

Situational Analysis of Access to Essential Healthcare Services in Nigeria: Implication for Trans-Sectorial Policy Considerations in Addressing Health Inequities

Sunday Atobatele, Oluomachukwu Omeje, Oluwafisayo Ayodeji*,
Faith Oisagbai, Sidney Sampson

Sydani Group, Abuja, Nigeria

Email: sunday.atobatele@sydani.org, oluomachukwu.omeje@sydani.org, *oluwafisayo.ayodeji@sydani.org,
*oluwafisayorichie@gmail.com, Faith.Oisagbai@sydani.org, Sidney.sampson@sydani.org

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Abstract

Background: Socioeconomic factors influence health outcomes and the distribution of health resources within and between countries globally. In Nigeria, there are various socio-economic factors that have been reported to be responsible for health inequities across the different geopolitical zones. **Objective:** To assess health inequities in relation to socio-economic factors that affect access to essential health care services in Nigeria, using family planning, maternal care, and childcare as indicators. **Method:** The study involved a cross-sectional secondary analysis of data from the 2018 Nigeria Demographic and Health Survey (NDHS) and a literature review of transdisciplinary approaches to addressing health inequities. **Result:** The overall result from the findings suggests a strong influence of geographical and socioeconomic factors in the distribution of healthcare services. Specifically, family planning services were more readily available and accessible in the Southern zones of Nigeria than in the Northern zone of Nigeria, which could be attributed to socio-cultural, religious, and access-related barriers. Results also showed that access to most maternal and child health care services was often skewed towards the southern zones, which could be due to the presence of more healthcare workers who provide these services coupled with higher access to maternal care, hence a higher uptake and utilization of maternal care services. Also, children in the northern zones had lesser odds of receiving basic and age-appropriate vaccination than those in other regions, which could be attributed to the supply-side disparities that exist between the northern and southern regions. **Conclusion:** This study concludes that level of educational attainment, wealth quintiles, as well as financial barriers, are

the major socio-economic factors that influence access to maternal and childcare services.

Keywords

Health, Inequities, Socio-Economic Factors, Family Planning, Maternal Care, Childcare

1. Background

The presence of health disparities between and within countries has resulted in a renewed focus on health inequity, especially in public health since the concept of universal health coverage became a global topic [1]. Health inequities are described by the World Health Organization as disparities in health status/outcomes or health resource distribution among different population groups, resulting in considerable socioeconomic situations in which individuals are born, grow, live, work, and age [2]. In all countries, there are large differences in health status among different socioeconomic groups regardless of their income level, whether low, middle, or high [3]. The lower a person's socioeconomic position, the higher the risk of poor health. There is therefore strong evidence that socioeconomic characteristics like education, employment status, income level, gender, and ethnicity have a significant impact on one's health. These socioeconomic factors, often known as social determinants of health, are non-medical factors that have an impact on health outcomes and inequities [2]. Social determinants of health have been classified by the Centre for Disease Control and Prevention into five domains; economic stability, education access and quality, neighbourhood and built environment, healthcare access and quality, social and community context [4].

Nigeria is a country with significant health inequities, as shown by health statistics [5]. There also exist widespread socio-structural barriers to fair access to essential health care services including high poverty and illiteracy levels coupled with geographical differences that can be attributed to predominant socio-cultural contexts [6]. These contexts, which are also reported by the WBG in 2021, are intricately linked to income and education indices. The report showed that 40% of Nigerians live below the global poverty level [7], with the average Nigerian living on \$1.90 per day [8], thus translating to limited financial access to healthcare even when a health facility was within geographical reach [9]. This situation is further compounded by the lack of a social safety net for the poor. The absence of a structured social welfare system that would have helped to cushion the effect of poverty on health often results in the death of many people from malnutrition, lack of transportation to health facilities, and exposure to extreme weather conditions, among others [10]. Although the National Health Insurance Scheme (NHIS) was launched in 2015 to achieve universal health coverage for Nigerians,

the scheme has not been able to capture a good number of the population. The report showed that many people pay out of pocket for healthcare [11], and only about 3% of Nigerians are covered by health insurance [12]. The exclusion of certain drugs and treatment for common diseases such as diabetes, sickle cell anaemia, HIV, most cancers, and other chronic diseases showed that the scheme is not comprehensive and does not provide the full coverage of health care services that people need, even for the few individuals who are insured [13].

A high level of education not only guarantees that people are in a better financial position to afford great healthcare but also gives them the necessary agency to seek care and navigate the health system efficiently. Studies have linked no and/or lower educational attainment to lower income and poor health outcomes [14]. Although the Nigerian education system has experienced rapid development in the past few decades, these changes have not been sustained due to a decline in foreign earnings and changes in policies [15]. The average federal government allocation for education between 2009 and 2021 which stands at 7% is a far cry from global recommendations of 15% to 20% of the total government budget for education following the Incheon Declaration and Framework for Action for the Implementation of Sustainable Development Goal (SDG) 4 (FFA). In the journey towards achieving the Sustainable Development Goal and targets for improving health and wellbeing, the Nigerian government has identified the need to enact policies aimed at reducing the wide disparity in health care access and outcomes. This identified need has translated to policies such as the 10-year developmental plan [16] and the One Primary Health Care Facility Per Ward Strategy, in addition to the Basic Primary Health Care Provision Fund and investments into improving education through the universal basic education scheme.

Despite these efforts, socio-economically disadvantaged Nigerians remain underserved, a situation which demands a clear understanding to quantify the current situation relating to access and utilization of health services in Nigeria. The objective of this study is therefore to assess health inequities in relation to socio-economic factors that affect access to essential health care services in Nigeria, using family planning, maternal care, and childcare as indicators. This would have huge implications for designing targeted policy strategies aimed at addressing these equity issues and placing the country on a more realistic pathway to attaining the SDG goals by 2030.

2. Methods

2.1. Study Design

The study involved a cross-sectional secondary analysis of data from the 2018 Nigeria Demographic and Health Survey (NDHS) and a literature review of transdisciplinary approaches to addressing health inequities.

2.2. Search Strategy

A systematic search of PubMed and Google scholar was performed for studies

that explored transdisciplinary approaches to addressing inequity in access to health care services. Key search terms used were: 1) Health inequity* OR health for all OR universal health coverage; 2) essential health services OR essential services OR health services OR maternal care services OR childcare services OR family planning services OR nutrition services; and 3) transdisciplinary approach* OR Multi-sectorial approach* OR Policy approach* OR Asset-based strategy*. Wild-cards and truncations were used to capture words that could have multiple endings. Search was restricted to studies that were reported in English, and basically, studies conducted in low- and middle-income countries to capture approaches that can be easily contextualized in Nigeria. There was no restriction to the publication period.

