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AN EVALUATION OF DEMAND FOR CHILD HEALTH CARE IN FOUR SELECTED WEST AFRICAN COUNTRIES: NIGERIA, GHANA, GAMBIA, AND LIBERIA

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ABSTRACT

West Africa is one of the regions with the highest number of births in Africa, but child survival is lowest compared to other parts of Africa, with a mortality ratio of 91.5 deaths per 1,000 live births. Despite this, health seeking behavior of mothers seems to be relatively poor and varies across countries in West Africa. The objective of this study is to evaluate demand for child health care and examine factors that account for the differentials in child health care seeking behavior in the four selected West African countries. Although prior studies have provided some evidence on child health care-seeking behavior globally, in low-income countries, middle-income countries, and sub-Saharan Africa, there is a study gap for West Africa, particularly factors accounting for differentials in the four selected countries. The study is theoretically founded on the demand model and the Andersen health care services utilization behavior model. Data was derived from DHS for the four selected countries, particularly the 2018, 2019, 2022, and 2023 waves of the DHS survey. The demand model for child health care was estimated using the logit regression. Results show that socioeconomic factors of mothers, such as wealth, employment status, residence, education, and distance to health facilities, are common factors that account for differences in child health care-seeking behavior patterns across the countries, which affects demand for child health care as well. The demand for child healthcare can be improved through conscious efforts to improve the socioeconomic status of the mother.

Keywords: Child, Health care, West Africa, Demand, Seeking behavior, West Africa

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1. Introduction

The West Africa region has almost 95 million children under five, accounting for about 14% of the world's under-five population, yet it records the highest rates of under-five mortality globally (UNICEF, 2023). Despite improvements in healthcare delivery across the region, child mortality remains alarmingly high at 91.5 deaths per 1,000 live births—far higher than in other parts of Africa (UNICEF, 2024). Malaria, diarrhoea, acute respiratory infections (ARI), and measles remain among the leading causes of death, although they are largely preventable and treatable (WHO, 2022).

Healthcare-seeking behaviour for childhood illnesses varies widely across countries in the region, despite the availability of effective treatments. Evidence from the Demographic and Health Surveys (DHS) shows that only about 60% of febrile children in Nigeria receive medical care, compared with 64%, 66%, and 81% in Ghana, Liberia, and the Gambia, respectively (DHS, 2018–2023). These differences suggest that access to healthcare services is influenced not only by their availability but also by structural, socioeconomic, and cultural factors that shape demand for care. Understanding these differences is therefore essential for designing targeted interventions that can improve child health outcomes in the region.

Previous studies on healthcare demand have examined healthcare-seeking behaviour in low- and middle-income countries (Mbagaya et al., 2005; Benova et al., 2008; Tebeje et al., 2017; Yaya et al., 2021; Govender et al., 2021; Kariuki, 2025). However, few studies have adopted a comparative approach across West African countries to explain why some countries perform better than others despite facing similar challenges. For example, it remains unclear why care-seeking rates in Liberia, with its post-conflict healthcare system, exceed those in Nigeria, which has a more extensive healthcare infrastructure. Much of the existing literature tends to focus on individual determinants, such as maternal education or distance to health facilities, without adequately examining how these factors interact within specific national contexts (Adedokun & Yaya, 2020; Bennett et al., 2015).

The COVID-19 pandemic further worsened existing inequalities by disrupting routine healthcare services. In low- and middle-income countries, including Ghana, Nigeria, and Liberia, outpatient visits for maternal and child health services declined by about 13.1% (Ahmed et al., 2022). These disruptions highlight the urgency of reassessing demand-side barriers to healthcare utilisation in the post-pandemic context. In the absence of a comprehensive cross-country analysis, policymakers lack the evidence required to design policies that address the specific challenges faced by individual countries.

Against this background, this study assesses the demand for paediatric healthcare and investigates the factors influencing differences in healthcare-seeking behaviour across four West African countries: Ghana, Nigeria, Liberia, and the Gambia. The study is guided by Andersen's Behavioural Model of Health Services

Utilisation (Andersen, 1995), which posits that healthcare use is influenced by predisposing factors (such as maternal education), enabling resources (such as household wealth and health insurance), and perceived need (such as the severity of illness). Using recent DHS data (2018–2023), the study examines how these factors interact differently across national contexts.

This study is important for several reasons. First, the findings can inform programme design and resource allocation by identifying country-specific barriers, such as geographic access challenges in Ghana (Bennett et al., 2015) or the effectiveness of community health worker programmes in Liberia (White et al., 2018). Second, the study contributes to broader discussions on health equity by highlighting how socioeconomic inequalities continue to shape access to healthcare services even when such services are available. Third, it provides updated evidence on healthcare demand in the context of post-pandemic recovery (Ahmed et al., 2022). Ultimately, the study supports Sustainable Development Goal (SDG) 3.2, which aims to reduce preventable under-five mortality to at least 25 deaths per 1,000 live births by 2030 (UN, 2015), by offering evidence-based, context-specific insights for child health policymaking in West Africa.

Research Questions

This study seeks to answer the following research questions:

- a) What is the extent of the prevalence of ARI, diarrhoea, and fever among children in the selected countries?
- b) What proportion of children with symptoms of ARI, fever, and diarrhoea received treatment or advice?
- c) What types of treatment are sought for diarrhoea, ARI, and fever?
- d) What accounts for differences in healthcare demand for childhood illnesses across countries?
- e) What are the determinants of treatment-seeking for diarrhoea, fever, and ARI in Nigeria?

Objectives of the Study

The objectives of the study are to:

- a) Examine the prevalence of childhood illnesses such as ARI, fever, and diarrhoea in the selected countries.
- b) Estimate the proportion of children for whom treatment or advice was sought.
- c) Examine the types of treatment sought for diarrhoea, ARI, and fever.
- d) Analyse cross-country differences in treatment-seeking for the selected childhood illnesses.
- e) Estimate the determinants of treatment-seeking for diarrhoea, fever, and ARI in Nigeria.

2. Literature Review

2.1. Theoretical literature

Conceptual Literature

The demand for health care is a demand derived from the demand for health, which is influenced by important factors such as price, income, education, population, etc. Health care are numerous services which maintain, improves and restore health and wellbeing (Ghorbani, 2021). In the context of this paper, we examine specifically the demand for child healthcare. Child healthcare are services and practice that enhances children's physical, mental, and developmental well-being, from infancy through adolescence, which focuses on preventing illness, promoting healthy growth through nutrition, vaccination, and regular check-ups. Child healthcare is often provided by paediatricians, nurses, and specialized programs (WHO, 2026). In the context of this paper, we examine the treatment of fever, diarrhoea, and acute respiratory infection (ARI).

