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Health Workforce Shortage a Major Challenge to Primary Healthcare Service Delivery in Urban and Rural Communities of Nigeria

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Abstract- ***Primary healthcare (PHC) in Nigeria faces severe challenges due to significant health workforce shortages, despite existing policies aimed at mitigation. Previous research points to inadequate funding, professional emigration, and poor working conditions as critical contributors to this crisis. This study focuses on Bayelsa State, where disparities in health service access between urban and rural populations highlight an urgent need for comprehensive reform. A mixed-methods study design was employed, collecting both quantitative and qualitative data. Questionnaires were administered to healthcare workers across 24 health facilities, achieving an impressive 98% response rate. The study also included community engagement efforts to gather insights on local health service delivery. Demographics results show a slight female majority (52.1%), with most aged 31-40 (30.2%) and 56.2% holding tertiary qualifications. Most surveyed facilities (95.8%) are government-owned PHCs, many established over 20 years ago. Urban areas have better staffing, with 30.4% of facilities having Medical Officers versus only 4% in rural areas. In urban areas, 62% of respondents use health centres versus 55% in rural areas. Urban satisfaction is 71% compared to 60% rural. Urban residents are 1.6 times more likely to engage with services (P < 0.05) and show an 85.7% agreement in documenting community complaints, emphasising transparency in healthcare. The study concludes with a call for actionable recommendations addressing health workforce distributions and community engagement in health governance. Local governments, healthcare workers, and community members are encouraged to prioritise increased funding, equitable workforce distribution, and enhanced community engagement to strengthen the healthcare system. These efforts are critical for advancing towards universal health coverage and improving health outcomes in line with Sustainable Development Goal 3 (SDG3).***

Key Words: ***Health Workforce, Major Challenge, Primary Healthcare, and Service Delivery.***

I. INTRODUCTION

Background to the Study:

Nigeria faces a significant challenge in primary healthcare (PHC) service delivery due to a critical health workforce shortage, which affects both urban and rural facilities. Despite efforts such as the Second National Strategic Health Development Plan (2018-2022), issues like inadequate funding, mismanagement, and limited access to care persist (National Strategic Health Development Plan II, 2018-2022; Oyekale, 2017). The three-tier PHC system is primarily managed by local authorities but fails to provide quality services, especially in rural areas, where facilities like Health Posts and Primary Health Clinics are under-resourced and poorly staffed, not meeting national personnel guidelines (National Primary Health Care Development Agency, 2007; Abdulraheem, Olapipo, and Amodu, 2012; Cometto et al., 2023). The workforce shortage leads to limited health services and poor care quality, eroding community trust in the healthcare system (Oyekale, 2017). Rural populations often depend on informal health practitioners or traditional medicine, highlighting healthcare access disparities when compared to urban centers (Alenoghena et al., 2014). Key factors contributing to the shortage include the migration of trained professionals, low salaries, and insufficient training opportunities (Cometto et al., 2023). Moreover, Nigeria's investment in health is lacking—it allocates only 3.38% of its GDP to health compared to the recommended 5%, resulting in inadequate infrastructure and one of the lowest health workforce densities globally at 1.95 per 1,000 population (World Health Organization, 2023; African Development Bank Group, 2022). This is compounded by high maternal and child mortality rates, indicating urgent systemic reforms are needed (World Health Organization, 2023; Ebiuwou Koku-Obiyai, 2021). Addressing these challenges calls for

a multifaceted strategy that emphasizes local health worker training, better remuneration, improved workforce planning, and community engagement to enhance healthcare delivery. Prioritizing human resource development is essential for Nigeria to achieve universal health coverage and improve health outcomes across all demographics (World Health Organisation, 2018).

II. AIM AND OBJECTIVES OF THE STUDY

To assess the health workforce shortage as a major challenge to primary healthcare service delivery in urban and rural primary healthcare facilities in Nigeria.

Research Specific Objectives:
1. To compare the health workforce and specialities available for service delivery in urban and rural communities in Bayelsa State.
2. To examine the effect of the workers shortage to Primary healthcare service delivery. strength and Weaknesses of Service Delivery
3. To assess the prospect of Primary Healthcare service delivery to the achievement of SDG3 in urban and rural communities of Bayelsa state.

Research Question:
1. What are the differences in the availability of the healthcare workforce and specialities for service delivery in urban versus rural settings in Bayelsa State?
2. What is the effect of the workers' shortage to Primary healthcare service delivery?
3. What are the prospects for improving PHC service delivery to support the achievement of SDG 3 in urban and rural communities of Bayelsa State?

Research Hypothesis:

$H_0$1: There is no statistically significant difference between the workforce and specialities in effective service delivery.
H_A1: There is a statistically significant difference between the workforce and speciality in effective service delivery.

This study addresses health workforce shortages as a significant barrier to primary healthcare in Bayelsa State, Nigeria, stressing the need for assessment tools that incorporate patient perspectives (Kress, Su, & Wang, 2016). Using a Primary Health Care Performance Indicators framework, it identifies systemic issues and advocates for targeted policies to enhance service quality. Adesina and Ogaji (2020) emphasize the importance of expanding social insurance, while Lawal and Anyiam (2019) highlight geographic access challenges. Local evaluations are essential for tailoring interventions (Nigeria Health Watch, 2022; Agency for Healthcare Research and Quality, 2020). The study primarily examines healthcare delivery in urban and rural Bayelsa, building upon existing research that points to government policy failures (Kress et al., 2016) and the adverse impact of out-of-pocket expenses (Adesina & Ogaji, 2020). It evaluates facilities' operational readiness, underscoring that many do not meet established standards (Oyekale et al., 2017). By focusing on often-overlooked local government facilities, the research aims to generate actionable insights for improving health outcomes in the region. Moreover, the study employs multidimensional frameworks such as Health System Performance Assessment (HSPA) to explore service delivery, workforce, and governance issues (WHO, 2007), and integrates the Theory of Planned Behavior to understand influences on healthcare delivery. By combining these frameworks with Expectancy-Value and Dynamic Capability Theory, the study seeks to provide evidence-based recommendations for PHC reforms, complemented by a visual framework to illustrate the relationships among key constructs.

