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Statistical Assessment of Primary Health Care Services on the Health Status of Rural Communities in Federal Capital Territory, Nigeria

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Abstract: *This paper investigated the statistical assessment of primary health care services on the health status of rural communities in Federal Capital Territory, Nigeria. The need for this paper was rural communities often have limited access to healthcare resources, which can lead to disparities in health outcomes and also place a strain on healthcare systems. This study employed quantitative research methodology in two recent secondary data. Thirteen and sixty-two Primary Health Care (PHCs) were used in the study respectively. The study also employed descriptive statistics and statistical test such as t-test and chi-square test to analyze the data collected. The result further showed that of the 62 PHCs visited 89% had good infrastructures, 26% had sufficient personnel and 85% had good service delivery. Therefore, it is recommended that there should be a need to improve on the workforce to meet the minimum standard for primary health care in Nigeria as well as regular monitoring and evaluation to assess the performances of the PHCs in FCT.*
Keyword: Primary Health Care, Rural Communities, T-test, Chi-square test

INTRODUCTION

The primary health care failure in Nigeria is attributed to a lack of healthcare workers across different care levels. The Minimum Standards for Primary Health Care in Nigeria emphasize the need for defining activity levels and setting standards for each component. Three operational categories, basic health care, priority health interventions, and health-related interventions, need

to be considered. Issues like stock-outs, expired drugs, and wastage of essential drugs need proper management and tailored recommendations based on the facility's level of care.

The World Health Organization asserts that the right to the highest health standard is a fundamental human right. All UN member countries are obligated to provide basic, affordable, and universal healthcare. Primary Health Care (PHC) is considered the most effective approach, considering the diverse needs, preferences, and specific characteristics of individuals, families, and communities. (WHO, 2019).

LITERATURE REVIEW

The WHO Conceptual SDOH framework demonstrates how social, economic, and political factors such as income, education, occupation, gender, race, and ethnicity influence a person's socioeconomic position which, in turn, plays a role in determining health outcomes. The World Health Organization (WHO) developed an operational framework for primary healthcare levers, including core strategic levers and operational levels. The Operational framework for PHC comprises 14 interdependent, interrelated, and mutually reinforcing levers for action, including four strategic and 10 operational ones. Nigeria, with a projected 200 million population, ranks fourth globally. Healthcare financing in the country is financed through tax revenue, out-of-pocket payments, foreign donations, and health insurance. (Olakunde, 2012). A robust primary health care system is designed to provide comprehensive services, addressing prevalent ailments and offering essential medications. It caters to the specific needs of women, mothers, and children, while also playing a crucial role in preventing and treating major infectious diseases like HIV/AIDS, tuberculosis, and malaria. Basic surgical care is an essential component. The system should address childbirth complications, promote public health measures, and emphasize preventive health care and education on healthy behaviors, warning signs of illnesses, good nutrition, and the importance of immunizations. In essence, it goes beyond treating illnesses, prioritizing preventive measures and education to ensure the overall well-being of individuals and communities. (WHO, 2008; Shaw et al., 2015). Nigeria encounters substantial challenges in achieving universal health coverage and efficient primary healthcare, posing developmental obstacles and hindering the realization of health-related Sustainable Development Goals. Successive governments have struggled due to issues such as accountability, data collection, transparency, and sustainability shortcomings. Insufficient institutional capacity, corruption, an unstable economic and political environment, and inadequate financing further compound these challenges, collectively contributing to the current health issues in the country, like maternal and child health, malaria etc. (Adinma and Adinma, 2010). Research on the impact of factors on Nigeria's primary healthcare system development is extensive, particularly in terms of financing. (World Bank, 2010; Aid, 2015; WHO, 2017; Gyuse et al., 2018).

The theoretical framework, as defined by USC Libraries Research Guides, is a tool used to restrict the scope of relevant data by focusing on specific variables and defining the researcher's perspective in analyzing and interpreting the gathered data. According to WHO in World Health Assembly resolution WHA72.2 on primary health care, the report emphasizes the importance of

monitoring, evaluating, and reviewing health progress and performance in the Operational framework for PHC to ensure that priority actions and decisions are implemented according to agreed objectives and targets.