2.3. Study Screening, Selection, and Data Extraction

One author screened the title and abstracts of the studies from the search result to identify eligible studies. Full-text screening was performed by two authors and disagreement was resolved by referring to a third author and through discussions and a consensus. Results of the screening were presented in Microsoft Office Excel. Data were extracted from selected studies and include study title, study link, lead author, contact details of the lead author, study location (country), aim of the study, study design, outcome measure, barriers/challenges to fair access to health care, and recommended trans-sectorial approaches to addressing inequities in access to essential health care services.

2.4. Sampling and Data Collection Approach

The sampling frame that was used for the 2018 NDHS is the Population and Housing Census of the Federal Republic of Nigeria conducted in 2006 by the National Population Commission. The NDHS survey is conducted every five years. Nigeria is administratively divided into states which are stratified into geopolitical zones. Each state is further divided into local government areas (LGAs), and each LGA is divided into localities. The primary sampling unit for the 2018 NDHS, referred to as cluster, is defined based on census enumeration areas (a subdivision of an administrative locality).

The survey adopted a two-staged stratified sampling approach. Stratification was achieved by separating each of the 37 states into rural and urban areas, resulting in a total of 74 sampling strata. Samples were selected independently in every stratum. Lower administrative level stratifications were achieved by sorting the sampling frame before sample selection according to administrative order and by using a probability that is proportional to size selection during the first sampling stage. For the first sampling stage, 1400 census enumeration areas (EAs) or clusters were selected with probability proportional to the size of the EA. This is to ensure that the survey precision was comparable across clusters. A listing of households in each selected EA was conducted and this served as a sampling frame for the selection of households in the second sampling stage. For the second sampling stage, a systematic probabilistic sampling was conducted to

select a fixed number of 30 households in every cluster resulting in a total sample size of 41,668 households. Given the non-proportional allocation of the sample to the different states and the possible differences in response rates, sampling weights were calculated, added to the data file, and applied so that the results of the survey would be representative at the national level as well as the domain level. These sampling weights were calculated based on sampling probabilities separately for each sampling stage and for each cluster.

Data collection for the 2018 NDHS was conducted from August 14, 2018, to December 29, 2018. The survey was successfully conducted in 1389 clusters after 11 clusters with deteriorating security conditions during the fieldwork were dropped. These areas were Zamfara (4 clusters), Sokoto (3 clusters), Katsina (2 clusters), Borno (1 cluster), and Lagos (1 cluster). Five questionnaires were used for the survey: the Household Questionnaire, the Woman's Questionnaire, the Man's Questionnaire, the Biomarker Questionnaire, and the Fieldworker Questionnaire. Information obtained from the woman's questionnaire includes but is not limited to, demographic characteristics (including age, education, media exposure), birth history, knowledge, use and source of family planning methods, antenatal, delivery, and post-natal care, vaccination, and childhood illnesses. The biomarker questionnaire was used to obtain information on anthropometric characteristics of children (height and weight measurements), biomarkers for anemia, malaria, and genotype.

2.5. Study Sample Selection and Data Collection

For the current study, we included all the women and their child(ren) whose information was obtained during the interviews. We extracted data on family planning, maternal care, and childcare. Indicators for family planning were unmet need, met need and demand satisfaction. Maternal care indicators include antenatal care from a skilled provider, number of antenatal visits, protection against neonatal tetanus, delivery done by a skilled provider, delivery done in the health facility, postnatal check within the first 2 days of birth, use of intermittent preventive therapy for malaria in pregnancy (IPTp), and anemia prevalence and use of insecticide-treated nets (ITN) in pregnancy. Childcare indicators include basic vaccination status, age-appropriate vaccination status, advice or treatment sought for acute respiratory illnesses (ARI), advice or treatment sought for fever, oral rehydration solution (ORS)/zinc given for diarrhea, nutritional status (measured using anthropometric indices such as height-for-age, weight-for-height, and weight-for-age), anemia prevalence, use of ITN, blood taken for testing for fever, and treatment for fever with artemisinin-based combination treatment. **Table 1** summarizes the description of each of the selected indicators. These indicators were considered as outcome variables for the study.

2.6. Independent Variables

The independent variables considered in the study include geopolitical zone of

Table 1. Description of the outcome indicators.

s/no	Outcome indicators	Description
Family Planning		
1	Unmet need	Proportion of women who want to stop childbearing or space their next birth but are not using contraceptive method
2	Met need	Proportion of women who are currently using family planning method
3	Demand satisfied	Proportion of the total demand for family planning that are met
Maternal Care		
4	Antenatal care from a skilled provider	Proportion of women who received care or support during pregnancy from a skilled provider
5	≥4 antenatal visits	Proportion of pregnant women who visited the health facility to receive care or support from a skilled provider up to 4 or more times
6	Protection against neonatal tetanus (most recent birth)	Proportion of pregnant women who received tetanus toxoid injections during pregnancy
7	Delivery done by skilled provider	Proportion of mothers whose child was delivered by a skilled provider
8	Delivery done in health facility	Proportion of mothers whose delivery was carried out in a health facility
9	Postnatal check in first 2 days after birth	Proportion of mothers and their child who received postnatal care within 48 hours of delivery
10	Use of IPTp during pregnancy	Proportion of women who used intermittent preventive treatment during pregnancy
11	Anemia prevalence in pregnancy	Proportion of pregnant women with hemoglobin levels below 11.0 g/dl
12	Use of ITN in pregnancy	Proportion of women who use insecticide-treated mosquito nets during pregnancy
Child Care and Nutrition		
13	All basic vaccination	Proportion of children who have received BCG against tuberculosis, 3 doses of DPT to prevent diphtheria, pertussis, and tetanus, at least 3 doses of polio vaccine and one dose of measles vaccine
14	All age-appropriate vaccination	Proportion of children who have received all basic vaccinations along with a birth dose of Hepatitis B and polio vaccine, one dose of inactivated polio vaccine and three doses of pneumococcal vaccine
15	Advice or treatment sought for acute respiratory illnesses	Proportion of mothers whose child has experienced a cough accompanied by short, rapid breathing or difficulty in breathing because of a chest-related problem, and sought treatment when this occurred from a health facility or health provider
16	Advice or treatment sought for fever	Proportion of mothers whose child has experienced fever, and sought treatment when it occurred from a health facility or health provider
17	Oral rehydration solution/Zinc given for diarrhea	Percentage of children with diarrhea who received rehydration solution from an oral rehydration salt or zinc supplements
18	Nutritional status (height-for-age)	Proportion of children who are stunted (below -2 SD)
19	Nutritional status (weight-for-height)	Proportion of children who are wasted (-2 SD)
20	Nutritional status (weight-for-age)	Proportion of children who are underweight (-2 SD)
21	Anemia prevalence (children ages 6 - 59 months)	Proportion of children aged 6 - 59 months with hemoglobin level less than 11.0 g/dl

Continued

22	Use of ITN in children	Proportion of children under age 5 who use insecticide-treated mosquito nets
23	Blood taken from heel/finger for testing for fever	Percentage of children who had a drop of blood take from a finger or heel prick (presumably for a malaria test)
24	Treatment of fever with ACT	Percentage of children with fever who were treated with artemisinin-based combination therapy

residence, maternal education attainment, and household wealth index. Geopolitical zone of residence was stratified according to the administrative zones of northcentral, northeast, northwest, southeast, southwest, and south-south zones. Maternal educational level was defined as having no education, primary education, secondary education, and more than secondary education. The household wealth index was presented in five quintiles (lowest, second, middle, fourth, and highest quintiles) and was derived from a measurement of the household dwelling unit, such as a source of drinking water, type of toilet facilities, materials used for flooring, external walls, and roofing, and ownership of durable goods.