2.2 Theoretical Literature

Several theories exist on health care demand and utilization (Parson's, 1951; Mechanics, 1978, Suchman's, 1965 Rosenstock's, 1994; Andersen, 1970, 1980, 1990 and Grossman, 1972) Peason's (1951) theory is directly related to individuals who seek for health care when they are ill, the sick role they take when they are sick, and their decision to seek healthcare (Varul, 2010). The Mechanic's (1978b) general theory incorporates decision-making that determines illness behaviour as well as the response of patients in seeking health care. The theory states that autonomy and heteronomy influence health care demand. Suchman's (1965) stages of illness and medical care are related to Peason's (1951) model. The theory indicates five stages of an individual's decision to seek care when ill, from the time the individual feels pain and has the symptoms of illness to the time of recovery. This theory is also focused on psychological aspects of health care utilization. Rosenstock's (1994) health beliefs model states that the individual's action to treat and prevent disease depends on the perception the person has about the severity of illness and the perceived cost and benefit of treatment and prevention. Young's (1981) model incorporates four components that are most essential to the individual's health service choice; these include the perception of the gravity of illness, knowledge of a home treatment option, the faith in a remedy option, and the accessibility of treatment. The theory shows that accessibility of treatment has the most important influence on health care utilization. Young's (1981) model of health care utilization reveals important reasons why some people do not seek health care. Andersen (1968) and Andersen and Newman (1995) health care utilization model related health care utilization to its determinants. He categorized the determinants of health care utilization into three: the predisposing factors, the enabling factors, and the need-based factors. The predisposing factors show the likelihood to utilize health care based on socio-cultural and demographic characteristics of the individual;

these include education, occupation, ethnicity, social networks, social interactions (religion), age, gender, as well as the beliefs of health care benefits and knowledge that people have concerning the health care system. The enabling factors consist of the logistical aspects of obtaining health care, which include individual/family resources and community resources. The need factors are those factors that predispose an individual to seek care due to individual, societal, or clinically evaluated perception of need for the health care. This involves needs that come about due to functional or health problems that necessitate health care utilization.

The Grossman model is one of the most important healthcare demand models in Health Economics. The model is a human capital model of demand for health and health care developed by Grossman (1972). The model is constructed within a human capital framework where health is seen as a durable capital stock, which depreciates over the life span. The Grossman model assumes that an individual has an inter-temporal utility function which is derived from health care consumption (to improve health stock) and the consumption of other commodities under certainty. In the Grossman model, the demand for health care enters the health production function because the demand for health care services is a derived demand for health. Health care services are not demanded for their own sake, but rather as a means to achieve good health through improvement in health status. Health is therefore seen as the outcome of productive processes, and choices are made to maximize utility subject to the lifetime discounted income. The health status can be improved upon through investment in inputs such as a healthy lifestyle, health care utilization, exercise, a good diet, and recreation. The Grossman model assumes a reduced form demand model where health is demanded as a consumption and investment good. Health as a consumption good improves the utility and overall welfare of individuals, while health as an investment good increases the number of healthy days used for market and non-market productive activities to earn income, since sound health enables an individual to participate in economic activities to earn income. Therefore, an individual will continue to demand health care to increase the stock of his/her health, given the condition that the marginal cost of investment in health is lower than the marginal returns derived from the consumption of health care.

2.3 Empirical literature

In order to put the study in context, this section critically examines the body of research on healthcare demand, intervention outcomes, and cross-national discrepancies in West Africa.

Demand for Child Care and Differential Outcomes in West Africa

A plethora of literature underscores the impact of evaluating the demand and supply for child health care, especially in the African region. Evidence has shown that the number of infant mortality rate keep increasing, and the contributing factor is skewed to malaria, childhood illness, incessant diarrhea, measles, acute Respiratory Infections, and chicken pox (WHO 2022). In light of Sustainable Development Goal 3,

Adeoti and Awoinyi (2014) provide empirical insight into the demand for health care in Nigeria using 2008 DHS data and evaluate the effect of the demand for health care service as a complement to unobservable factors that affect the health status of children. The author employed ordinary least squares and two-stage least squares, respectively, to quantify the demand for child health care. Evidence from the study showed that the increase in economic growth in Nigeria has not translated to a demand and supply for a health care equilibrium state. And the factors determining the equilibrium state include the immunization, age of the child, mother's educational status, demand for health care services, child health Status in Nigeria, household size, and sector. The outcome from the study provides a background for this study, but may not provide some absolute determinants for all the countries in West Africa. To fill the gap, this study adds value to the method by employing the logistic model to examine the impact of factors on the countries that control for the factors against countries that do not. Kpebi, Ly, and Kouanda (2022) in a West African representative study comprising Cote d'Ivoire, Burkina Faso, and Niger, focused on the staffing needs for the frontier health workers for assessment to determine the contribution to meeting the demand for health care. Evidence from the study was deduced with a Workload Indicators of Staffing Need method, document reviews, in-depth interviews, and health providers and observations. Evidence was revealed that a shortage of health workers exists in major services in Cote d'Ivoire and Nigeria, unlike Burkina Faso, where there are adequate staff records. The effect of the staffing gap in Niger and Côte d'Ivoire caused increased work pressure, leading to low service delivery in the rural areas. While evidence from Kpebi, Ly, and Kouanda (2022) may reflect West Africa challenges in the demand for health care, this study departs to study other countries in West Africa, Nigeria, Ghana, Gambia, and Liberia with a quantitative effectiveness approach to determine and validate the factors affecting the differentials in the demand for health care. The impact of geography on the determination of demand for health care is underscored for effective policy making and intervention (Grady et al. 2017; Yourkavitch, Burgert-Brucker, Assaf, and Delgado 2018; Lloyd 2023). Evident question and thrust from the various insights on the case of the demand for health may rationalize the need to seek the understanding of the location impact. Lloyd (2023), with a spatial analysis, revealed that the information on the demand for health creates the need for a corresponding supply of health care in a particular location. The experiment conducted in Burkina Faso showed that the location mapping of the demand for health care enhanced supply. Yourkavitch, Burgert-Brucker, Assaf, and Delgado (2018), similarly, with a spatial analysis, revealed that the determination of the geographical impact on the demand for health care is facilitated by the identification of hotspots. Findings on the geography inform the allocation of resources to increase precision on the reduction target of child health inequity between and within countries. The study applied the data from the Demographic and Health Survey Program surveys conducted in 27 selected African countries between 2010 and 2014 and quantified the impact on six child health indicators for subnational regions comprising measles and Diphtheria, and tetanus (DPT-3) immunizations, Care seeking, stunting, and under-5 mortalities. The geographical area consideration