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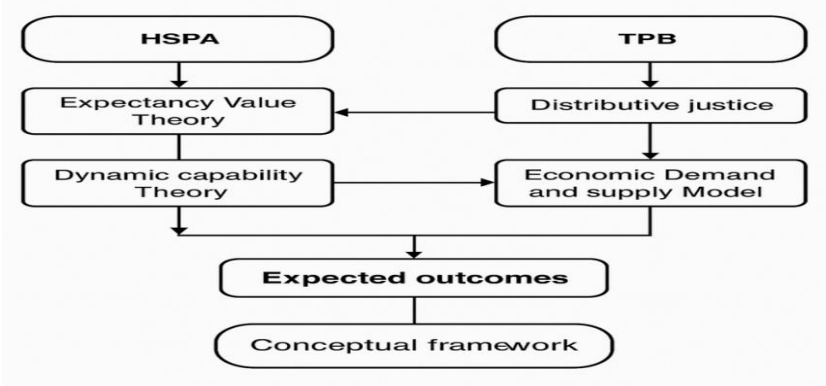

Figure 1: Conceptual Framework Integrating Health System Performance and Behavioural Theories for Primary Healthcare Service Delivery Assessment.

The health workforce shortage poses a significant challenge to primary healthcare (PHC) service delivery, particularly in low- and middle-income countries. This issue is accentuated by inadequate staffing in rural areas, where healthcare facilities often operate with limited resources and fail to meet national personnel guidelines (National Primary Health Care Development Agency, 2007; Abdulraheem, Olapipo, and Amodu, 2012). The migration of trained professionals, low salaries, and insufficient training opportunities contribute to these shortages (Cometto et al., 2023). Despite the Alma-Ata Conference's emphasis on health equity, disparities in access and workforce distribution remain stark between urban and rural settings. Rural populations frequently rely on informal practitioners or traditional medicine, further underlining the divide in healthcare accessibility (Alenoghena et al., 2014; Oyekale, 2017). The World Health Organization (2023) reports Nigeria's healthcare investment at a meager 3.38% of GDP, leading to a low health workforce density of 1.95 per 1,000, underscoring the urgent need for systemic reforms. Barriers such as inadequate working conditions and stigmatization dissuade healthcare workers from practicing in rural areas (Ogonna et al., 2022; Wang et al., 2020). Increased sociocultural factors impacting workforce retention further complicate the scenario (Reilly, 2021). The advent of telehealth services is suggested as a viable alternative to address provider shortages in these regions (Peterson, 2020). Collaboration is vital for improving health outcomes. Efforts must unify governments, NGOs, and community stakeholders to advocate for tailored PHC services, enhancing care quality and access (Barkley et al., 2020; Bhutta, 2017). Overall, addressing the health workforce shortage is crucial for achieving universal health coverage and Sustainable Development Goals.

III. MATERIALS AND METHODS

Study Area:

This research focuses on primary healthcare centers in Bayelsa State, Nigeria, founded on October 1, 1996, from the old Rivers State. Strategically located with the longest coastline in West Africa, Bayelsa is bordered by Rivers State to the east and Delta State to the west. The name "Bayelsa" arises from acronyms of three original Local Government Areas: Brass LGA (BALGA), Yenagoa LGA (YELGA), and Sagbama LGA (SALGA). The state includes eight Local Government Areas: Ekeremor, Kolokuma Opokuma, Yenagoa, Nembe, Ogbia, Sagbama, Brass, and Southern Ijaw, with Yenagoa as the capital. Bayelsa is situated in the South-South geopolitical zone of Nigeria, characterized by a tropical rainforest climate, with mean temperatures ranging from 25°C to 31°C. As of the 2018 projection, the population was approximately 2,332,787, including 494,310 children under five from the 2006 census. Despite having 225 health facilities offering routine immunisation, the state's doctor-to-patient ratio is 1:7000, below the WHO’s recommendation of 1:5000, indicating ongoing challenges in healthcare access (McFubara et al., 2012). Brass LGA –15 Primary Healthcare Health Facilities, Ekeremor LGA. -- 25 Primary Healthcare Health Facilities, Kolokuma/Opokuma LGA. -- 15 Primary Healthcare Health Facilities, Nembe LGA. -- 29 Primary Healthcare Health Facilities, Ogbia LGA. -- 32 Primary Healthcare Health Facilities, Sagbama LGA. -- 32 Primary Healthcare Health Facilities, Southern Ijaw LGA. -- 41 Primary Healthcare Health Facilities, Yenagoa 36 Public primary healthcare health facilities. The total State primary healthcare facilities to use for this study are 225.