2.7. Data Analysis

The distributions of the independent variables—geopolitical zone of residence, maternal educational attainment, and household wealth index—were summarized using descriptive statistics. The distributions were expressed in frequencies and proportions across the different categorical levels of the independent variables. We examined measure of association between the independent variables and the outcome indicators using bivariate analysis. Due to the dichotomous nature of the outcome indicators, we assumed they follow a Bernoulli distribution. As a result, we used multi-level mixed effect generalized linear modelling with Newton-Raphson (maximum likelihood) optimization, binomial variance function and the logit link function to fit logistic regression models for each of the outcome indicators. We used multilevel analysis due to the stratified nature of the data. To account for the clustering effect, we adopted the mixed-effect logistic regression approach. We applied Bayesian Information Criterion to assess the goodness of fit of the models. All analyses were adjusted to account for the aggregate nature of the datasets. Measures of association were exponentiated and presented as odds ratios (ORs) with their corresponding 95% confidence intervals, with a p-value of <0.05 considered statistically significant. Data analysis was done using Stata statistical software.

3. Results

3.1. Cross-Sectional Analysis

Out of the 41,668 households that were sampled, 40,666 were occupied. Of the occupied households, 40,427 were successfully interviewed, resulting in a response rate of 99%. In the interviewed households, 42,121 women aged 15 - 49 were identified for individual interviews. 41,821 women completed interviews

with a response rate of 99%. Data for these women and their child(ren) were included in the analysis.

3.2. Family Planning

Table 2 presents the distribution of women with unmet needs, met needs and demand satisfied for family planning across the six geopolitical zones, educational attainment levels, and wealth quintiles, and the results of the logistic regression analyses. From the logistic regression, the odds of having an unmet need for family planning are relatively similar across the six geopolitical zones, with women residing in the South-south region having approximately 1.5 times higher odds of having an unmet need than women residing in the other zones (OR 1.49; 95% CI 1.33, 1.67). Women in the Southeast (OR 2.02; 95% CI 1.80, 2.27) and South-west regions (OR 2.80; 95% CI 2.52, 3.10) have more than two times higher odds of having their need for family planning met than women residing

Table 2. Univariate analysis of the association between area of residence, educational attainment, and index of wealth measurement on access to family planning series.

	Family planning								
	Unmet need			Met needs			Demand satisfied		
	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)
Geopolitical Zone									
North Central	21%	4086	1.00	16%	4086	1.00	44%	4086	1.00
Northeast	19%	4841	0.91 (0.82, 1.01)*	10%	4841	0.54 (0.48, 0.62)*	33%	4841	0.64 (0.58, 0.69)*
Northwest	14%	9826	0.65 (0.59, 0.72)*	7%	9826	0.38 (0.34, 0.42)*	32%	9826	0.60 (0.55, 0.64)*
Southeast	18%	2893	0.83 (0.74, 0.94)*	28%	2893	2.02 (1.80, 2.27)*	61%	2893	2.02 (1.83, 2.22)*
SouthSouth	28%	2777	1.49 (1.33, 1.67)*	22%	2777	1.43 (1.27, 1.62)*	44%	2777	0.99 (0.90, 1.09)
Southwest	22%	4666	1.11 (1.01, 1.24)*	35%	4666	2.80 (2.52, 3.10)*	61%	4666	2.00 (1.84, 2.18)*
Education									
No education	17%	12955	1.00	5%	12955	1.00	24%	12955	1.00
Primary	21%	4580	1.35 (1.24, 1.47)*	19%	4580	4.38 (3.94, 4.88)*	48%	4580	2.94 (2.74, 3.16)*
Secondary	21%	8767	1.33 (1.24, 1.43)*	27%	8767	6.67 (6.09, 7.31)*	56%	8767	4.09 (3.86, 4.33)*
More than secondary	17%	2788	1.02 (0.92, 1.14)	33%	2788	9.09 (8.14, 10.15)*	66%	2788	6.28 (5.75, 6.86)*
Wealth Quintile									
Lowest	16%	6008	1.00	4%	6008	1.00	21%	6008	1.00
Second	17%	6224	1.07 (0.97, 1.17)	8%	6224	1.84 (1.58, 2.15)*	31%	6224	1.69 (1.55, 1.83)*
Middle	21%	5601	1.37 (1.25, 1.51)*	15%	5601	3.72 (3.22, 4.30)*	41%	5601	2.59 (2.38, 2.81)*
Fourth	22%	5599	1.41 (1.29, 1.55)*	25%	5599	7.32 (6.39, 8.41)*	54%	5599	4.38 (4.03, 4.74)*
Highest	19%	5657	1.17 (1.07, 1.29)*	33%	5657	10.72 (9.36, 12.27)*	64%	5657	6.64 (6.12, 7.21)*

*P-value < 0.005 indicating statistical significance.

in other regions; with women in the North-east (OR 0.54; 95% CI 0.48, 0.62) and Northwest zones (OR 0.38; 95% CI 0.34, 0.42) having significantly lower odds. The demand for family planning was approximately twice more likely to be satisfied in the South-east (OR 2.02; 95% CI 1.83, 2.22) and South-south (OR 2.00; 95% CI) than in other zones.

Women across all educational attainment levels have relatively similar odds of having their need for family planning not met. However, the odds of having their needs met and the demand for family planning satisfied consistently increased as level of educational attainment increased, with women who attained higher than secondary educational level having about nine times (OR 9.09; 95% CI 8.14, 10.15) and six times (OR 6.28; 95% CI 5.75, 6.86) higher odds of having their needs met and demand satisfied respectively than women with no primary education. In the same vein, women across all wealth quintile levels had relatively similar odds of having their family planning need not met. However, with an increasing measure of wealth, the odds of having their needs met and demand satisfied increased; with women within the highest wealth quintile having approximately ten times (OR 10.72; 95% CI 9.36, 12.27) and seven times (OR 6.64; 95% CI 6.12, 7.21) higher odds of having their needs met and demand satisfied respectively than women within the lowest wealth quintile.