METHODOLOGY

In this paper, research work centered on Statistical assessment of primary health care services on the health status of rural communities in federal capital territory Nigeria using a secondary research format such as published data set, reports, and visit to the PHCs in FCT. The data was also sourced from The State of Primary Healthcare in Nigeria 2022 Report and FCT Accountability Scorecard 2022 and visit to the PHCs in the communities in FCT.

Population of the Study

From the FCT Accountability Scorecard, 62 PHCs were visited. While in The State of Primary Health Care in Nigeria 2022 Report, 13 PHCs were visited bringing the sample size to a total of 75 PHCs.

Nigeria, located in Sub-Saharan Africa, is currently the most populous nation with over 200 million citizens in which majority of its population are between 0-14 years (NBS, 2018). Projections suggest that this population is anticipated to rise to 214,028,302 by the beginning of Q3 2020 and is expected to reach its peak by the year 2050 (CIA, 2020).

Sampling Technique

In the State of Primary Healthcare in Nigeria 2022 study, a simple random sampling technique was employed to choose the 783 PHCs studied across 34 states of the federation. However in this study our area of focus is FCT where 13 PHCs were visited. In the FCT Accountability Scorecard, a simple random sampling technique was also employed when selecting the 62 PHCs in the 6 Area Councils in FCT.

Data Collection Procedure

The first secondary data set collected was from The State of Primary Health Care in Nigeria 2022 Report where 13 PHCs were randomly visited and a total of 390730 individuals were sampled. The data was collected using the standardized KOBO Toolbox form documenting the state of primary healthcare facilities. This form follows the “Minimum standards for Primary Healthcare” as outlined by the National Primary Healthcare Development Agency (NPHCDA), the Agency responsible for the development and management of PHCs in Nigeria. The specific data criteria collected are: state of Water, Sanitation and Hygiene (WASH); Infrastructure, Personnel and Service delivery. However, this study will be looking at only three of the criteria namely Infrastructure, Personnel and Service delivery in FCT as it affects the health status of the communities.

The other secondary data set used was collected from the FCT Accountability Scorecard which studied 62 PHCs in all the 6 Area councils in FCT; 10 PHCs in Abaji Area Council, 12 PHCs in AMAC, 10 PHCs in Bwari Area Council, 10 PHCs in Gwagwalada Area Council, 10 PHCs in Kwali Area Council and 10 PHCs in Kuje Area Council. The Kobo Collect platform mobile application was used for data collection. 49 data elements were collected across the 6 building blocks of the health system in 62 health facilities, one per ward.

Method of Data Analysis

The two secondary data will be analyzed using descriptive statistics as well as t-test and chi-square. Quantitative data were analyzed using R software package. Binary Logistic Regression was used to identify the impact the various health services have on the health status. The hypothesis was tested based on the standard requirement for the PHCs. The three objectives were analyzed based the standard requirements for PHCs.

Data Analysis and Interpretation

4.1 Presentation of result derived from the state of primary health care in Nigeria's federal capital territory

Table 1: Showing The Descriptive Statistics for The Determinants Of Personnel

Descriptive Statistics For Personnel				
	N	Mean.	Standard. Deviation	Standard Error Mean
YES	6	4	2.97	1.21

The descriptive statistics for the determinants of personnel have a mean value of 4, standard deviation of ± 2.97 and standard error of 1.21 as shown in Table 1.

		YES	NO	PERCENTAGE
SERVICE DELIVERY	ANTENATAL CARE	10	3	77%
	WARD DEVELOPMENT COMMITTEE	12	1	92%
	DELIVERY ROOM.	5	8	38%
	MATERNITY/LYING IN WARD.	9	4	69%
	LABORATORY.	12	1	92%
	INPATIENT WARD.	3	10	23%
	VACCINES RECEIVED SINCE 2021	220837		
	VACCINES ADMINISTERED	151008		
		68%		

Table 1: Showing The Distribution Of The Determinants Of Service Delivery In All 13 PHCs Visited Table 1 and Figure 1 shows the table and pie chart for the distribution of the determinants of service delivery in all 13 PHCs visited and from it one can ascertain that 77% and 10 of the 13 PHCs provided antenatal care, 92% and 12 of the 13 PHCs had a ward development committee, 38% and 5 of the 13 PHCs had at least one delivery room, 69% and 9 of the 13 PHCs had maternity/lying in ward, 92% and 12 of the 13 PHCs had a laboratory and 23% and 3 of the 13 PHCs had in-patient-ward respectively. 68% of the vaccines received since 2021 have been administered.