contributed to the differentials in health outcomes within the specific region and across the subnational levels. The outcome suggested a varying strategy to fit into the geographical peculiarity. Lungu et al (2020), through a cross-sectional study involving 543 caregivers of under-five children, examined the determinants of healthcare-seeking from a biomedical health provider for childhood symptoms of fever, cough with fast breathing, and diarrhoea in three urban slums of Lilongwe, Malawi. Results show that Public health facilities constituted the most frequently used health providers. Healthcare was more likely to be sought for younger than older under-five children.

Child Health Care Intervention and Differential Gap Mitigation for West African Countries

To meet the demand for child health care in West African countries, the understanding of the socioeconomic characteristics is emphasized (Owolabi et al. 2017; Ogundele, Pavlova, and Groot 2020). The inequalities in access to health care are, to an extent, reflected in the socioeconomic characteristics, and the effective interventions in the literature highlight socioeconomic characteristics as key to meeting the demands of health care in West Africa. Considering the low-wealth group and demand for health care profiling, the proportion of households with no education in Burkina Faso, Niger, and Senegal accounts for more than 80% source of the disparity in health care. Further decomposition shows that more women in the high-wealth group reside in urban residences in Nigeria, Ghana, and Senegal (at least 45%) compared with Burkina Faso and Niger (at most 23%). Likewise, more women live in rural locations in Niger and Burkina Faso compared with Ghana, Senegal, and Nigeria. The effect of the inequality showed a gender-controlled socioeconomic characteristic impact. For instance, women from rural areas and low wealth group are unlikely to have information on pregnancy complications in Burkina Faso, Niger, and Senegal. And, the women who rely on permission to visit health facilities or who reported problems with money to pay, come from Burkina Faso and Niger more compared with Nigeria and Ghana, which will likewise affect demand for child health care (Ogundele, Pavlova, and Groot 2020).

The long list of strategies and interventions in the literature offers a unique challenge for each strategy in meeting the demand for health care in West Africa. Health expenditure intervention and financing by regional government commonly dominate among other interventions as a solution to the health care gap (Sarpong and Fofack 2018; Olatunde, Adebayo, and Fagbemi 2019; Osei, Kulu, and Appiah-Konadu 2023; Dadjo, Omonaiye, and Yaya 2023; Dauda and Balogun 2023). Health financing comprises the private sector direct engagement, insurance, subsidies, and microcredit intervention. Empirical studies on the 10 West African studies showed that direct financing and insurance are effective in meeting the demand for health care. Evidence. Quantitative evaluation using annual data from 1991-2015, estimated with a panel fully modified least squares (FMOLS), established a positive relationship between the health expenditure and under-5 mortalities. That is, increased health expenditure significantly reduced the under-5 mortalities in West Africa, amidst other socioeconomic characteristics and facilitators, including institutional quality,

female literacy rate, and immunization, which are central for reducing the under-five mortality rate in the region (Olatunde, Adebayo, and Fagbemi 2019). The insurance scheme of intervention further effectively enhanced the meeting of the demand for health care in ten West African countries, especially during the Ebola pandemic. Benin, Cabo Verde, Ivory Coast, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, and Senegal health insurance significantly decreased the under-5 mortality and increased life expectancy with the socioeconomic profiling on income grouping. The evidence relied on the time series observation for the pre-Ebola time, 2005 to 2015, while the post-Ebola time was 2014 to 2016, and the effect was estimated using the generalized least squares (GLS) method (Sarpong and Fofack 2018). Stunting is another health outcome for which health expenditure is evaluated for West African countries by Osei, Kulu, and Appiah-Konadu (2023). With annual data collected in the 16 West African nations between 1990 and 2018, the Impulse Response Functions (IRFs) and the Pooled Mean Group (PMG) estimate technique are used to quantify that higher health spending significantly decreased. Furthermore, shocks to government health spending had a detrimental impact on both health metrics. To improve service delivery for children's health, the authors suggest increasing the efficiency of the public health sector by granting licenses to healthcare professionals and giving independent authorities the authority to designate leaders of healthcare institutions.

Evidence on the predominant health financing is complemented by some scanty non-financial interventions on the health outcomes. This is in the event of continuing under-5 mortalities in West Africa despite the financial intervention. The West African Health Organization (WAHO) underscored the sub-region for bilingual professionals who are skilled in public health, management, leadership, promotion of research, and evidence-based decision-making and information technology to build human capacity in public health to bridge the gap that remains after the financial intervention (Sanou, Awoyale, and Diallo 2014; Sombie, Bouwayé, Mongbo, *et al* 2017).

Insight into the literature confirms the existence of challenges in meeting the demand for child health care in the West African region. The majority of the empirical studies fall short of applying a quantitative effectiveness approach to estimate the impact and determine the effectiveness of the health interventions on health outcomes. The application of time series observation by studies to estimate the differentials in health outcomes may not be sufficient in providing adequate policy insight required to target the challenges of demand for health care. Secondly, to ascertain the precision in location, the selected countries are designed to control for bias that may be associated with the heterogeneity in some socioeconomic countries. Nigeria, Ghana, Gambia, and Liberia share closely controlled socioeconomic characteristics and geographical proximity. Unlike the studies reviewed, the rationale for selecting the population falls short of controlling for socioeconomic characteristics. Furthermore, whereas previous research provides insightful macro-level analysis, this study is the only one to employ a micro-level analytical lens to examine inter-country differences while controlling for socioeconomic status and geographic proximity. It is on this premise that this study accounts for the health outcome differentials and further evaluates the demand for

child health care-seeking behaviour in the four selected West African countries using the evidence synthesis and logistic regression model.