3.3. Antenatal Care

Table 3 presents the distribution of women, across the six geopolitical zones, educational attainment levels, and wealth quintiles, who had their antenatal care provided by a skilled provider, ≥ 4 antenatal visits, recent protection against neonatal tetanus, delivery done by a skilled provider, delivery done in the health facility, post-natal check in the first 48 hours following birth, used IPTp and ITN during pregnancy, and diagnosed of anemia in pregnancy.

Women who reside in Southeast and Southwest zones had consistently higher odds of having their antenatal care provided by a skilled provider, of attending ≥ 4 antenatal visits, recently protected against neonatal tetanus, had their delivery done by a skilled provider and in a health facility, and had post-natal check 2 days after birth than women residing in the Northern and South-South regions. The odds of using ITN in pregnancy were found to be approximately three times higher in women residing in the Northwest region (OR 3.60; 95% CI 2.97, 4.37) than in women residing in other regions; with women in the southern region having significantly lesser odds of making use of ITN in pregnancy. The odds of a woman being diagnosed with anemia during pregnancy were found to be relatively similar across all the six zones.

With the increasing level of educational attainment and measure of wealth, index is a correspondingly higher odds of a woman having their antenatal care provided by a skilled provider, of attending ≥ 4 antenatal visits, recently protected against neonatal tetanus, had their delivery done by a skilled provider and in a health facility, and had post-natal check 2 days after birth. However, the odds of

Table 3. Univariate analysis of the association between area of residence, educational attainment, and index of wealth measurement on access to maternal care services.

Geopolitical Zone	Antenatal Care												Post-natal check in first 2 days after birth			Use IPTp in pregnancy			Women diagnosed with anaemia			Use of ITN in pregnancy									
	Antenatal Care by Skilled Provider			≥4 antenatal visits			Recent protection against neonatal tetanus			Delivery done by skilled provider			Delivery done in health facility			Odds ratio (95% CI)			Odds ratio (95% CI)			Odds ratio (95% CI)			Odds ratio (95% CI)						
	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)				
North Central	66%	3031	1.00	54%	3031	1.00	49%	4619	1.00	45%	1787	1.00	56%	1787	1.00	55%	2093	1.00	49%	635	1.00										
Northeast	58%	3862	0.71 (0.64, 0.78)*	44%	3862	0.66 (0.60, 0.73)*	54%	3862	0.85 (0.78, 0.94)*	33%	6213	0.35 (0.32, 0.38)*	25%	6213	0.63 (0.56, 0.72)*	65%	2350	1.44 (1.27, 1.63)*	58%	2222	1.13 (1.01, 1.28)*	58%	811	1.41 (1.15, 1.74)*							
Northwest	54%	7644	0.60 (0.55, 0.65)*	42%	7644	0.62 (0.57, 0.67)*	46%	7644	0.61 (0.56, 0.67)*	19%	12558	0.20 (0.18, 0.22)*	16%	12558	0.19 (0.18, 0.21)*	21%	4649	0.33 (0.29, 0.37)*	58%	4649	1.08 (0.97, 1.21)*	59%	3906	1.16 (1.04, 1.29)*	78%	1690	3.60 (2.97, 4.37)*				
Southeast	89%	2138	4.21 (3.60, 4.92)*	83%	2138	4.09 (3.58, 4.67)*	92%	2138	8.36 (7.04, 9.93)*	84%	3428	4.61 (4.14, 5.14)*	82%	3428	4.64 (4.18, 5.15)*	72%	1304	3.15 (2.70, 3.67)*	79%	1304	2.89 (2.46, 3.40)*	66%	1823	1.58 (1.38, 1.79)*	39%	391	0.66 (0.51, 0.85)*				
South South	77%	2019	1.72 (1.51, 1.95)*	70%	2019	1.92 (1.71, 2.17)*	76%	2019	2.26 (2.00, 2.56)*	60%	2968	1.31 (1.19, 1.44)*	53%	1160	1.38 (1.19, 1.61)*	74%	1160	2.19 (1.86, 2.57)*	60%	1813	1.22 (1.08, 1.39)*	29%	320	0.43 (0.32, 0.57)*							
Southwest	88%	3218	3.81 (3.34, 4.34)*	84%	3218	4.51 (4.00, 5.07)*	83%	3218	3.60 (3.20, 4.05)*	81%	4407	3.66 (3.33, 4.03)*	77%	1685	4.26 (3.67, 4.93)*	77%	1685	4.26 (3.67, 4.93)*	65%	1685	1.41 (1.23, 1.62)*	51%	2759	0.85 (0.76, 0.95)*	31%	462	0.47 (0.37, 0.61)*				
Education																															
No education	45%	9738	1.00	35%	9738	1.00	40%	9738	1.00	16%	15858	1.00	14%	15858	1.00	19%	5786	1.00	64%	4823	1.00	15%	2645	1.00							
Primary	75%	3293	3.56 (3.26, 3.89)*	63%	3293	3.22 (2.96, 3.49)*	68%	3293	3.08 (2.83, 3.35)*	46%	5103	4.44 (4.14, 4.76)*	41%	5103	4.25 (3.96, 4.57)*	44%	1877	3.31 (2.96, 3.70)*	59%	2228	20.76 (18.00, 23.95)*	33%	877	2.80 (2.35, 3.35)*							
Secondary	86%	6962	7.26 (6.72, 7.85)*	76%	6962	6.15 (5.73, 6.59)*	81%	6962	6.25 (5.81, 6.72)*	71%	10413	12.73 (11.99, 13.51)*	65%	10413	11.40 (10.73, 12.11)*	62%	4186	6.73 (6.15, 7.36)*	55%	6053	18.13 (15.98, 20.57)*	43%	2052	4.41 (3.84, 5.06)*							
More than secondary	97%	1919	43.52 (32.94, 57.49)*	89%	1919	15.20 (13.11, 17.64)*	90%	1919	12.82 (11.01, 14.94)*	92%	2818	60.51 (52.47, 69.79)*	88%	2818	44.49 (39.42, 50.22)*	80%	1086	16.74 (14.23, 19.70)*	47%	1513	13.10 (11.24, 15.27)*	62%	570	9.59 (7.85, 11.72)*							
Wealth quintile																															
Lowest	41%	4716	1.00	31%	4716	1.00	38%	4716	1.00	13%	7572	1.00	12%	7572	1.00	18%	2775	1.00	48%	2775	1.00	66%	2354	1.00	67%	1017	1.00				
Second	53%	4850	1.64 (1.52, 1.78)*	43%	4850	1.67 (1.54, 1.82)*	48%	4850	1.52 (1.40, 1.64)*	24%	7782	2.00 (1.83, 2.17)*	20%	7782	2.04 (1.87, 2.23)*	25%	2955	1.47 (1.29, 1.67)*	54%	2955	1.28 (1.16, 1.42)*	62%	2752	0.85 (0.76, 0.96)*	70%	1049	1.15 (0.95, 1.38)				
Middle	73%	4448	3.87 (3.55, 4.23)*	61%	4448	3.47 (3.18, 3.78)*	65%	4448	2.95 (2.71, 3.21)*	45%	7043	5.37 (4.95, 5.83)*	40%	7043	5.15 (4.73, 5.60)*	42%	2666	3.27 (2.89, 3.69)*	68%	2666	2.31 (2.07, 2.58)*	59%	2979	0.76 (0.68, 0.85)*	70%	886	0.70 (0.58, 0.84)*				
Fourth	84%	4103	7.89 (7.12, 8.74)*	73%	4103	6.16 (5.62, 6.70)*	77%	4103	5.51 (5.02, 6.05)*	66%	6254	12.48 (11.47, 13.58)*	59%	6254	11.06 (10.14, 12.06)*	61%	2416	7.20 (6.34, 8.17)*	73%	2416	2.99 (2.66, 3.36)*	55%	3223	0.65 (0.59, 0.73)*	43%	721	0.37 (0.30, 0.45)*				
Highest	93%	3794	19.80 (17.25, 22.74)*	85%	3794	13.20 (11.83, 14.72)*	87%	3794	11.11 (9.93, 12.43)*	84%	5541	34.68 (31.45, 38.26)*	80%	5541	29.56 (26.86, 32.54)*	75%	2123	13.24 (11.54, 15.19)*	81%	2123	4.55 (3.99, 5.18)*	50%	3310	0.53 (0.47, 0.59)*	38%	637	0.30 (0.25, 0.37)*				