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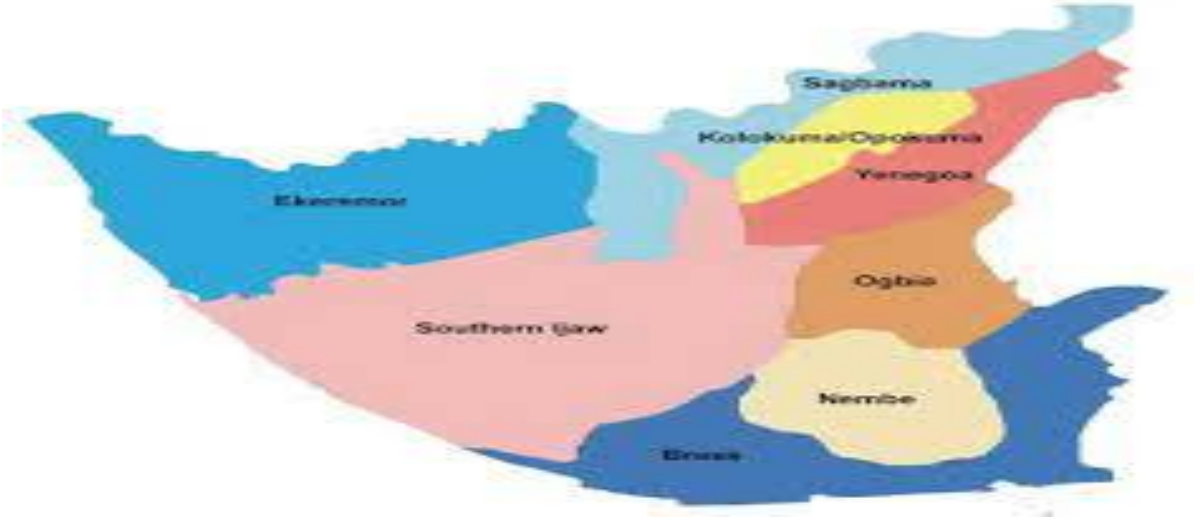

Figure 3. Map of the Bayelsa State.

Research Design.

The research study is a cross-sectional descriptive design using a mixed-method to comparative urban and rural primary healthcare facilities in Bayelsa State, focusing on key factors affecting health service delivery. The study utilises quantitative data collection to evaluate the effectiveness of these healthcare facilities. Additionally, a correlation analysis will be employed to explore relationships between independent and dependent variables, facilitating a comprehensive understanding of the service delivery landscape in both urban and rural contexts.(Creswell, 2008).

3.2 Inclusion/Exclusion Criteria:

3.2.1 Inclusion Criteria:

1. All public Primary Healthcare facilities/centres in urban and rural communities.
2. All staff in the rural and public Primary Healthcare Centres.

3.2.2 Exclusion Criteria:

1. Private healthcare centre
2. All secondary and tertiary healthcare centres

Population for the Study.

This study was an assessment of the primary healthcare facilities in Bayelsa State, urban and rural communities. Hence, the major population of the study was all primary health centres as distributed into the urban and rural centres of the State, the staff available at the time of the research, and a proportion of the community members were allocated to the community sampled for the study. The researcher was provided a list of the staff per sampled primary healthcare centres and the staff involved in the study.

Sample and Sampling:

The researcher used stratified cluster sampling to assess primary healthcare facilities in Bayelsa State, Nigeria, emphasizing urban-rural service distribution disparities (Peter-Kio & Oweredaba, 2023). The state was divided into three senatorial zones, and public healthcare facilities were randomly selected within each of the eight Local Government Areas (LGAs) for qualitative data (Smith & Johnson, 2022). Facilities were categorised as urban or rural, with eight primary healthcare centres and one community chosen per zone for quantitative data (Brown et al., 2024; Taylor & Lee, 2023). This approach ensured representativeness in service delivery capacity (Wilson, 2024) and statistical significance for urban-rural comparisons (Thompson, 2022), while demographic stratification provided deeper insights (Davis et al., 2023). Standardised data collection instruments ensured consistency, significantly enhancing the evaluation of healthcare services and informing public health policy decisions (Robinson & Kim, 2024; Anderson & Patel, 2025).

Sample Size Determination:

This study employed a cross-sectional comparative design, assessing urban and rural samples separately. Quantitative data were collected from Primary Healthcare Centres, targeting at least 20% prevalence in rural areas and 10% in urban areas, ensuring an 80% power (Ji & Wang, 2020; Ahmed et al., 2021; Raut, 2018; Ogbonna et al., 2024).

Using the standard formula for comparing two proportions at 95% confidence level and 80% power, we applied the following:

- Expected prevalence in rural communities: 20%
- Expected prevalence in urban communities: 10%
- Precision (d): 5%
- Zα = 1.96 (for 95% CI)
- Zβ = 0.84 (for 80% power)

Recalculated Formula:

$$n = \frac{(Z_\alpha + Z_\beta)^2 \times 2 \times p \times q}{d^2}$$

$$n = \frac{(1.96 + 0.84)^2 \times 2 \times 0.15 \times (1 - 0.15)}{0.05^2} = 800$$

Adding 10% for non-response, the final sample size is approximately 880 community

A stratified random sampling method was employed to select from Bayelsa State's 225 public Primary Healthcare Centres (PHCs), with stratification based on senatorial zones (Central, West, East) and urban-rural classification. A total of 24 PHCs were chosen, with eight facilities allocated per senatorial zone, guided by listings from the Bayelsa State Primary Healthcare Board and urban-rural categorisation provided by the Federal Ministry of Health based on factors such as population density and infrastructure (Ji & Wang, 2020; Ahmed et al., 2021).

Table 1.: Sampled Health Facilities by Senatorial Zone and Urban–Rural Location

Senatorial Zone	Urban PHCs (n)	Rural PHCs (n)	Total PHCs Sampled (n)
Bayelsa Central	3	5	8
Bayelsa West	2	6	8
Bayelsa East	2	6	8
Total	7	17	24

Facilities were selected from the official master list using unique identification numbers and location data to ensure randomisation, regional balance, and geographic representativeness. (World Health Organisation 2015, Ekenna *et al*, 2020).

