (17.9)	
	Intelligence	6 (2.8)	0 (0.0)	3 (10.7)	
	Ordnance	4 (1.9)	0 (0.0)	0 (0.0)	
	Others	5 (2.4)	1 (4.0)	2 (7.1)	

Cpl.: Corporal, Sgt.: Sergeant, SSgt.: Staff Sergeant, WO: Warrant Officer, MWO: Master Warrant Officer, AWO: Army Warrant Officer, Sup.: Supply, Trans.: Transport, Mil.: Military

Table 3 shows no statistically significant association between FP attitudes and any of the socio-demographic characteristics examined. All chi-square tests returned p-values exceeding 0.05, indicating that age, religion, tribe, educational level, occupation, husband's rank, and husband's corps were not significantly associated with attitude towards FP in this study population.

Discussion

This historical cross-sectional study, conducted in 1988 among soldiers' wives in Abakpa-Nike Barracks, Enugu State, found that 80.0% approved of FP, while 10.6% opposed and 9.4% were indifferent. No statistically significant associations were observed between FP attitudes and the socio-demographic variables examined (all $p > 0.05$).

The high prevalence of positive attitudes is notable given the socio-demographic profile of the sample, particularly the relatively low levels of formal education. In many settings, lower educational attainment has been associated with less favorable FP attitudes. A contemporaneous Enugu-based study reported a lower prevalence of positive attitudes (40.3%) among antenatal clinic attendees [11]. However, differences in time, population, and setting limit direct comparison, and these findings should be interpreted cautiously.

The barracks environment may have shaped the observed pattern. Military communities are characterized by structured organization, shared living conditions, and access to institutional healthcare services. These factors may increase exposure to FP information and reduce disparities in access across socio-demographic groups. In addition, close social networks within the barracks may facilitate the spread of prevailing norms and attitudes. Features of military life, including periodic spousal absence and economic considerations, may also \influence how FP is perceived. These explanations are plausible but cannot be confirmed within the present study. The proportion of respondents expressing opposition or indifference (20.0%) remains relevant. In Nigeria, such attitudes have been linked to religious beliefs, spousal influence, and concerns about contraceptive side effects [11]. In the present sample, Pentecostal Christianity and Roman Catholicism together accounted for over 83% of religious affiliation, and given the explicit teaching of several denominations against artificial contraception during the 1980s, religious concerns were likely operative for at least a subset of opposing respondents. These subgroups may represent important targets for tailored communication and education strategies within similar settings.

Indifference, meanwhile, is not a passive state but may signal inadequate information or perceived absence of personal relevance. Women who are aware of FP but have not been sufficiently engaged with its specific benefits, risks, and practical dimensions may remain in a state of passive non-adoption. This group as particularly amenable to targeted educational interventions. Programs that engage directly with spousal attitudes, address common FP misconceptions, and incorporate religious leaders as credible advocates for responsible parenthood may be especially effective in converting indifferent or opposing women into informed, empowered FP users.

The absence of statistically significant associations between FP attitudes and socio-demographic variables differs from findings in other studies, where education, age, and religion have been identified as important correlates [6,12,13,15]. One possible explanation is that the relatively uniform social and informational environment of the barracks reduced variability in attitudes across subgroups. Alternatively, the sample size and the skewed distribution of responses toward approval may have limited the statistical power to detect associations. It is also possible that unmeasured factors, such as exposure to health education or peer influence, played a role.

Contemporary studies from different settings report substantial variation in FP attitudes, with both lower and higher levels of approval documented [7,10,15,16]. These findings underscore the context-specific nature of FP attitudes but should not be interpreted as direct comparators to this 1988 dataset.

Conducted in the same year as Nigeria's first National Population Policy [3], this study provides a snapshot of FP attitudes within a defined military community at a key policy moment. As such, it serves as a historical reference point rather than a basis for current generalization. Changes in population structure, education, health systems, and FP programs over time mean that these findings should be interpreted within their temporal context. Nonetheless, they offer a baseline for future studies seeking to examine how FP attitudes in military communities may have evolved.

Strengths of the study

This study has several notable strengths. It constitutes, to the authors' knowledge, the first systematic investigation of FP attitudes among soldiers' wives in a Nigerian Army barracks, filling an important gap in the reproductive health literature for a distinct and theoretically interesting population group. The systematic random sampling method reduces the risk of selection bias, and the high response rate of 88.3% supports the representativeness of the sample within the study

The interviewer-administered questionnaire design minimizes literacy-related non-response bias, which is particularly important in a population with substantial proportions of participants with limited formal education. The study's historical timing, coinciding with Nigeria's inaugural National Population Policy, adds distinctive contextual significance to the findings, providing a temporally anchored baseline for longitudinal comparison.