*P-value < 0.005 indicating statistical significance.

being diagnosed with anemia in pregnancy increased with increasing level of educational attainment with women who had attained more than secondary education having more than nine times the odds of being diagnosed with anemia than women with no education (OR 9.59; 95% CI 7.85, 11.72). Women across all wealth quintile levels had relatively similar odds of being diagnosed with anemia in pregnancy. The odds of using ITN in pregnancy decreased with increasing measure of wealth index with women in the highest wealth quintile having 70% lower odds of using ITN in pregnancy than women in the lowest wealth quintile (OR 0.30; 95% CI 0.25, 0.37).

3.4. Childcare

Table 4 presents the distribution of children, across the six geopolitical zones, maternal educational attainment levels, and measure of household wealth index, according to those who have received basic vaccination, age-appropriate vaccination, and ORS/Zinc for diarrhea; whose caregiver sought advice/treatment for ARI and fever; those who measured below 2SD of height-for-age, weight-or-height and weight-for-age; children diagnosed with anemia, use ITN, had their blood taken for test for fever and received ACT for fever.

Children in the northern zones had lesser odds of having received basic and age-appropriate vaccination than those in other regions. Similarly, the odds of receiving ACT for fever were found to be lower in children in the northern zones than in other zones. Children in the northwest and southwest zone had higher odds of receiving ORS/Zinc for diarrhea.

Children in the Northeast and Northwest zones of the country had higher odds of being stunted (below 2-SD height for age), wasted (below 2-SD weight for height) and underweight (below 2-SD weight for age). Also, children in the Southwest zone had lower odds of being diagnosed with anemia, and higher odds of having their blood taken for test for fever. The odds of using insecticide treated nets were found to be higher in children in the northern zones. However, children in the southeast zone had a higher odd of receiving ACT for fever.

There was a correspondingly higher odd of a child/child's caregiver receiving all basic vaccinations, seeking advice/treatment for ARI and fever, for the increasing level of the mother's education and measure of wealth index. In contrast, with the increasing level of the mother's education and measure of wealth index, there was a corresponding lower odd of a child receiving ORS/Zinc for diarrhea, being stunted, and being wasted. However, there was no pattern of the odds of a child receiving all age-appropriate vaccinations, for increasing level of the mother's education or wealth index. There was no data for the increasing level of mother's education in relation to a child being underweight, diagnosed with anemia, using insecticide-treated nets, and having their blood taken for test for fever and receiving ACT for fever. For every increasing wealth index there were correspondingly lower odds of a child being underweight, being diagnosed with anemia, using an insecticide-treated net, and a corresponding higher odd of a child's blood being taken for test for fever and receiving ACT for fever.

Table 4. Univariate analysis of the association between area of residence, educational attainment, and index of wealth measurement on access to child care and nutrition services.