Study Instrument for Data Collection:

This study employed a cross-sectional comparative design, assessing urban and rural samples separately. Quantitative data were collected from Primary Healthcare Centres, targeting at least 20% prevalence in rural areas and 10% in urban areas, ensuring an 80% power (Ji & Wang, 2020; Ahmed et al., 2021; Raut, 2018; Ogbonna et al., 2024).

Data Analysis.

Data were analyzed using IBM SPSS version 21.0, employing descriptive statistics to summarize facility characteristics and respondent profiles. Sections B to H formed indices on service delivery domains such as infrastructure and funding adequacy (Shahzad et al., 2021). Inferential analyses included t-tests, chi-square tests, and Mann–Whitney U tests ($p < 0.05$), alongside binary logistic regression for service acceptability and performance predictors. The analytical framework utilized the Donabedian model to connect structural quality, processes, and outcomes (Manguri, 2023).

Table 2: Summary of Study Variables, Data Types, and Analytical Tools.

Variable Domain	Data Type	Description / Examples	Analytical Tool	Expected Output
Human Resources (Section C)	Numeric (Counts); Categorical	Number and types of health workers	Frequencies, T-test	Staff profile distribution, mean availability
Service Acceptability (Section D)	Categorical (Yes/No); Composite Score	Past use, satisfaction, willingness to return	Frequencies, Chi-square, T-test	Service acceptability rates, comparisons

SDG Alignment (Section H)	Categorical (Likert-style or Yes/No)	Community participation, vaccination, equity	Frequencies, T-test	SDG3 compliance indicators
Demographics (Community)	Categorical	Gender, age, education, occupation	Frequencies, Cross-tabulation	Respondent profiles
Urban-Rural Differences	Categorical/Continuous	Urban vs. Rural facility and community status	T-test, Chi-square	Urban-rural comparisons
Overall Service Quality	Composite (Index Score)	Aggregated B–H section scores	T-test, Logistic Regression (if modeling)	Predictors of service quality/acceptability

Composite domain scores were generated by summing affirmative responses within each section. Comparative analyses were conducted using t-tests for mean differences, chi-square tests for associations, and logistic regression for outcome modelling. These analyses align with WHO's health systems evaluation and Donabedian's structure-process-outcome model.

Study Validity

The validity of the study was ensured by the use of a pretested structural quality questionnaire and checklist. The instrument was subject to test and approval by the School of Public Health, University of Port Harcourt, via the supervisor.

Study Variables.

Independent variables included demographic characteristics, functionality traits, and factors influencing service delivery, such as infrastructure quality, maintenance culture, provider education, health programs, and funding. The dependent variable comprised health workers and caregivers at primary health care facilities and community visits meeting selected criteria (Shahzad et al., 2021; Manguri, 2023).

Definition of study variables:

The assessment of primary healthcare service delivery in Bayelsa State examines independent variables, including demographic characteristics (age, gender, marital status, education, income) and functionality aspects (service availability, infrastructure quality, maintenance culture). Factors influencing healthcare utilization also include provider education, health programs, and funding. The dependent variable assesses whether health workers and caregivers adhere to effective service delivery criteria. Urban evaluation criteria encompass livability, social dynamics, economic viability, and quality of life, while rural communities face challenges like lower population density and limited access to essential services. Demographic shifts, such as aging populations and youth outmigration, further complicate these issues, highlighting the need for targeted development policies to enhance rural contributions to the economy and society (Martino et al., 2021; Najafi et al., 2024; Cattivelli, 2024; Salvia et al., 2020).

Objective(S) To Be Measured by the Tool:

The Health Facility Assessment Tool evaluates primary healthcare (PHC) service delivery across urban and rural contexts through three sections. Section A gathers demographic data and assesses the facility's operational status. Section B examines the availability and training of healthcare workers to ensure they meet community needs. Section C measures PHC's role in contributing to Sustainable Development Goal 3 (SDG3) by evaluating community engagement, vaccination effectiveness, and sustainable health initiatives. This comprehensive framework facilitates targeted interventions and resource allocation, enhancing healthcare functionality, acceptability, and effectiveness in improving health outcomes and accessibility (Martino et al., 2021; Najafi et al., 2024).

Description/Outline of Sections of Tool:

The Health Facility Assessment Tool is essential for evaluating primary healthcare (PHC) service delivery in urban and rural areas, consisting of three sections. Section A establishes the facility's operational status and collects demographic data. Section B assesses the health workforce by examining the availability of trained healthcare workers to meet community needs. Section C measures PHC's contribution to

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Sustainable Development Goal 3 (SDG3) by evaluating community engagement, vaccination effectiveness, and sustainable health initiatives. This tool provides critical indicators for long-term health outcomes and facilitates targeted interventions and resource allocation, enhancing the functionality, acceptability, and effectiveness of healthcare services while addressing access barriers in various settings (Martino et al., 2021; Najafi et al., 2024).

Benefits of the Research:
Assessing health facility quality in Bayelsa State, Nigeria, is vital for effective healthcare planning and service delivery. This study supports the Hospital Management Board and Ministry of Health in deploying qualified personnel and improving maintenance practices, ultimately enhancing healthcare services and preventing disease outbreaks (Martino et al., 2021; Najafi et al., 2024).

Ethical Considerations.
Ethical clearance was obtained from the University of Port-Harcourt Post-Graduate School Ethical Review Committee, with permission from Bayelsa State healthcare authorities for questionnaire distribution. The researcher communicated the study's aims to participants, securing informed consent and ensuring response confidentiality. Participants were informed of no known risks associated with their involvement, as the questionnaires were anonymous and did not include personal identifiers (Martino et al., 2021; Najafi et al., 2024).

Confidentiality, Validity and Reliability of the Study Tool.