3.0 Methodology

Model specification

The theoretical framework for this study is founded on the Grossman (1972) model and its extensions. In the Grossman model, it is assumed that an individual has a utility function U where

$$U_i = U(H_i, Z_i, X_i) \dots \dots \dots (1)^1$$

H_i is the stock of health at age t , Z is a vector of all other goods consumed, and X_i is a vector of characteristics of the individual. Where

$$\frac{\partial U}{\partial H} \geq 0 \text{ \& } \frac{\partial U}{\partial Z} \geq 0.$$

The health of the individual is produced via a health production technology (T) such that

$$H_i = T(C_i, M_i, Y_i) \dots \dots \dots (2)$$

$$\frac{\partial T}{\partial C_i} \geq 0, \frac{\partial T}{\partial M_i} \geq 0.$$

C_i stands for the health care, while M_i is a vector of other complementary health inputs, and Y_i is a vector of characteristics of the individual that determine the efficiency of their own health production.

Equations 1 and 2 form a composite utility function which is stated as;

$$U_{yi} = U[T(C_i, M_i, Y_i), Z_i; X_i] \dots \dots \dots (3)$$

Equation 3 is differentiated with respect to Y to obtain equation 4

$$\frac{\partial U}{\partial Y_i} = U'(C_i, M_i, Z_i, X_i Y_i) \dots \dots \dots (4)$$

If Z_i^* is defined as a vector consisting of Z_i and M_i , in equation 5

$$U_i = U'(C_i, Z_i^*, X_i, Y_i) \dots \dots \dots (5)$$

Equation 5 is maximised subject to the budget constraint in equation 6

$$I_i = P_c C_i + P_z \cdot Z_i \dots \dots \dots (6)$$

Where I_i is the income of the individual, P_c is the price of health care, while P_z is the vector of prices of other goods. The optimisation process yields a demand or utilisation function specified in equation 7

¹ Note: Equations were derived from Nketiah-Amponsah et al (2012)

$$D_i = D_C'(P_C, P_Z, I_i X_i, Y_i) \dots \dots \dots (7)$$

In addition, Andersen (1968) as well as Andersen and Newman (1995) categorised the determinants of health care demand into three: the predisposing factors, the enabling factors, and the need-based factors. The predisposing factors consist of sociocultural and demographic characteristics of the individual; these include education, occupation/employment status, ethnicity, age, gender, social networks and interaction, such as religion, beliefs of health care benefits, and knowledge that people have concerning the health care system. The enabling factor consists of individual/family resources and community resources as reflected by the economic status of a child's mother and location of residence; these include income, health insurance coverage, travel capacity, and quality of relationships, as well as health facilities and availability of persons for assistance, such as health personnel. The need factor reflects societal or clinically evaluated need for health care; such needs come about due to functional or health problems that necessitate health care utilisation. Child health care is therefore determined by predisposing factors, enabling factors, and need factors.

Application of the Grossman theoretical model

The demand for child health care is a derived demand to enhance health for children. According to Grossman (1972), child health care demand is therefore related to its own shadow price and the price of other goods, as well as other maternal characteristics. Maternal characteristics affect the taste, health, and productive efficiency of the child. These characteristics include: wealth status, education, marital status, health insurance status, area of residence, age, religion, employment status, and region. The utilization of child health care promotes good health, which in turn improves utility.

Equation 7 above can be regarded as the child health care model estimated in this study. The D_i stands for the demand, the P_c is the price of health care, P_z is the price of other goods, I is the wealth/income of mother of the i^{th} child, X is the vector of characteristics of the mother of the i^{th} woman which influences her child's health care consumption, Y is a vector of characteristics that determine the efficiency of health production such as education of the i^{th} woman's child.

The empirical Model of the study

Equation 7 is operationalized as the basis for the empirical model stated below;

$$Y_{ci} = f(\beta_0 + \beta_1 \text{wealth of mother} + \beta_2 \text{education of mother} + \beta_3 \text{education of father} + \beta_4 \text{region of mother} + \beta_5 \text{religion of mother} + \beta_6 \text{age of mother} + \beta_7 \text{residence of mother} + \beta_8 \text{distance} - \beta_9 \text{no money} + \beta_{10} \text{ethnicity of mother} + \beta_{11} \text{employment status of mother} + \beta_{12} \text{health insurance status of mother} + \beta_{13} \text{child age} + \beta_{14} \text{child sex} + u \dots \dots \dots (8)$$

Where Y_{Ci} represents demand for child health care, specific treatment for diarrhoea, fever, and acute respiratory infection (ARI).

The independent variables with coefficients β_1 to β_{14} reflect socioeconomic status and other factors that can create differentials in child healthcare utilization. In the Nigerian DHS data, ARI treatment is captured by the treatment of fever and cough. Therefore, ARI and fever have the same dependent variable.

Estimation Technique

The model will be estimated using logistic regression. The value of the dependent variable ranges between 0 and 1. For the 3 category of healthcare that will be examined (diarrhoea, fever, and acute respiratory infection (ARI)). 1 if treatment is sought, and 0 if treatment is not sought. Results will be presented using charts and tables.

Data

The study utilized Demographic and Health Survey (DHS) reports for the selected countries and DHS data for Nigeria. Table 1 provides details of the survey in terms of the country, year of publication, and number of respondents.

Table 1: Data Information

S/N	Country/year	Year
1	Ghana	DHS 2022 report
2	Nigeria	DHS 2018 and 2024 data and report
3	Gambia	DHS 2020 report
4	Serra Leone	DHS 2020 report

4. Result and Discussion

4.1 Result

In this section, we present the results according to each of the objectives.

Prevalence of ARI, diarrhea, and fever among children in selected countries

ARI, fever, and dehydration from diarrhea are important contributing causes of childhood morbidity and mortality in African countries. Figures 1 to 4 show children under age 5 who had symptoms of ARI or had a fever during the 2 weeks preceding the survey. Figure 1 shows that in Ghana, fever and diarrhea were more prevalent compared to ARI, with 1,252 children having symptoms of fever and 1,054 children having symptoms of diarrhea. Very few children (181) had symptoms of ARI. In Gambia figure 2 shows that more children (1,403) had diarrhoea compared to 1,104 and 332 with diarrhoea and ARI, respectively. In Nigeria, figure 3 shows that more children exhibit symptoms of fever (4,164) compared to diarrhoea and ARI (3,833 and 589). This is similar to Liberia, where more children showed symptoms of fever (1,217) compared to

diarrhoea (763) and ARI (216). Examining the prevalence of ARI diarrhoea and fever across the 3 countries, figures 1 to 4 show that fever is the most common childhood illness, followed by diarrhoea, and ARI is the least. Nigeria seems to have the largest burden, 4,164 for fever, 3,833 for diarrhoea, and 589 for ARI. The necessity for integrated preventive health initiatives is highlighted by this trend, which points to ongoing exposure to environmental and vector-borne disease hazards, especially in Nigeria.