Answering Research Questions
Question 1

Why is it important to investigate the availability of the minimum requirements of the infrastructure of the PHCs in FCT.?

Table 2: Showing The One Sample T-Test For The Determinants Of Infrastructure

Infrastructure One-Sample Test.							
	Test Value. = 13						
	T	Df	Significance		Mean Difference	95% Confidence Interval of the Difference	
			One-Sided p	Two-Sided p		Lower	Upper
YES	-4.83	5	0.002	0.005	-5.67	-8.68	-2.65

A one sample t-test was run to determine whether there is a difference in the availability of the various determinants of infrastructure in the study the data was obtained from as compared to if it is assumed that all the 13 PHCs visited had all the various infrastructures defined by the value 13. Mean of all the determinants of infrastructure in the study (7.33±2.88) was lower than the average if all the determinants were available 13, a statistically significant difference of 5.67. (95% CI, -8.68 to -2.65), t(5) = -4.83, p = 0.005. There was a statistically significant difference between means ($p < 0.05$).

Question 2

What is the effect of the medical personnel of the PHC on the health status of the patients in the communities?

Table 3: Showing The One Sample T-Test for The Determinants of Personnel

One-Sample Test For Personnel							
	Test Value = 13						
	T	Df	Significance		Mean Difference	95% Confidence Interval of the Difference	
			One-Sided p	Two-Sided p		Lower	Upper
YES	-7.43	5	<0.001	<0.001	-9.00	-12.11	-5.89

A one sample t-test was run to determine whether there is a difference in the availability of the various determinants of personnel in the study our data was obtained from as compared to if it is assumed that all the 13 PHCs visited had all the various personnel defined by the value 13. Mean

of all the determinants of personnel in the study (4.00±2.97) was lower than the average if all the determinants were available 13, a statistically significant difference of 9.00. (95% CI, -12.11 to -5.89), t(5) = -7.43, p = 0.001. There was a statistically significant difference between means ($p < 0.05$).

More Skilled Health Workers

Table 4: Showing The Frequency Table For More Skilled Health Workers

FREQUENCY TABLE FOR PERSONNEL OR MORE SKILLED HEALTH WORKERS					
			MORE SKILLED HEALTH WORKERS		Total
			NO	YES	
PERSONNEL	BAD	Count	36	10	46
		Expected Count	26.7	19.3	46.0
		% within PERSONNEL	78.3%	21.7%	100.0%
		% within 9 OR MORE SKILLED HEALTH WORKERS	100.0%	38.5%	74.2%
		% of Total	58.1%	16.1%	74.2%
		Residual	9.3	-9.3	
		Standardized Residual	1.8	-2.1	
	GOOD	Count	0	16	16
		Expected Count	9.3	6.7	16.0
		% within PERSONNEL	0.0%	100.0%	100.0%
		% within 9 OR MORE SKILLED HEALTH WORKERS	0.0%	61.5%	25.8%
		% of Total	0.0%	25.8%	25.8%
		Residual	-9.3	9.3	
		Standardized Residual	-3.0	3.6	
Total		Count	36	26	62
		Expected Count	36.0	26.0	62.0
		% within PERSONNEL	58.1%	41.9%	100.0%

	% within 9 OR MORE SKILLED HEALTH WORKERS	100.0%	100.0%	100.0%
	% of Total	58.1%	41.9%	100.0%

Table 32 shows that the percentage of the PHCs that had 9 or more skilled health workers but then had an overall bad personnel availability was 38.5% whereas the percentage of PHCs that had 9 or more skilled health workers with an overall good personnel availability was 61.5%. The percentage of PHCs without 9 or more skilled health workers that also had an overall bad personnel availability was 100%, while those without 9 or more skilled health workers with an overall good personnel availability was 0%.