The researcher aligns with the National Health Council's Resolution 466/2012 and adheres to ethical standards outlined in Resolution No. 196 (Novoa, 2014). Key ethical principles include impersonality, transparency, and participant confidentiality, with questionnaires designed to ensure anonymity. A thorough validation process was conducted to confirm the reliability and validity of the quality questionnaire and checklist, incorporating expert feedback for enhanced face and content validity and aiming to minimize biases. Consistent administration across contexts facilitated response comparability. Reliability was verified through stability across trials, analyzed with descriptive and inferential statistics, including the T-test. This careful focus on validity and reliability underpins the study's findings and their implications for Bayelsa State's healthcare system.

IV. DATA ANALYSIS, RESULTS AND DISCUSSION

Introduction
This study assesses the primary healthcare service delivery in urban and rural primary healthcare facilities in Bayelsa State. This chapter presents data analysis, results and discussion. This presentation was based on the responses from 24 Primary Healthcare Facilities and 867 completed questionnaires out of 880 questionnaires distributed giving a response rate of 98%.

4.1 Data Analysis and Results

4.1.1: Demographic Characteristics and Facility information

TABLE 4.1: Demographic Characteristics of the Respondents. N=867

S/NO	Items	Response	Respondents	Percentage (%)
1	Gender	(a) Males	415	47.9
		(b) Females	452	52.1
		Total	867	100
2	Age	(a) 20 – 30	199	22.9
		(b) 31 – 40	262	30.2
		(c) 41 – 50	244	28.1
		(d) 51 – 60	163	18.8
		Total	867	100
3	Educational Level	(a) Primary	105	12.1
		(b) Secondary	275	31.7
		(c) Tertiary	487	56.2
		Total	867	100
4	Occupation	(a) Farming	89	10.3

		(b) Trader	114	13.1
		(c) Civil Servant	577	66.5
		(d) Fishing	87	10.1
		Total	867	100
6	Marital status	Single	337	38.9
		Married	402	46.4
		Divorced	128	14.7
		Total	867	100

Table 4.1 The demographic characteristics of the respondents are as follows: Gender: 415 male respondents (47.9%) and 452 female respondents (52.1%). Age distribution: 199 respondents (22.9%) aged 20-30, 262 (30.2%) aged 31-40, 244 (28.1%) aged 41-50, and 163 (18.8%) aged 51-60. Education: 105 respondents (12.1%) were primary certificate holders, 257 (31.7%) had 'O' levels, and the majority, 487 (56.2%), were graduates from higher institutions. Occupation: 89 respondents (10.3%) were farmers, 114 (13.1%) were traders, 577 (66.5%) were civil servants, and 87 (10.1%) were fishermen or fisherwomen. Marital status: 337 respondents (38.9%) were single, 402 (46.4%) were married, and 128 (14.7%) were divorced.

Table 4.2: Facility Identification and Characteristics n=24

Variable	Frequency	Percentage
Ownership Type		
Government	23	95.8
Private	1	4.2
Facility Category		
Health Post	1	4.2
PHC	21	87.5
CHC	2	8.3
Year Established		
5-10years	2	8.3
11-20years	4	16.7
>20years	18	75.0
Facility Status		
Functional	24	100.0

Table 4.2 reveals the characteristics of healthcare facilities, indicating that 95.8% are government-owned and 4.2% are privately owned. The majority, 87.5%, are Primary Health Centres (PHCs), with 8.3% designated as Community Health Centres and 4.2% as Health Posts. Most facilities have been operational for over 20 years, indicating an older infrastructure. Approximately 16.7% were established 11-20 years ago, and 8.3% are relatively new. Notably, all 24 facilities are currently functional, reflecting full operational status.

4.1.3 Health workforce and specialities available for service delivery

Table 3: The health work force and specialty available for service delivery in urban and rural areas in Bayelsa State n=24

Variable		Urban	Rural	Total	OR(95% CI)	X^2 (P-value)
Medical Officers	None	7 (30.4%)	16 (69.6%)	23 (96%)	0.696 (0.531-0.912)	0.430 (0.512)
	8	0 (0.0%)	1 (100.0%)	1 (4%)		

Nurses/Midwives	None	2 (16.7%)	10 (83.3%)	12 (50%)	10.286 (0.068)
	1	0 (0.0%)	5 (100.0%)	5 (21%)	
	2	1 (50.0%)	1 (50.0%)	2 (8%)	
	3	2 (66.7%)	1 (33.3%)	3 (13%)	
	4	1 (100.0%)	0 (0.0%)	1 (4%)	
	6	1 (100.0%)	0 (0.0%)	1 (4%)	
Community Health Officers	None	3 (21.4%)	11 (78.6%)	14 (58%)	1.834 (0.400)
	1	4 (44.4%)	5 (55.6%)	9 (38%)	
	3	0 (0.0%)	1 (100.0%)	1 (4%)	
Community Health Extension Worker (CHEWs)	None	0 (0.0%)	3 (100.0%)	3 (13%)	4.195 (0.522)
	1	1 (20.0%)	4 (80.0%)	5 (21%)	
	2	3 (37.5%)	5 (62.5%)	8 (33%)	
	3	1 (25.0%)	3 (75.0%)	4 (17%)	
	5	2 (66.7%)	1 (33.3%)	3 (13%)	
	>20	0 (0.0%)	1 (100.0%)	1 (4%)	
Junior Community Health Extension Worker JCHEWs	None	4 (26.7%)	11 (73.3%)	15 (63%)	2.541 (0.468)
	1	3 (50.0%)	3 (50.0%)	6 (25%)	
	2	0 (0.0%)	2 (100.0%)	2 (8%)	
	60	0 (0.0%)	1 (100.0%)	1 (4%)	
Environmental Health Officers	None	3 (23.1%)	10 (76.9%)	13 (54%)	3.149 (0.533)
	1	2 (33.3%)	4 (66.7%)	6 (25%)	
	2	2 (66.7%)	1 (33.3%)	3 (13%)	
	12	0 (0.0%)	1 (100.0%)	1 (4%)	
	20	0 (0.0%)	1 (100.0%)	1 (4%)	
Laboratory Technicians	None	2 (22.2%)	7 (77.8%)	9 (38%)	3.563 (0.468)
	1	4 (33.3%)	8 (66.7%)	12 (50%)	
	3	0 (0.0%)	1 (100.0%)	1 (4%)	
	4	1 (100.0%)	0 (0.0%)	1 (4%)	
	10	0 (0.0%)	1 (100.0%)	1 (4%)	
Pharmacy Technicians	None	4 (30.8%)	9 (69.2%)	13 (54%)	0.431 (0.806)
	1	3 (30.0%)	7 (70.0%)	10 (42%)	
	5	0 (0.0%)	1 (100.0%)	1 (4%)	
Volunteers	None	1 (25.0%)	3 (75.0%)	4 (17%)	10.931 (0.280)
	1	0 (0.0%)	5 (100.0%)	5 (21%)	
	2	2 (40.0%)	3 (60.0%)	5 (21%)	
	3	1 (25.0%)	3 (75.0%)	4 (17%)	