Limitations of the study

Several limitations must be acknowledged. First, this study was conducted in a single military barracks, which restricts the generalizability of findings to other Nigerian Army barracks and to civilian populations. The Abakpa-Nike Barracks represents a specific social and institutional context, and attitudes may differ across barracks situated in different geopolitical zones or ethnic compositions. Second, the cross-sectional design precludes causal inference: the direction and determinants of any observed association between socio-demographic variables and FP attitudes cannot be established from this design. Third, as with all surveys based on self-reported data, social desirability bias is a potential concern; respondents embedded in a highly hierarchical community setting may have been inclined to report attitudes perceived as **16** socially acceptable within that setting. Fourth, the historical nature of this dataset means that the study context and the original questionnaire instrument cannot be revisited or supplemented with additional methodological verification. Fifth, the sample size of 265, while sufficient for prevalence estimation, may have limited statistical power to detect small but potentially meaningful associations between socio-demographic variables and FP attitudes. Future studies should include power analyses that specifically account for the expected prevalence of positive attitudes in this population.

Conclusion and Recommendations

This historical cross-sectional study, conducted in 1988 among soldiers' wives in Abakpa-Nike Barracks, Enugu State, found a high prevalence of positive attitudes toward FP (80.0%), with smaller proportions expressing opposition (10.6%) or indifference (9.4%). No statistically significant associations were observed between FP attitudes and the socio-demographic variables examined. These findings describe a generally favorable attitudinal profile within this military community at a key moment in Nigeria's population policy development.

The results suggest that, within this 1988 military setting, FP attitudes were relatively uniform across socio-demographic groups. This pattern may reflect the structured and institutionally mediated environment of military life, including shared access to healthcare services and exposure to similar health information channels. However, these interpretations remain contextual and cannot be generalized beyond the study setting or time period.

Given its timing alongside the introduction of Nigeria's first National Population Policy in 1988, this study provides a historical baseline for understanding FP attitudes within a defined military population during an important policy transition.

Recommendations

Rather than programmatic interventions directed at this historical cohort, the primary value of these findings lies in their implications for understanding how institutional environments may shape reproductive health attitudes.

Future research should examine how FP attitudes within Nigerian military communities have evolved since 1988, particularly in relation to subsequent national FP policies and expanded reproductive health programming. Repeated cross-sectional studies across different time periods and barracks locations would allow assessment of temporal and contextual variation.

Comparative and qualitative studies would further help clarify how institutional factors such as military healthcare delivery, peer networks, spousal dynamics, and religious life within barracks influence FP attitudes. Where possible, longitudinal designs would provide stronger evidence on how attitudes translate into contraceptive behavior over time.

Overall, this study serves as a historical reference point, highlighting the potential influence of institutional settings on reproductive health attitudes at a specific moment in Nigeria's policy history.

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ADVANCING PREVENTIVE AND COMMUNITY HEALTH IN RESOURCE-LIMITED SETTINGS — INSIGHTS FROM PROF OBINNA ONWUJEKWE, A LEADING VOICE IN WEST AFRICAN RESEARCH.

An interview with

Prof Obinna Onwujekwe MD, PhD, FWACP, FAMedS, FAS

Professor of Pharmacoeconomics/ Pharmacoepidemiology in Department of Pharmacology and Therapeutics. Professor of Health Economics, Systems & Policy in the Department of Health Administration and Management, both at the University of Nigeria Enugu Campus. Director of Research in the University of Nigeria, the Coordinator of the Health Policy Research Group and the President of the Nigerian Health Economics Association. Editor-in-Chief at African Journal of Health Economics.

In an insightful conversation with the *Meddika Journal*, Professor Obinna Onwujekwe offered a candid assessment of the structural and systemic challenges facing preventive and community health in Nigeria. Drawing from decades of experience in health economics, policy, and systems research, he emphasized that the country's health challenges are less about resource scarcity and more about inefficiency, weak implementation, and systemic corruption.

Policy and System Barriers

Professor Onwujekwe identified poor implementation of policies and misallocation of resources as major barriers to effective preventive health interventions. While acknowledging that these challenges are not unique to Nigeria, he stressed that corruption significantly undermines the deployment of available resources. According to him, the persistent gap lies not in knowledge generation, but in the failure to translate existing knowledge into actionable implementation.