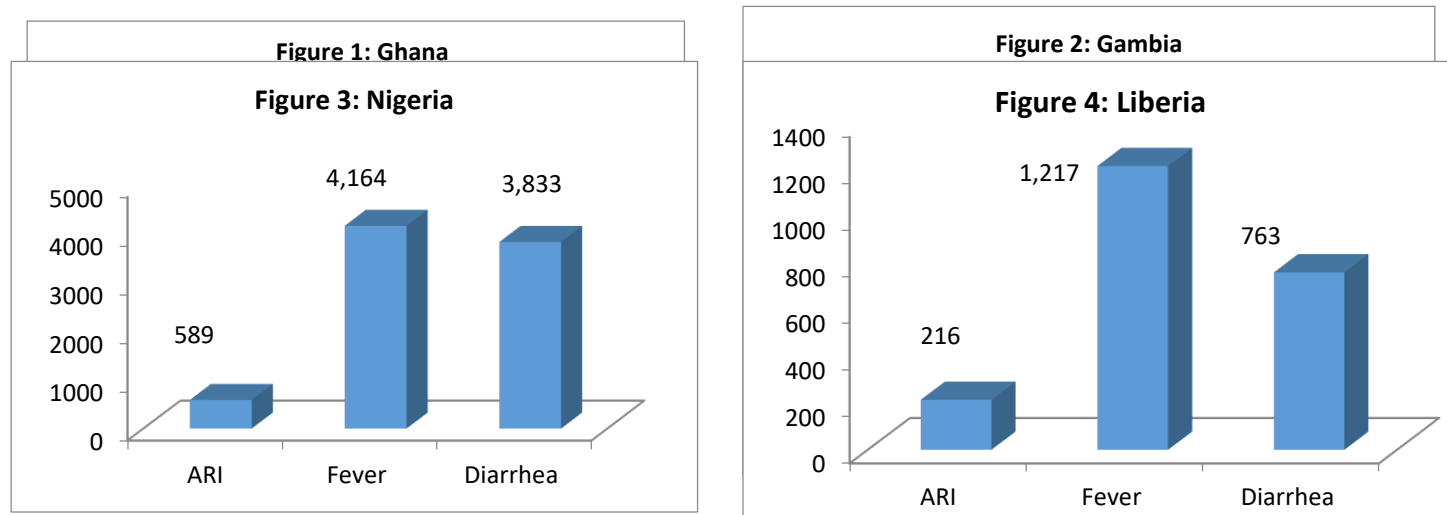


Figure 1-4: children under age 5 who had symptoms of ARI or had a fever during the 2 weeks preceding the survey

Percentage of children with ARI, Fever and diarrhoea symptoms for whom treatment/advice was sought

Prompt medical attention when a child has the symptoms of ARI, diarrhea, and fever is very important in reducing child deaths. Figures 5 to 8 shows percentage of children under age 5 with a fever in the 2 weeks before the survey for whom advice or treatment was sought from a health provider, a health facility, or a pharmacy. Figure 5 shows that 63% of children were treated for ARI, 66% for fever, and 61% for diarrhea. This shows that more children were treated for fever. This figure shows that the majority of the children received treatment, but there is a reasonable number of children without treatment. In Nigeria, 60% of children were treated for the 3 illnesses. In Liberia, 78% were treated for ARI, 81% were treated for fever, while 66% were treated for diarrhea. This shows that fever treatment was more prevalent than diarrhea. In Gambia, 54% were treated for fever, 62% for ARI, and 70% diarrhea. Figures 5 to 8 show that Liberia had more children treated for the 3 childhood illnesses compared to other countries. Nigeria comparatively

had the least treatment, with 60% for all childhood illnesses. Gambia had the least treatment for fever compared to the other 3 countries. These figures revealed that the demand for childhood treatment/care varies across countries, with some countries having more treatment than others. Nigeria's low coverage highlights the structural problems with maternal health awareness and access, while Liberia's greater treatment rate might be a reflection of more effective post-conflict community health worker models.

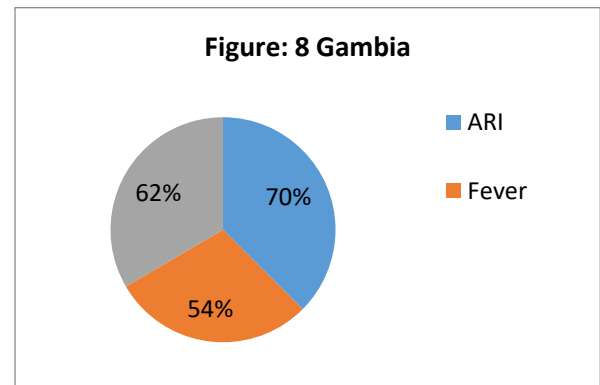
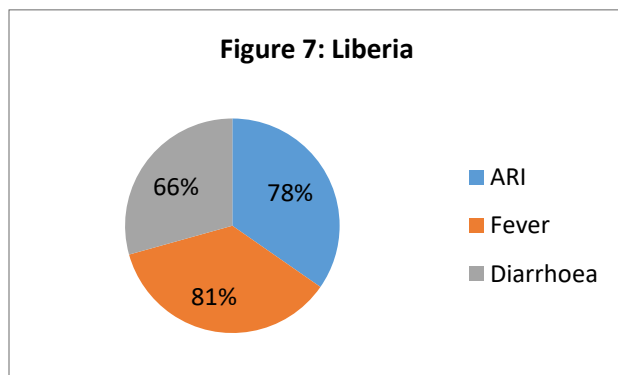
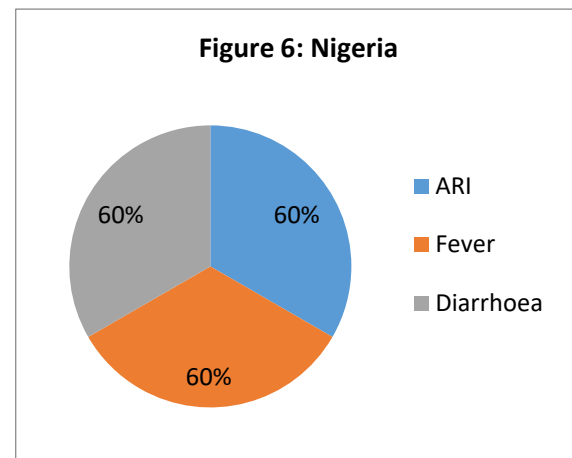
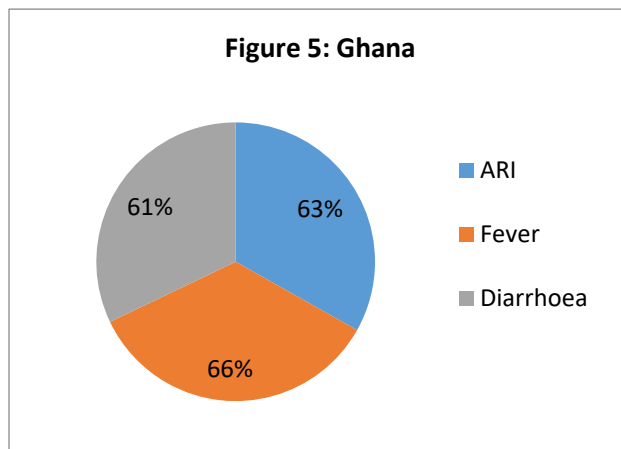