	4	0 (0.0%)	1 (100.0%)	1 (4%)	
	5	1 (100.0%)	0 (0.0%)	1 (4%)	
	6	1 (100.0%)	0 (0.0%)	1 (4%)	
	7	0 (0.0%)	1 (100.0%)	1 (4%)	
	8	0 (0.0%)	1 (100.0%)	1 (4%)	
	10	1 (100.0%)	0 (0.0%)	1 (4%)	
Administrative/Support Staff	None	3 (20.0%)	12 (80.0%)	15 (63%)	4.316 (0.505)
	1	1 (100.0%)	0 (0.0%)	1 (4%)	
	2	1 (33.3%)	2 (66.7%)	3 (13%)	
	3	1 (50.0%)	1 (50.0%)	2 (8%)	
	4	0 (0.0%)	1 (100.0%)	1 (4%)	
	6	1 (50.0%)	1 (50.0%)	2 (8%)	

Table 4. illustrates the distribution and availability of healthcare personnel across urban and rural areas in Bayelsa State, highlighting notable disparities in staffing and service delivery capabilities. The data reveal that Medical Officers are in limited supply, with only one rural facility reporting to have officers, while 96% of facilities had none. Rural locations exhibited a slightly higher likelihood of having a Medical Officer, though this difference was not statistically significant. Nurses and midwives were predominantly absent, especially in rural facilities, where 83.3% lack adequate staffing. Urban facilities showed better nurse availability. Community Health Officers (CHOs) are notably underrepresented, with 58% of facilities lacking them, particularly in rural areas. Community Health Extension Workers (CHEWs) displayed variable staffing, with 13% of facilities lacking them, all situated in rural areas. Junior Community Health Extension Workers (JCHEWs) faced similar shortages, with 63% of facilities without them, primarily in rural settings. Environmental Health Officers were absent in over half of the facilities, again with rural areas being more affected. Laboratory Technicians were less frequently available in rural facilities, while urban areas fared better, with 38% lacking them. Pharmacy Technicians were also notably absent, with a 54% lack of staffing, disproportionately affecting rural areas. Volunteers were more commonly present in rural settings, with 8-10 volunteers, whereas urban areas had fewer or none. Lastly, Administrative and Support Staff were insufficient in 63% of facilities, mainly affecting rural locations.

1.4: Acceptability of PHC Services in Urban and Rural Communities

Table 4.5: Level of Acceptability of PHC Services in Urban and Rural Communities in Bayelsa State

n=867

S/N	Item	Category	Yes	No	Total	Mean	SD	Std. Error Mean	OR (95%CI)	X^2(P-value)
1	Have you used the health centre before?	Urban	382(62%)	230(38%)	612(71%)	1.6031	0.4899	0.0249	1.603(1.554-1.652)	64.458(0.000)
		Rural	141(55%)	114(45%)	255(29%)					
		Total	523(60%)	344(40%)	867(100%)					
2	Have you received health services from the health workers before?	Urban	460(75%)	152(25%)	612(71%)	1.2526	0.4351	0.0221	1.253(1.209-1.296)	56.713(0.000)
		Rural	188(74%)	67(26%)	255(29%)					
		Total	648(75%)	219(25%)	867(100%)					
3	Do you like the service you receive from them?	Urban	358(58%)	255(42%)	612(71%)	1.4253	0.4950	0.0251	1.425(1.376-1.475)	56.713(0.000)
		Rural	141(55%)	114(45%)	255(29%)					
		Total	498(57%)	369(43%)	867(100%)					
4	Does the service meet your expectations?	Urban	378(62%)	235(38%)	612(71%)	1.3866	0.48760	0.02475	1.387(1.338-1.435)	56.015(0.000)
		Rural	154(60%)	101(40%)	255(29%)					
		Total	532(61%)	335(39%)	867(100%)					