Geopolitical Zone	Child Care																	
	Basic vaccination			Age-appropriate vaccination			Advice/Treatment sought for ARI			Advice/Treatment sought for fever			ORS/Zinc given for diarrhea			Below 2-SD Height for age		
	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)
North Central	31%	864	1.00	20%	864	1.00	60%	55	1.00	58%	754	1.00	18%	486	1.00	29%	1616	1.00
Northeast	23%	1133	0.66 (0.54, 0.80)*	12%	1133	0.57 (0.45, 0.72)*	71%	461	1.66 (0.93, 2.96)*	69%	1959	1.61 (1.36, 1.92)*	18%	1378	0.97 (0.74, 1.27)	52%	1632	2.63 (2.28, 3.04)*
Northwest	20%	2036	0.55 (0.46, 0.66)*	11%	2036	0.51 (0.41, 0.63)*	84%	146	3.39 (1.69, 6.79)*	74%	3039	2.09 (1.77, 2.46)*	29%	1504	1.85 (1.43, 2.40)*	60%	2955	3.74 (3.28, 4.26)*
Southeast	57%	641	2.94 (2.38, 3.64)*	42%	641	2.89 (2.30, 3.63)*	54%	52	0.78 (0.36, 1.67)*	70%	643	1.69 (1.36, 2.12)*	23%	196	1.37 (0.91, 2.05)	18%	1537	0.55 (0.46, 0.65)*
South South	42%	596	1.60 (1.28, 1.98)*	29%	596	1.66 (1.30, 2.12)*	91%	66	6.67 (2.46, 18.08)*	82%	710	3.19 (2.51, 4.05)*	22%	170	1.28 (0.83, 1.96)	20%	1224	0.60 (0.50, 0.72)*
Southwest	43%	874	1.68 (1.38, 2.04)*	35%	874	2.14 (1.72, 2.66)*	72%	34	1.85 (0.73, 4.71)*	72%	360	1.80 (1.37, 2.36)*	26%	216	1.64 (1.12, 2.41)*	24%	2186	0.79 (0.69, 0.92)*
Mother's education																		
No education	7%	2645	1.00	70%	436	1.00	67%	3982	1.00	21%	2256	1.00	57%	3766	1.00	10%	3808	1.00
Primary	20%	877	3.34 (2.67, 4.17)*	69%	152	0.95 (0.64, 1.42)	74%	1137	1.44 (1.24, 1.67)*	22%	601	1.02 (0.82, 1.27)	38%	1678	0.46 (0.40, 0.51)*	6%	1689	0.54 (0.43, 0.68)*
Secondary	31%	2052	6.08 (5.10, 7.25)*	81%	199	1.80 (1.20, 2.71)*	77%	1982	1.66 (1.47, 1.88)*	24%	925	1.19 (0.99, 1.42)	23%	3872	0.23 (0.21, 0.25)*	5%	3872	0.48 (0.40, 0.57)*
More than secondary	50%	570	13.39 (10.72, 16.72)*	94%	27	5.31 (1.24, 22.75)*	84%	364	2.57 (1.93, 3.42)*	37%	168	2.21 (1.59, 3.07)*	14%	1100	0.12 (0.10, 0.15)*	5%	1098	0.46 (0.34, 0.61)*
Wealth quintile																		
Lowest	15%	1349	1.00	7%	1349	1.00	69%	277	1.00	65%	2153	1.00	19%	1234	1.00	58%	1898	1.00
Second	20%	1327	1.47 (1.20, 1.80)*	9%	1327	1.28 (0.97, 1.68)	69%	208	1.03 (0.70, 1.52)	69%	1930	32.59 (26.76, 39.69)*	18%	1051	0.95 (0.77, 1.17)	51%	2134	0.75 (0.67, 0.85)*
Middle	29%	1226	2.44 (2.00, 2.96)*	18%	1226	2.67 (2.08, 3.43)*	74%	145	1.29 (0.82, 2.02)	72%	1510	37.98 (30.92, 46.65)*	25%	776	1.39 (1.12, 1.73)*	38%	2356	0.43 (0.38, 0.49)*
Fourth	40%	1172	3.95 (3.26, 4.79)*	29%	1172	5.02 (3.95, 6.38)*	79%	112	1.68 (1.00, 2.82)*	78%	1128	52.49 (42.01, 65.59)*	28%	564	1.65 (1.30, 2.08)*	27%	2433	0.26 (0.23, 0.29)*
Highest	59%	1070	8.42 (6.94, 10.23)*	48%	1070	11.68 (9.22, 14.79)*	94%	72	7.78 (2.75, 22.02)*	85%	745	81.89 (62.86, 106.67)*	38%	325	2.54 (1.95, 3.31)*	16%	2327	0.14 (0.12, 0.16)*

Continued

Geopolitical Zone	Child Care																		
	Below 2-SD Weight for Height			Below 2-SD Weight for Age			Child diagnosed with anaemia			Use of ITN			Blood taken for test for fever			Received ACT for fever			
	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	%	N	Odds ratio (95% CI)	
North Central	6%	1620	1.00	15%	1622	1.00	66%	1620	1.00	47%	4461	1.00	14%	754	1.00	31%	520	1.00	
Northeast	10%	1650	1.86 (1.43, 2.42)*	33%	1661	2.77 (2.34, 3.29)*	70%	1807	1.23 (1.06, 1.42)*	47%	6004	1.00 (0.92, 1.08)	13%	1959	0.92 (0.72, 1.18)	18%	1569	0.48 (0.38, 0.60)*	
Northwest	10%	2989	1.87 (1.47, 2.38)*	38%	3012	3.51 (3.01, 4.10)*	70%	3216	1.20 (1.06, 1.36)*	72%	11416	2.81 (2.62, 3.02)*	13%	3039	0.91 (0.72, 1.15)	27%	2552	0.85 (0.69, 1.04)	
Southeast	5%	1539	0.82 (0.59, 1.12)	11%	1541	0.67 (0.54, 0.83)*	70%	1496	1.20 (1.03, 1.40)*	37%	3419	0.64 (0.58, 0.70)*	14%	643	1.01 (0.74, 1.36)	53%	556	2.56 (2.00, 3.29)*	
SouthSouth	4%	1222	0.71 (0.50, 1.01)*	10%	1226	0.64 (0.51, 0.81)*	73%	1192	1.41 (1.20, 1.67)*	33%	2962	0.55 (0.50, 0.61)*	12%	710	0.86 (0.64, 1.17)	31%	564	1.00 (0.77, 1.29)	
Southwest	5%	2182	0.87 (0.66, 1.16)	15%	2189	0.99 (0.83, 1.19)	60%	2060	0.76 (0.67, 0.87)*	35%	4395	0.60 (0.55, 0.65)*	26%	360	2.10 (1.53, 2.87)*	31%	278	0.99 (0.72, 1.36)*	
Mother's education																			
No education	38%	3835	1.00																
Primary	20%	1692	0.40 (0.35, 0.46)*																
Secondary	13%	3886	0.24 (0.22, 0.27)*																
More than secondary	9%	1100	0.17 (0.14, 0.21)*																
Wealth quintile																			
Lowest	11%	1919	1.00	41%	1941	1.00	80%	2120	1.00	59%	7066	1.00	11%	2153	1.00	31%	520	1.00	
Second	8%	2150	0.71 (0.57, 0.87)*	31%	2160	0.66 (0.58, 0.75)*	75%	2235	0.75 (0.65, 0.86)*	58%	7211	0.97 (0.91, 1.03)	12%	1930	1.19 (0.98, 1.45)	18%	1569	1.19 (1.01, 1.40)*	
Middle	7%	2372	0.60 (0.48, 0.74)*	21%	2377	0.39 (0.34, 0.44)*	67%	2412	0.49 (0.43, 0.57)*	53%	6720	0.78 (0.73, 0.83)*	15%	1510	1.44 (1.18, 1.76)*	27%	2552	1.40 (1.18, 1.66)*	
Fourth	5%	2435	0.44 (0.35, 0.55)*	15%	2441	0.25 (0.21, 0.28)*	65%	2388	0.47 (0.41, 0.54)*	45%	6092	0.55 (0.52, 0.59)*	18%	1128	1.86 (1.52, 2.29)*	53%	556	1.56 (1.30, 1.86)*	
Highest	4%	2328	0.35 (0.28, 0.45)*	10%	2331	0.15 (0.13, 0.18)*	53%	2235	0.28 (0.25, 0.32)*	40%	5567	0.45 (0.42, 0.49)*	18%	745	1.90 (1.51, 2.40)*	31%	564	2.25 (1.85, 2.74)*	

*P-value < 0.005 indicating statistical significance.

4. Discussion

The study revealed that access to essential health care services varied across different geopolitical zones, levels of educational attainment, and wealth quintiles. The demand for family planning was more likely to be met in the southern zones than in the northern zone, and approximately twice more likely to be satisfied in the southeastern zone than in other zones. Also, findings showed that access to most maternal and child health care services are skewed towards the southern zones, persons in the top quintiles of wealth index and as well as individuals who have attained higher educational milestones.