Table 5: Showing The Chi-Square Tests for More Skilled Health Workers

CHI-SQUARE TESTS FOR MORE SKILLED HEALTH WORKERS					
	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square.	29.86[a]	1	<0.0010		
Continuity Correction[b.]	26.730	1	<0.0010		
Likelihood Ratio.	36.160	1	<0.0010		
Fisher's Exact Test.				<0.0010	<0.0010
N of Valid Cases.	62				
Table 5: a. 0 cells (.0%) having expected count lesser than 5. The least expected count stands at 6.71					
b. Only Computed for 2x2 table.					

As shown in table 33, a Pearson chi-square test was conducted to examine the association between personnel and 9 or more skilled health workers. The results of the test indicated that there was a significant association between personnel and 9 or more skilled health workers. Pearson's χ^2 (1) = 29.86, p < 0.001.

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Table 6: Showing The Chi-Square Tests for Personnel * Med Lab Scientist/Technician

CHI-SQUARE TESTS FOR MED LAB SCIENTIST/TECHNICIAN					
	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square.	12.72[a]	1	<0.0010		
Continuity Correction[b.]	10.67	1	0.0010		
Likelihood Ratio.	18.01	1	<0.0010		
Fisher's Exact Test.				<0.0010	<0.0010
N of Valid Cases.	62				
Table 6: a. 0 cells (.0%) having expected count lesser than 5. The least expected stands at 5.94.					
b. Only computed for a 2x2 table.					

As shown in table 39, a Pearson chi-square test was conducted to examine the association between personnel and med lab scientist/technician. The results of the test indicated that there was a significant association between personnel and med lab scientist/technician. Pearson's χ^2 (1) = 29.86, p < 0.001.

Question 3

How important is the PHC's health delivery service to the health status of the patients in the communities?

Table 7: Showing The One Sample T-Test for The Determinants of Service Delivery

One-Sample Test For Service Delivery							
	Test Value = 13						
	T	Df	Significance		Mean Difference	95% Confidence Interval of the Difference	
			One-Sided p	Two-Sided p		Lower	Upper
YES	-2.96	5	0.016	0.032	-4.50	-8.41	-0.59

A one sample t-test was run to determine whether there is a difference in the availability of the various determinants of service delivery in the study our data was obtained from as compared to

if it is assumed that all the 13 PHCs visited had all the various service deliveries defined by the value 13. Mean of all the determinants of service delivery in the study (8.50±3.73) was lower than the average if all the determinants were available 13, a statistically significant difference of 4.50. (95% CI, -8.41 to -0.59), t(5) = -2.96, p = 0.032. There was a statistically significant difference between means ($p < 0.05$).

Table 8: Showing The Paired Samples Correlations Between Personnel and Service Delivery

Paired Samples Correlations Between Personnel and Service Delivery					
		N	Correlation	Significance	
				One-Sided p	Two-Sided p
Pair 1	PERSONNEL & SERVICE DELIVERY	6	-0.16	0.38	0.76

A paired samples correlation was conducted to assess the relationship between personnel and service delivery. The results indicated that there was no significant correlation between the variables, r(5) = -0.16, p =0.76.

Table 9: Showing The Paired Samples T-Test Between Personnel and Service Delivery

Paired Samples Test Between Personnel and Service Delivery										
		Paired Differences					T	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	PERSONNEL - SERVICE DELIVERY	-4.50	5.13	2.09	-9.88	0.88	-2.15	5	0.042	0.084

A paired sample t-test was conducted to compare the means of determinants of personnel (4.00±2.97) and the means of the determinants of service delivery (8.50±3.73). The results

indicated that there was no significant difference between the means, t(5) = -2.15, p = 0.084, 95% CI (-9.88 to 0.88). There was no statistically significant difference between means (p > 0.05).

DISCUSSION OF RESULTS

Table 2 shows that under infrastructure namely detached building, electricity, ambulance, pharm. fridge, temperature log and cooling van using a one sample test had (95% CI, -8.68 to -2.65), t(5) = -4.83, p = 0.005. The calculated t 4.83 when compared at the 0.05 level of significance, the critical t 2.571 is less than the calculated t. Therefore, there is a significant correlation between the infrastructure of the PHCs and health status of the community. This agrees with Kress *et al* in their study on Assessment of Primary Health Care System Performance in Nigeria: Using the Primary Health Care Performance Indicator Conceptual Framework that Nigeria appears to have a sufficient facility density and as a result most Nigerian have geographic access to primary health care.