Figure 5-8: percentage of children under age 5 with a fever in the 2 weeks before the survey for whom advice or treatment was sought from a health provider, a health facility, or a pharmacy

Types of treatment sought for diarrhea, ARI, and fever

This section reveals the different types of treatment that were sought for fever, diarrhea, and ARI. Figure 9 presents the type of treatment sought by countries. Figure 9 shows that some children were given fluid from an ORS packet or prepackaged ORS fluid, zinc, or both zinc and ORS to treat diarrhea and ACT/antimalarial to treat fever and ARI. Figure 9 also shows that the majority (46.60%) of children were treated for diarrhea using the ORS packet and fluid compared to zinc and both ORS and zinc. 56.90% of children in Nigeria were treated for fever and ARI using

ACT/antimalarial. In Ghana, more children were also treated for diarrhea using ORS packets and fluid compared to other treatment options, and 78% of children were treated for fever using ACT/antimalarial. The same scenario occurs in Gambia and Liberia, as 49.30% and 55.80%, respectively, were treated for diarrhea using ORS packets and fluid compared to other treatment options. Comparatively, all 4 countries use ORS packets and fluid compared to other treatment options for treating diarrhea. In terms of fever, Ghana has the highest usage of ACT/antimalaria (78.30%) compared to other countries, followed by Nigeria, Gambia, and Liberia with 56.90%, 54.20%, and 37.40%, respectively. The comparatively low usage of zinc and combination therapy indicates a lack of adherence to the WHO-recommended integrated management of pediatric diseases (IMCI), despite the widespread use of ORS and ACTs.

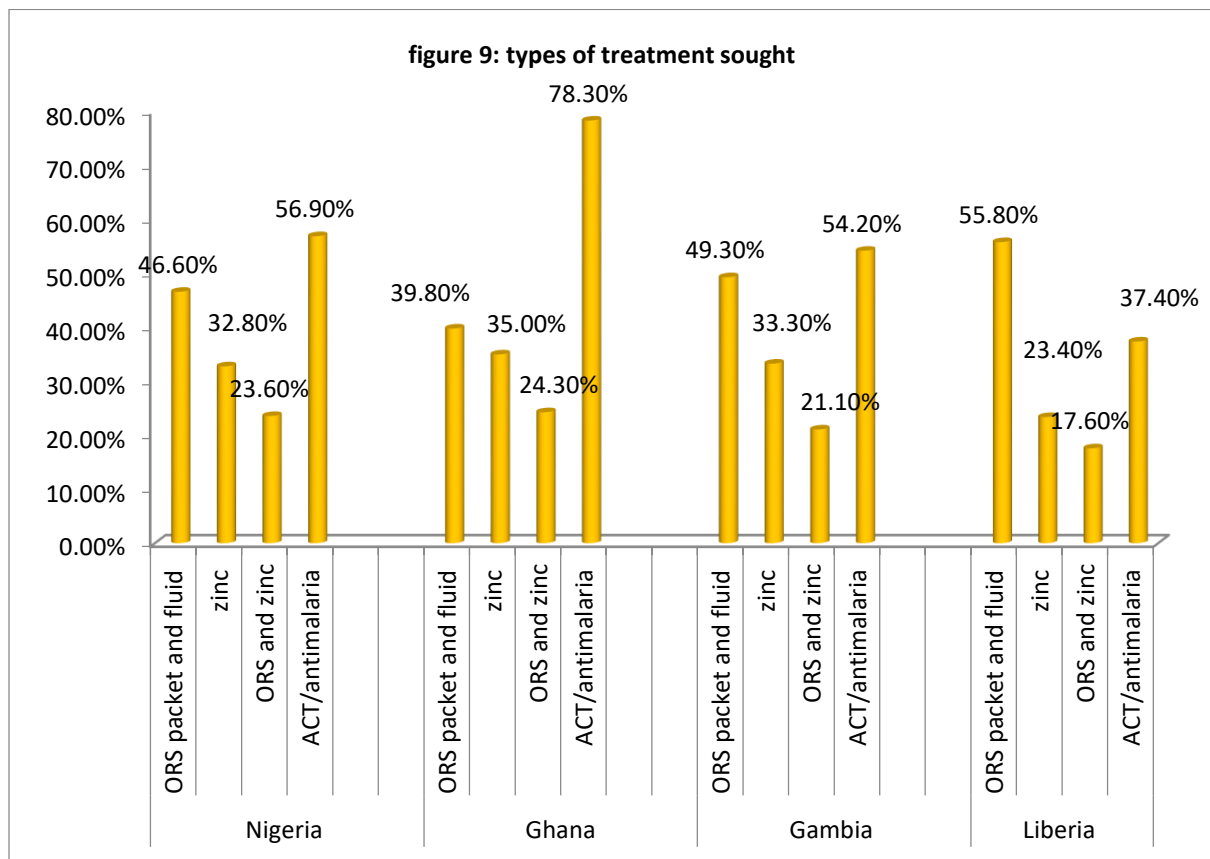


Figure 9: Different types of treatment that were sought for fever, diarrhea, and ARI

Accounting for differentials in treatment/ healthcare demand across countries

In sections 3.2 and 3.3, it was observed that there are differences across countries in terms of treatments of the 3 childhood diseases. This section seeks to examine some likely factors that may be accounting for the differences. These factors are socioeconomic and demographic factors such

as the mother's education, residence, mother's wealth status, and the sex of the child. These factors will be examined one after the other for each of the treatments.