4.1. Family Planning

Access to family planning services varies across socio-demographic groups. Women residing in the northern zones have higher odds of not having their family planning needs met or demand satisfied. This has been attributed to socio-cultural, religious, and access-related barriers. A study that explored factors affecting the uptake of family planning services in the north-western part of Nigeria highlighted the dominant religious (Islamic) views that affect the demand and use of contraception as well as beliefs that make modern contraceptive use almost futile [17]. Other reported barriers resulting in poor uptake of family planning services include fear of side effects, fear of and actual spousal rejection, lack of education, misinformation, and superstitious beliefs [18] [19]. In the same vein, our study showed that women residing in the southern regions significantly had higher odds of having their family planning needs met and demand satisfied than women in the northern regions. This aligns with findings from studies that reported a higher uptake and utilization of family planning services among Christian women than Muslim women, with the southern regions occupied predominantly by Christians [20] [21].

Furthermore, the odds of having needs for family planning services met and demand satisfied showed a positive correlation with increasing levels of educational attainment and wealth index. The odds of the women having their needs met and the demand for family planning satisfied consistently increased as the level of educational attainment increased. This finding is in line with a study done in the south-southern part of Nigeria that observed FP uptake to be directly proportional to the level of education [22]. In a similar vein, with the increasing measure of wealth, the odds of women having their needs met and demand satisfied increased. This may be because of the inability of the women in this category to purchase FP services. This group can be disaggregated into the urban poor, rural rich and rural poor with very little disposable income to spend on FP services for far greater expenses and necessities. Another angle could be the low levels of reproductive health knowledge in poor city neighborhoods as well as remote villages limiting information about the availability of the services [23] [24].

4.2. Maternal Care

For the maternal health care sector to be effective, measuring equal access to maternal care services is pivotal [25]. Eight indicators were used to measure access to maternal care services and utilization across the socio-economical and socio-cultural factors. From our results, we found that women living in the Southeastern and Southwestern parts had more access to maternal care services based on having their antenatal care by a skilled provider, attending ≥ 4 antenatal visits, recently protected against neonatal tetanus, had their delivery done by a skilled provider and in a health facility, and had post-natal check 2 days after birth to women in the South southern and Northern parts. This may be linked to the presence of more healthcare workers to provide these services in the geopolitical zone with higher access to maternal care hence a higher uptake and utilization of maternal care services.

Studies showed that health workers tend to be densely populated in industrialized and urbanized areas [3] [26]. Areas of industrialization and urbanization are found more in the southwestern and southeastern regions as against the northern and south southern regions. The presence of mountains, water bodies as well as insecurity can as well pose a challenge and may be the reason for the sparse distribution of health care workers in these regions making it hard-to-reach. The presence of industries, as well as urbanization, has also been reported to be drivers of healthcare services [27].

Another reason from our findings of inequity in maternal services in these regions may be due to the distance in reaching health facilities in these regions by the women as most of the health facilities in good conditions are sparsely located and the ones easily accessible to the women tend to be far from their households. This is in line with a study done in Kano state, Northern Nigeria, where the authors reported low uptake of maternal care services majorly due to the long distance between the women's home and local facilities [28], and roads that are in the deplorable state thereby posing as a deterrent to accessing health care by the women in those communities.

Our findings that geographical region remarkably has a positive or negative effect on the access and utilization of maternal care services supports a range of findings that have been done by previous researchers [3] [10] [29]. The odds of using ITN in pregnancy were found to be approximately three times higher in women residing in the Northwest than in women residing in other regions; with women in the southern region having significantly lesser odds of making use of ITN in pregnancy. The high use of ITNs in pregnancy among pregnant women in this region may be due to the prioritization of rural communities over urban communities by anti-malaria-funded intervention programs [30]. The presence of internally displaced persons and hard-to-reach areas in the northern parts of Nigeria could account for more ITN campaigns targeted at reaching women in this region [31], while the odds of a woman being diagnosed with anemia during pregnancy were found to be relatively similar across all the six zones.

Similarly, with the increasing level of educational attainment and measure of wealth index is correspondingly higher odd of a woman having her antenatal care provided by a skilled provider, attending ≥ 4 antenatal visits, recently protected against neonatal tetanus, had their delivery done by a skilled provider and in a health facility, and had post-natal check 2 days after birth. The results suggest that women who have a higher level of education and wealth quintiles were able to access and utilize maternal care services more than their corresponding counterparts.

Our results can be linked to other studies that found a strong relationship between the use of maternal care services and the educational level of the women [32]. Financial barriers remain a determinant in accessing maternal and child-care services [33]. A study conducted by a group of researchers estimated the probabilities of a delivery done at a governmental health facility between the lowest decile (the poorest) and the highest decile (the richest) to be 17.9% [34]. This result suggested that there remains a financial barrier to the utilizations of health facilities thereby preventing pregnant women from using safe delivery care at health facilities [30]. However, the odds of being diagnosed with anemia in pregnancy increased with increasing level of educational attainment with women who had attained more than secondary education having more than nine times the odds of being diagnosed with anemia than women with no education. This explains the measure of exposure equated to education as women with a higher level of education can understand anemic symptoms and then relate/discuss it with their health care provider for timely prognosis and prescription while women across all wealth quintile levels had relatively similar odds of being diagnosed with anemia in pregnancy. Likewise, the odds of using ITNs in pregnancy decreased with the increasing measure of the wealth index with women in the highest wealth quintile having 70% lower odds of using ITNs in pregnancy than women in the lowest wealth quintile. We can attribute this to the place of residence of these women as women who do better off and have more money tend to stay in highbrow areas and can afford the cost of fumigation and buying insecticides compared to their other counterparts whose places of residence could be in swamy or slummy areas hence the need for a rise in the use of ITNs. These areas are more prone to mosquitoes and as a result, these women become more susceptible to malaria. Another factor that could also increase the use in ITNs by women with low wealth quintiles is its cost effectiveness as ITNs tend to offer a long-lasting solution to preventing malaria than other methods.

4.3. Child Care

Our findings from the twelve outcome indicators used to measure equitable access distribution to childcare services showed heterogeneity across the different geopolitical zones, level of education and measure of wealth index.

Children in the northern zones had lesser odds of having received basic and age-appropriate vaccination than those in other regions. This can be attributed

to the supply-side disparities that exist between the northern and southern regions [35]. The lower concentration of health workers and health facilities in the southern part may account for the deficit of the supply chain system in the distribution and minimal coverage of childcare services in this region [3]. Our result agrees with another study that highlights insufficiency in human resources and commodities at immunization service delivery points and the long distance to a vaccination service delivery point in the North as a reason for inequitable distribution of these services [35].