Rethinking Health Financing

Contrary to the widely held perception of Nigeria as a resource-limited setting, Professor Onwujekwe argued that the country is better described as resource-mismanaged. He noted that donor funding contributes only a small fraction—approximately 5%—of total health expenditure, while about 70% is financed through out-of-pocket payments by citizens, and 25% by government spending.

He highlighted the Basic Healthcare Provision Fund (BHCPF) as a critical yet underutilized resource. Designed to allocate at least 1% of the Consolidated Revenue Fund to primary healthcare, the BHCPF has the potential to significantly strengthen health systems. However, challenges in tracking and accountability have limited its impact. He emphasized that efficient utilization of existing funds could substantially bridge financing gaps without requiring additional resources.

Community Participation as a Cornerstone

A recurring theme in his reflections was the importance of community engagement. Referencing principles from the Alma-Ata Declaration, he underscored that meaningful community participation remains underdeveloped in Nigeria's health system.

He explained that when communities are actively involved in designing and implementing health interventions, they develop a sense of ownership that enhances sustainability and effectiveness. Such participatory approaches also allow interventions to be tailored to local contexts, recognizing that strategies effective in one community may not be suitable for another.

Integrating Traditional and Informal Providers

On the role of traditional and informal healthcare providers, Professor Onwujekwe advocated for structured integration into the formal health system. He noted that recent policy efforts, including the establishment of departments for complementary and alternative medicine, aim to bridge this gap.

Rather than dismissing traditional practices, he emphasized the need to train, supervise, and monitor informal providers, thereby improving the quality of care they deliver. This integration, he argued, would enhance the overall effectiveness of the health system while maintaining scientific standards.

Bridging the Research–Policy Divide

Addressing the persistent gap between research and policy, Professor Onwujekwe highlighted the importance of early and continuous engagement with policymakers. He described strategies such as co-creating research agendas with stakeholders and organizing policy dialogues to translate findings into actionable decisions.

He further stressed that researchers must move beyond isolated academic work and actively build networks with policymakers. According to him, credibility, visibility, and sustained interaction are essential for ensuring that research findings influence policy and practice.

The Role of Technology and Artificial Intelligence

On emerging innovations, he described artificial intelligence (AI) as both a present and future tool in advancing health systems. AI, he noted, has the potential to enhance decision-making, system design, and data analysis.

However, he cautioned that AI should be viewed as a support tool rather than a replacement for human reasoning, emphasizing the need for critical thinking in interpreting AI-generated insights.

Measuring Success Beyond Disease Reduction

Professor Onwujekwe challenged conventional metrics for evaluating health programs, advocating for a broader focus on quality of life and overall well-being. He argued that improvements in happiness and life satisfaction are critical indicators of successful health interventions, extending beyond mere reductions in disease burden.

Accountability and the Burden of Corruption

A significant portion of the discussion centered on the multifaceted nature of corruption within the health sector. Professor Onwujekwe expanded the definition of corruption beyond financial misappropriation to include absenteeism, employment fraud, and procurement irregularities.

He highlighted the effectiveness of community-based accountability mechanisms, where local groups monitor health facility performance. Such horizontal approaches, alongside traditional top-down enforcement, were identified as essential in addressing systemic inefficiencies.

The Role of Medical Students and Young Professionals

Professor Onwujekwe emphasized that medical students and young professionals have a vital role to play in advancing community health. Through research, collaboration, and active engagement in health systems, students can contribute meaningfully to bridging gaps between knowledge and practice.

A Call for Structural Reform

Looking Ahead: Structural Reform

Looking toward the future, Professor Onwujekwe expressed strong concerns about the current structure of Nigeria's health system, suggesting that meaningful progress may require fundamental restructuring rather than incremental reforms.

Drawing on historical perspectives, he referenced the widely used community medicine textbook Lucas and Gilles' Short Textbook of Public Health Medicine, noting that one of its authors, Adetokunbo Lucas, had previously declined consultancy roles unless the system was completely overhauled. According to him, this position reflects a longstanding recognition that superficial reforms may not be sufficient to address deeply rooted structural challenges.

Despite these concerns, he acknowledged that change remains possible through new leadership, innovation, and emerging technologies, particularly as younger professionals enter the system with new ideas.

Conclusion

The insights shared by Professor Onwujekwe underscore a critical shift in perspective: Nigeria's health challenges are not solely defined by limited resources, but by how effectively those resources are managed and deployed. Advancing preventive and community health will require deliberate efforts to strengthen accountability, foster community ownership, and bridge the longstanding divide between knowledge, policy, and practice.

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