Treatment of childhood diseases by the education of mothers

Figures 10 to 12 show the treatment of ARI, fever, and diarrhea by the education status of the mother. Figure 10 shows that in Nigeria, children of women with no education and those with

More than secondary education (80.30% and 88%) are treated for ARI, while 62.7% and 74.20% of women with primary and secondary education treat their children with ARI. In Ghana, women with no education treat their children with ARI compared to women with primary and secondary education. In Gambia, women with secondary or higher education utilize ARI treatment for their children compared to women with primary or no education. In Liberia, women with primary education utilize ARI treatment compared to women with no education or secondary education. A comparative analysis of ARI treatment by education shows that it varies slightly across countries with relatively low inequality.

Figure 11 shows the treatment of fever by education. The figure shows that fever treatment in Nigeria is biased by education. The more educated a woman is, the likelihood of treating her child with fever. This same pattern is also observed in Ghana and Liberia. In Gambia, women with primary education are more likely to utilize fever treatment (72.40%) compared to no education (61.20%) and secondary or more education (64.10%). On the contrary, fever treatment is biased by education in Nigeria, Ghana, and Liberia. Fever treatment by education is lower in Nigeria compared to other countries; therefore, education is an important factor causing discrepancies in fever treatment across countries.

In Figure 12, diarrhea treatment is biased by education in Nigeria, as women with no education are less likely to treat their children's diarrhea compared to women with more than secondary education. This pattern is similar in Liberia. However, in Ghana and Gambia, diarrhea treatment is not biased by education. 63.30% of women with no education are more likely to treat their children with fever compared to women with more than secondary or higher education (56.60%). Therefore, education also influences diarrhea treatment. This illustrates how educational achievement affects both health awareness and care-seeking agency, which is in line with Andersen's concept of predisposing factors.