5	Would you go back if there is a health need?	Urban	442(72%)	170(28%)	612(71%)	1.2861	0.45251	0.02297	1.286(1.241-1.331)	55.983(0.000)
		Rural	177(69%)	78(31%)	255(29%)					
		Total	619(71%)	248(29%)	867(100%)					
6	You will recommend others to attend and receive health services in this facility.	Urban	411(67%)	201(33%)	612(71%)	1.3505	0.47775	0.02425	1.351(1.303-1.398)	55.682(0.000)
		Rural	152(60%)	103(40%)	255(29%)					
		Total	563(65%)	304(35%)	867(100%)					
7	The environment of the health facility looks good and attractive.	Urban	277(45%)	335(55%)	612(71%)	1.4794	0.50022	0.02539	1.479(1.430-1.529)	58.255(0.000)
		Rural	174(68%)	80(32%)	255(29%)					
		Total	451(52%)	416(48%)	867(100%)					
8	The health workers are well-trained, and you like them.	Urban	344(56%)	268(44%)	612(71%)	1.4201	0.49421	0.02509	1.420(1.371-1.469)	56.601(0.000)
		Rural	159(62%)	96(38%)	255(29%)					
		Total	503(58%)	364(42%)	867(100%)					
9	The health workers treat you kindly and professionally.	Urban	358(58%)	255(42%)	612(71%)	1.4072	0.49195	0.02497	1.407(1.358-1.456)	56.345(0.000)
		Rural	156(61%)	98(39%)	255(29%)					
		Total	514(59%)	353(41%)	867(100%)					

Table 4.1.4 The analysis of Primary Health Care (PHC) services in Urban and Rural Communities of Bayelsa State revealed that 60% of respondents had utilized health centers, with 75% receiving care from health workers. Satisfaction levels were moderate, with 57% expressing contentment and 61% feeling their expectations were met. A significant majority (71%) indicated they would return for future services, and 65% would recommend the facilities to others. The environment of health facilities was deemed good by 52% of participants, while 58% acknowledged the competence of health workers. Chi-square analysis showed a significant difference ($P<0.05$) in service acceptability between urban and rural areas, with urban respondents being 1.6 times more likely to use health centers and 72% more likely to recommend services, reflecting higher satisfaction and quality confidence. However, rural facilities were appreciated for their attractiveness and the personable nature of health workers, suggesting a need for tailored healthcare planning to address these disparities (cited results from Items 1-9).

The Prospect of Primary Healthcare Service Delivery to the Achievement of the SDG3 in Urban and Rural Communities

Table 5 The Prospect of Primary Healthcare Service Delivery to the Achievement of the SDG3 in Urban and Rural Communities n=24

Variable		Urban	Rural	Total	OR (95%CI)	X^2(P-value)
Communities participate in PHC activities	Strongly Agree	7 (100.0%)	10 (58.8%)	17 (70.8%)		4.069 (0.131)
	Agree	0 (0.0%)	6(35.3%)	6 (25.0%)		
	Disagree	0 (0.0%)	1(5.9%)	1(4.2%)		
Access is equitable for women/children	Strongly	3 (42.9%)	12 (63.2%)	15 (55.6%)		1.665 (0.435)
	Agree	3 (42.9%)	4 (21.1%)	7 (25.9%)		
	Disagree	1 (14.3%)	1 (5.3%)	2 (7.4%)		
SDG 3 indicators are monitored in the facility	Strongly Agree	5 (71.4%)	4 (19.0%)	9 (25.7%)		5.580 (0.061)
	Agree	1 (14.3%)	11 (52.4%)	12 (34.3%)		
	Disagree	1 (14.3%)	2 (9.5%)	3 (8.6%)		

Community complaints are documented	Strongly Agree	6 (85.7%)	3 (18.8%)	9 (33.3%)	10.286 (0.006)
	Agree	0 (0.0%)	9 (56.3%)	9 (33.3%)	
	Disagree	1 (14.3%)	5 (31.3%)	6 (22.2%)	
The facility reaches underserved groups	Strongly Agree	3 (42.9%)	7 (38.9%)	10 (38.5%)	1.514 (0.469)
	Agree	4 (57.1%)	7 (38.9%)	11 (42.3%)	
	Disagree	0 (0.0%)	3 (16.7%)	3 (11.5%)	

Table 4.10 provides a comparative analysis of primary healthcare (PHC) service delivery in relation to Sustainable Development Goal 3 (SDG 3) across urban and rural communities. The data indicates that urban areas show stronger participation in PHC activities, with 58.8% reporting unanimous involvement compared to rural communities. Access to healthcare is perceived to be better in urban settings, particularly in terms of participation and monitoring; however, rural communities feel they provide better access for women and children. Urban facilities demonstrate higher alignment with SDG 3 monitoring, with over 70% of rural areas lacking awareness or implementation. Community feedback is more actively documented in urban facilities, with 85.7% strongly agreeing that complaints are recorded—a significant gap in the engagement between urban and rural PHC facilities. Urban areas excel at institutionalizing community feedback, which is vital for accountability and improvement, aligning well with SDG principles. Both urban and rural respondents express moderate confidence in the outreach to underserved groups, but the lack of statistically significant differences suggests that their outreach efforts and perceptions are comparably aligned.

V. DISCUSSION OF FINDINGS

The Demographic Discussion of the Findings:
The healthcare workforce shortage significantly impacts primary healthcare (PHC) service delivery in Nigeria, particularly in regions like Bayelsa State. A demographic analysis indicates a disparity in access and quality between urban and rural areas, with 87.5% of facilities being government-owned Primary Health Centres (Qi et al, 2023). This reliance on the public sector limits private investment, affecting diversity and competitiveness in service delivery. Gender-sensitive programming is crucial, reflecting the higher representation of women (52.1%) in the study, while targeted interventions are needed for the 31 to 40 years age group (30.2%). Although 56.2% of respondents hold tertiary qualifications, the ageing infrastructure of facilities is concerning, as over 75% have operated for more than 20 years, with only 16.7% being relatively newer (11-20 years old). While all facilities are functional, this does not guarantee quality or patient satisfaction, highlighting the need for enhanced resource adequacy, staff competence, and infrastructure conditions (Fiscella *et al,* 2000). With the government's push for stronger PHC systems to achieve Universal Health Coverage, there is an urgent requirement for policies that support facility upgrades, boost community-based health investment, and encourage responsible private sector involvement to improve health outcomes across urban and rural areas (Khatri *et al,* 2025).