Similarly, the odds of receiving ACT for fever were found to be lower in children in the northern zones than in other zones. From earlier established findings in this study, we can attribute the northern zone to having a lower concentration of women with formal education hence an increase in the number of women with a lack of knowledge of correct malaria treatment. Another reason could be from drug stock-outs of ACT drugs that may be due to poor road network in the northern region affecting the supply of these drugs. Children in the northwest and southwest zone had higher odds of receiving ORS/Zinc for diarrhea which is in contrast with a study done on the knowledge of childhood diarrhea among caregivers which demonstrated a correspondingly low level of knowledge and usage rate of ORS [36]. The implication of this is that not receiving ORS/Zinc for diarrhea in time could lead to weight loss in some children, and death in others.

Furthermore, our study found that children in the Northeast and Northwest zones of the country had higher odds of being stunted, wasted and underweight. This could be the effect of cultural preference on the food choice and is not necessarily associated with equitable distribution of health services in this region. Certain types of food that are highly nutritious and meant to aid the rapid growth of the children are replaced with monotonous meals with very low nutritional benefits resulting in nutritional deficiencies which are linked to causes of wasting and underweight in children [37]. Also, children in the Southwest zone had lower odds of being diagnosed with anemia, and higher odds of having their blood taken for test for fever. The odds of using insecticide treated nets were found to be higher in children in the northern zones. However, children in the southeast zone had a higher odd of receiving ACT for fever all of which are linked to the reasons for inequitable distribution in maternal health care services. With the increasing level of educational attainment and wealth quintiles, it is a correspondingly higher odd of receiving vaccinations and seeking advice/treatment, which could be due to the health-seeking behaviors and easy accessibility of educated and wealthier women. In contrast to the lower odd of a child receiving ORS/Zinc for diarrhea and poor nutrition which is not directly influenced by the increasing measure of wealth quintiles and educational level but by environmental factors like access to clean water and better food choices. With an increasing availability of clean water and food choices is a corresponding decrease in malnutrition and a child being diagnosed with diarrhea.

Whereas environmental factors have little to no effect on a child being un-

derweight as other factors such as genetics, improper metabolism of nutrients or lack of food have more roles to play in a child's weight which could account for the lack of data between in the increasing level of the mother's education in relation to a child being underweight. Conversely, women with higher wealth quintiles can easily afford adequate and balanced nutrition, thereby accounting for a correspondingly lower odd of a child being underweight. However, there was no pattern to the odds of a child receiving all age-appropriate vaccinations, for increasing level of the mother's education or wealth index. This surprisingly did not support findings of previous studies [38] which reported that the commencement, continuation, and completion of vaccinations in children are directly dependent on the mother's educational level, socio-economic status, and employment status.

The increasing level of education of the mother has a direct influence on a child being diagnosed with anemia, using insecticide-treated nets, having their blood taken for test and receiving ACT for fever even though there was no data to validate these findings. For every increasing wealth index there were correspondingly lower odds of a child being diagnosed with anemia, and a corresponding higher odd of a child's blood being taken for test for fever and receiving ACT for fever which are all linked to the inequitable distribution of access to health services between the rich and the poor. The lower odds in the use of an insecticide-treated net with increasing measure of wealth could be linked to intervention programs targeted at vulnerable groups of people especially rural-poor people with the provision of free ITNs.

5. Implications for Policy Consideration

Our study showed a linkage between educational attainment, geographical distribution, and wealth index as determinants of health inequity. We therefore adapted the Systems of Power factor from the Health Equity Framework to describe implications for policy consideration. The Systems of Power factor refers to policies, programmes, and practices that promote health by ensuring that people have access to resources and opportunities that allow them to live healthy lives [39].

Equity in health means everyone has an equal chance to be healthy, and this implies equalizing disadvantaged social groups with the more advantaged counterparts [40]. Therefore, governments at all levels need to be committed to ensuring the implementation of policies and strategies aimed at improving the health sector, especially in underserved communities. Government must formulate policies and strategies to improve living and working conditions, as well as the educational attainment of the average individual, particularly women experiencing the greatest socioeconomic disadvantage.

Approaches to improved family planning, and maternal and childcare services should be intensified in rural-poor, vulnerable, and disadvantaged communities with a more effective system of ensuring that programs are tailored to their

needs. This can be done by engaging a multipronged teaching approach to target rural communities with instructions on family planning, maternity, and child-care practices [41]. The teaching should be aimed at educating women, especially in the northern part of Nigeria, on the need for basic healthy lifestyles, including vaccination, health checks, etc. The challenge of distance to health facilities which is prevalent in rural areas should be addressed by establishing more health posts and equipping them with adequate human and infrastructural resources. Government must also endeavour to provide food enrichment products and supplements for malnourished children in underserved communities [42]. This will contribute to the Social Development Goals (SDG) 2 by reducing malnutrition, and SDG 3 by reducing child mortality and altering the life-course trajectories of disadvantaged children [43].

Since the wealth index is one of the drivers of health inequity, priority must be given to strategies that aim at improving the economic conditions of the population, especially women of childbearing age and families with young children. Government needs to assist people into employment through the implementation of high-quality active labour market programs. In the case of Nigeria, an intervention that provides financial support for the start-up of small businesses, vocational training, search for jobs, and integrated support for disabled people are more likely to be effective. Job possibilities should also be created in underprivileged communities. This can be accomplished by increasing public and private infrastructure investments, as well as investing in health care, social services, and education and training. This must however be implemented with a sustainable approach that can help to check insecure employment, underemployment and poor-quality work. The working condition of the workforce also needs to be improved through better worker representation, effective health and safety legislation, extended employment rights, and adequate minimum wage [44].

The government also needs to implement pro-poor interventions such as demand-side incentives and provide a functional system for monitoring health inequalities to periodically identify differences in health between different population subgroups for timely intervention.

6. Conclusion

Health inequity spans several countries and despite attempts being made to improve health outcomes in these regions, evidence shows that more work still needs to be done to ensure equitable healthcare. Access to essential health care services varied across different geopolitical zones, levels of educational attainment, and wealth quintiles. Persons in the top quintiles of the wealth index and as well as individuals who have attained higher educational milestones are better informed about their health, thus, accessing healthcare when the need arises. This study, therefore, concludes that level of educational attainment, wealth quintiles, as well as financial barriers, are among the determining factors in accessing maternal and childcare services in Nigeria.

Author Contributions

Sunday Atobatele and Sidney Sampson conceptualized and designed the study. Oluomachukwu Omeje conducted preliminary data analysis and interpretation.

Oluwafisayo Ayodeji, Oluomachukwu Omeje and Faith Oisagbai drafted the manuscript. Sunday Atobatele and Oluwafisayo Ayodeji reviewed and revised the manuscript.

All authors approved the final content of the manuscript for publication.

Ethics and Consent

No ethical approval is required for this review as it used data that are already publicly available.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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