Implication to Research and Practice

Table 3 shows that under personnel namely medical officer, community health officer, nurse/midwives, pharmacy technicians, junior community health extension worker and health attendants using a one sample test had (95% CI, -12.11 to -5.89), t(5) = -7.43, p = 0.001. The calculated t 7.43 when compared at the 0.05 level of significance, the critical t 2.571 is less than the calculated t. Therefore, there is a significant correlation between the personnel in the PHCs and health status of the community. The study result agrees with the study on Primary Health Care in Nigeria: Strategies, Constraints in Implementation by Alenoghenai, I, *et al*, 2014 that no health system can function effectively without an effective workforce.

CONCLUSION

The study provided an empirical evidence of the effect of primary health care service delivery, infrastructure and personnel on the health status of the communities in the study area. The study assessed and concluded that the primary health care service delivery, infrastructure and personnel impacted positively on the health status of the communities in the Federal Capital Territory (F.C.T).

Future Research

One of the future research in this regard could be association between the facilities and time to event on any emergence at the rural communities in Nigeria.

REFERENCES

Alonge S. K. (2020). Primary Health Care In Nigeria: An Appraisal Of The Effect Of Foreign Donations. *Ajhse Vol: 1 (2): 86-100, 2020*

Ananaba, A., Sadiq, F.U. and Piron, L. (2018). Health Financing In Nigeria: Retrieved From: http://www.perlnigeria.net/storage/casestudies/june2018/vfspjjonqo 5evzdf8dnt.pdf.

CIA (2020). The World Factbook 2020. Washington Dc: Central Intelligence Agency. Assessed From https://www.cia.gov/library/publications/resources/the-world-factbook/index.html

NDHS (2018). Nigeria Demographic And Health Survey 2018. Abuja, Nigeria, And Rockville, Maryland, USA: *NPC and ICF, 1 -488*

Primary Health Care Progression Model Assessment Tool. Primary Health Care Performance Initiative (PHCPI). (2019). https://improvingphc.org/sites/default/files/phc-progression%20model%202019-04-04_final.pdf.

Primary Health Care On The Road To Universal Health Coverage 2019 Monitoring Report (Conference Edition). Geneva: World Health Organization. (2019). https://www.who.int/healthinfo/universal_health_coverage/report/uhc_report_2019.pdf?ua=1.

Resolution Wha72.2: Primary Health Care. (2019). In: Seventy-Second World Health Assembly, May 2019. Geneva: World Health Organization. https://apps.who.int/gb/ebwha/pdf_files/wha72/a72_r2-en.pdf

The World Bank. (2016). World Development Indicators Database. Available At http://data.worldbank.org/data-catalog/world-development-indicators

The World Bank, (2010). Improving Primary Health Care Delivery In Nigeria: Evidence From Four States. *World Bank Publications.*

Shaw, R. P., Wang, H., Kress, D. and Hovig, D. (2015). Donor And Domestic Financing Of Primary Health Care In Low Income Countries. *Health Systems And Reform 1(1): 72-88.*

State Of Primary Health Care In Nigeria's Federal Capital Territory - An Accountability Scorecard. October, 2021.

UNICEF. (2006). UNICEF State Of The Worlds Children 2006: *Unicef State Of The Worlds Children 2006*. New York: UNICEF.

World Health Organization (2020a). Health Systems Strengthening Glossary. Retrieved From: https://www.who.int/healthsystems/hss_glossary/en/index5.html

World Health Organization And United Nations Children's Fund. Operational Framework For Primary Health Care: Transforming Vision Into Action. Geneva: World Health Organization. (2020). https://www.who.int/publications/i/item/9789240017832.

World Health Organization. (2018). A Vision For Primary Health Care In The 21st Century: Towards Universal Health Coverage And The Sustainable Development Goals. *No.Who/His/Sds/2018.15*. World Health Organization.

World Health Organization.(2000). The World Health Report 2000: Health Systems: Improving Performance. Geneva: World Health Organization; 2000.