Health workforce and specialities available for service delivery in urban and rural communities in Bayelsa State.

There are marked disparities in healthcare personnel between urban and rural areas in Bayelsa State, Nigeria, revealing a critical workforce shortage affecting primary healthcare (PHC) delivery. Medical Officers are predominantly absent, with 96% of healthcare facilities lacking them, and only one rural facility has such personnel. In rural settings, 83.3% of facilities are deprived of adequate nursing and midwifery staff, whereas urban facilities exhibit better staffing levels (Okoroafor et al., 2021).

Community Health Officers (CHOs) are notably absent in 58% of facilities, and there is a 13% shortage of Community Health Extension Workers (CHEWs) in rural areas. Additionally, Environmental Health Officers are largely underrepresented, contributing to a systemic inequity where urban residents have superior access to healthcare services and professionals compared to those in rural communities (Chen et al., 2019). The insufficiency of Laboratory Technicians and

Pharmacy Technicians also exacerbates this situation, with shortages affecting 38% and 54% of facilities, respectively. While rural areas report an influx of volunteers (8-10), Administrative and Support Staff are lacking in 63% of facilities, further hindering healthcare delivery. Studies indicate that essential services, such as antenatal care and immunisation, heavily depend on the availability of CHEWs, JCHEWs, Nurses and CHOs; however, states like Cross River report only 40% of the necessary nursing workforce and 60% for CHOs/CHEWs (Okoroafor et al., 2022). Rural residents, although more likely to have a usual source of care, experience limited physician availability and reduced healthcare hours, corroborated by research findings (Kirby and Yabroff 2020). Internationally, similar shortages exist, particularly impacting female health professionals in countries like India, underscoring a global workforce challenge in delivering effective PHC (Konki et al., 2023). There is an urgent need for targeted interventions to ameliorate the healthcare workforce deficiencies and enhance service delivery across Nigeria's varied health landscapes.

Prospect of Primary Healthcare service delivery to the achievement of the SDG3 in urban and rural communities of Bayelsa state.

A comparative analysis of primary healthcare (PHC) service delivery in Bayelsa State, Nigeria, reveals significant disparities between urban and rural areas concerning Sustainable Development Goal 3 (SDG 3). Urban participation in PHC activities stands at 58.8%, while over 70% of rural communities lack awareness of such initiatives. Urban facilities demonstrate superior service access, with 85.7% effectively recording community feedback, contrasted by rural facilities, which often lack similar mechanisms (Chotchoungchatchai et al., 2020). The persistent health workforce shortage exacerbates the challenges, particularly in rural areas, where training and alignment with SDG 3 remain inadequate. Although both urban and rural populations express moderate confidence in outreach to underserved groups, significant engagement gaps persist. The 2018 Declaration of Astana highlights the importance of a robust PHC system that integrates service provision, multisectoral actions, and citizen empowerment. To address these gaps, essential policy actions are needed, including enhancing SDG sensitization and training for rural healthcare workers, strengthening community participation, institutionalising feedback processes, and supporting targeted outreach programs. Sub-optimal PHC implementation in Sub-Saharan Africa often stems from insufficient government funding, an inadequate healthcare workforce, and health illiteracy. Coordinated efforts among local, national, and international stakeholders are crucial to increase government health spending, improve rural healthcare worker retention, and update training curricula to focus on community engagement. These strategies are vital for advancing toward achieving health-related SDGs and fostering inclusivity and equity in health systems.

CONCLUSION

The study investigates the disparities in primary healthcare (PHC) service delivery between urban and rural communities in Bayelsa State, Nigeria, highlighting the health workforce shortage as a critical challenge. Urban areas report a greater number of healthcare professionals, including doctors, nurses, and support staff, contributing to a higher coverage rate for PHC services. The findings also indicate that urban facilities set clearer operational targets and effectively meet them, achieving coverage of 75-95%. However, both urban and rural facilities acknowledge challenges such as poor governance and inadequate human resources affecting service delivery. The reliance on community participation is emphasised as a means to enhance the sustainability and affordability of PHC services. The research confirms the need for targeted interventions to improve service delivery, particularly in rural areas, to achieve Sustainable Development Goals (SDG 3) effectively, acknowledging the essential role of community engagement. (Chotchoungchatchai et al., 2020)

RECOMMENDATIONS

The health workforce shortage represents a significant challenge to effective primary healthcare service delivery in Nigeria's urban and rural communities, exacerbating existing disparities in access and quality of care (Chotchoungchatchai et al., 2020).

Recommendations for the Government:

1. Increase funding and resources for rural healthcare facilities to improve access and service quality.

2. Implement policies for equitably distributing healthcare workers between urban and rural areas, including incentives for rural postings.
3. Promote public-private partnerships to support healthcare financing and ensure accessibility without financial barriers.
4. Develop frameworks for community participation in health delivery, supporting local health worker initiatives.

Recommendations for Community Members:

1. Actively utilize available healthcare services and participate in health programs and education initiatives.
2. Advocate for local health needs through regular community discussions with healthcare authorities.
3. Enhance understanding of health issues and available services via local educational initiatives.
4. Encourage participation in health initiatives organised by healthcare providers to improve program effectiveness.

By implementing these recommendations, stakeholders can significantly improve primary healthcare access and quality in Bayelsa State, supporting the achievement of Sustainable Development Goals (SDG) and ensuring the right to health for all residents, regardless of their geographical location.

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