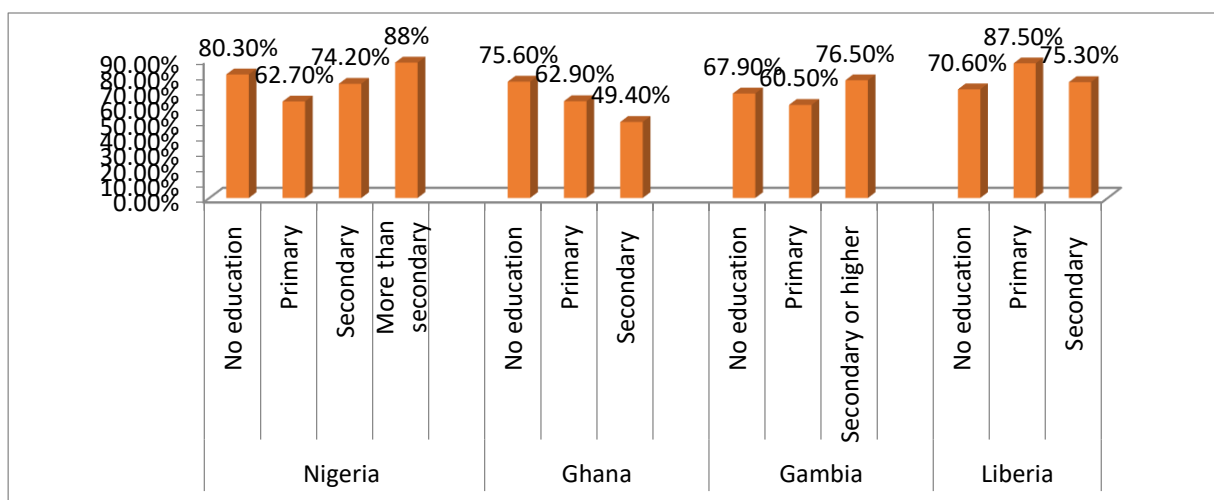


Figure 10: ARI treatment by education of mother

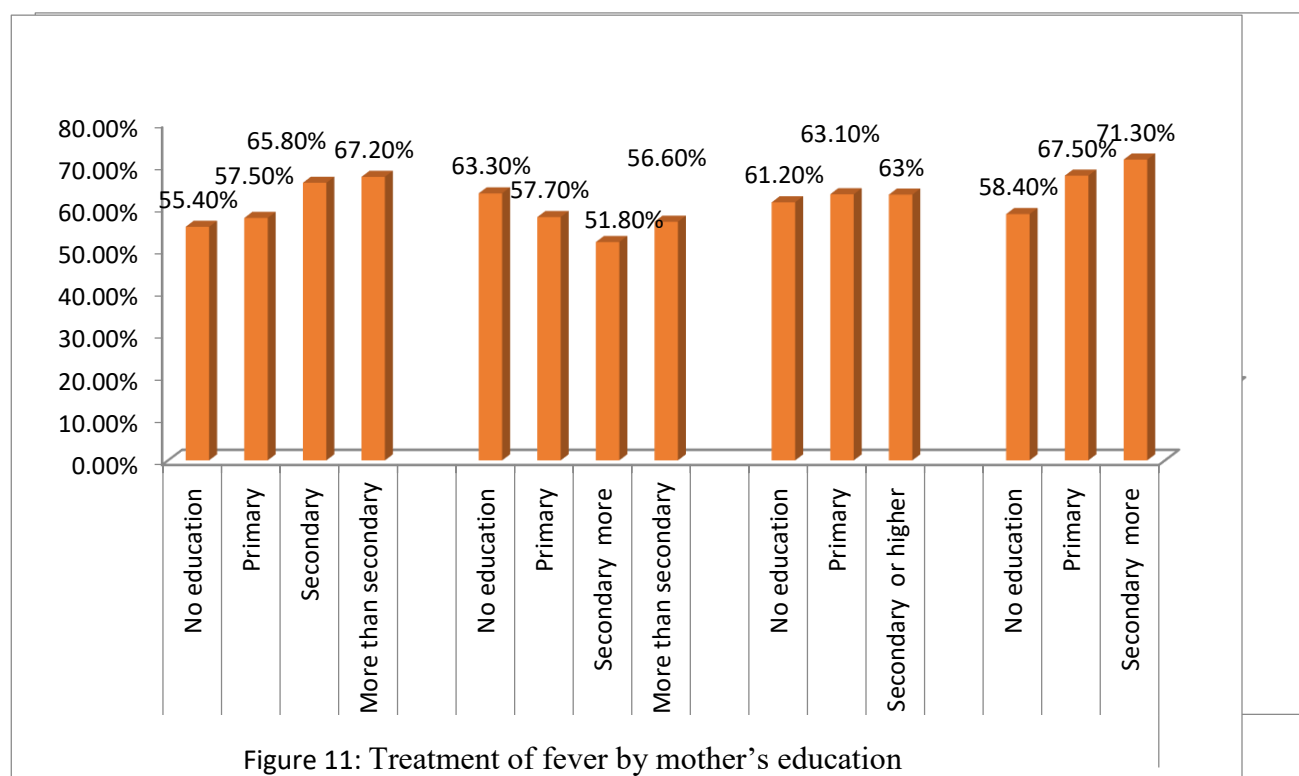


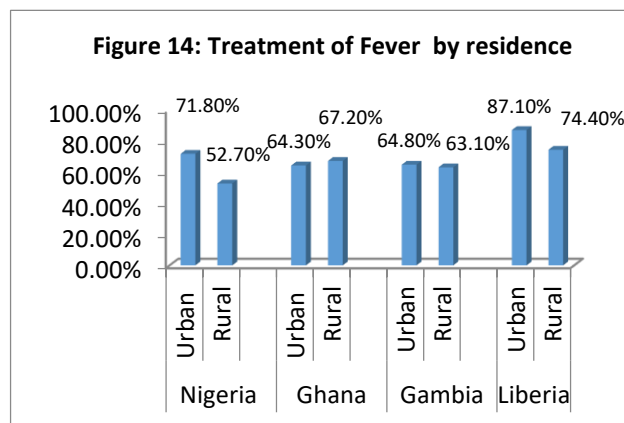
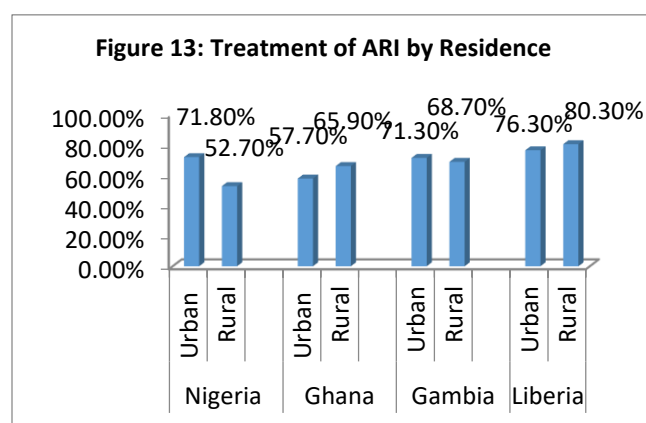
Figure 11: Treatment of fever by mother's education

Figure 12: Treatment of childhood diarrhea by the education of mothers.

Treatment of childhood diseases by the mother

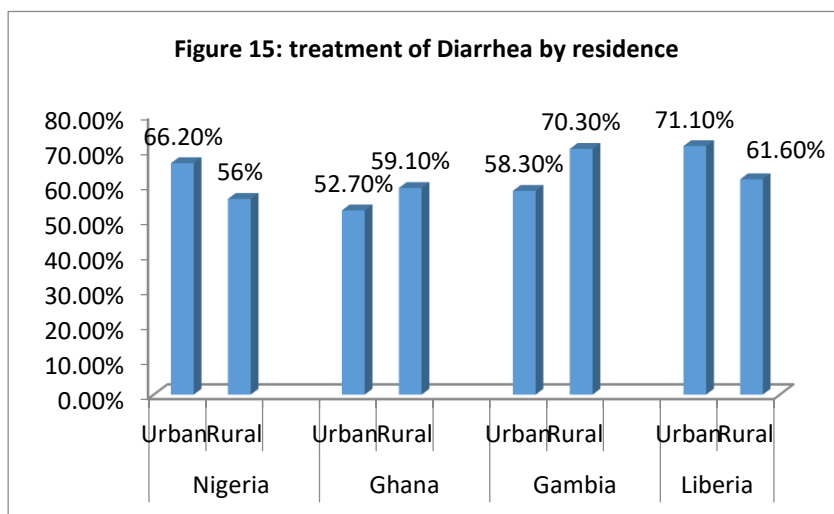
Figures 13 to 15 show the treatment of ARI, fever, and diarrhea by residence (rural and urban). Figure 12 shows that ARI treatment is biased, as 71.80% of urban residents treat ARI, while 52.70% of rural residents treat ARI in Nigeria. The same trend occurs in Gambia and Liberia. However, the disparity in treatment

based on residence is greater in Nigeria. In Ghana, the reverse is the case, as rural residents are more likely



to treat ARI compared to urban residents. In

Figure 14, treatment of fever in Nigeria is also biased by residence. 71.80% of urban residents treat fever, while 52.7% of rural residents treat fever. The differences are similar in Liberia. In Figure 15, treatment of diarrhea is also biased by residence in the four countries. Nigeria and Liberia have treatment biased in favour of the urban residence, while Ghana and Gambia are biased in favour of the rural residence. Nevertheless, the biases are more in Nigeria and Liberia compared to Ghana and Gambia.



· Figure 13-15: treatment of fever, diarrhea and ARI by residence

Treatment of childhood diseases by the wealth status of the mother

Figures 16 to 18 show treatment by wealth status. The figures show that Nigeria exhibits consistent disparity in the treatment of ARI, fever, and diarrhea in favour of children of women with the highest wealth/income. This disparity is wider in Nigeria. Ghana, Gambia, and Liberia also have disparities that are not systematic. Nigeria's ongoing wealth-based inequality might be a sign of increased income inequality and unequal access to healthcare facilities.

Figure 16: ARI treatment by wealth

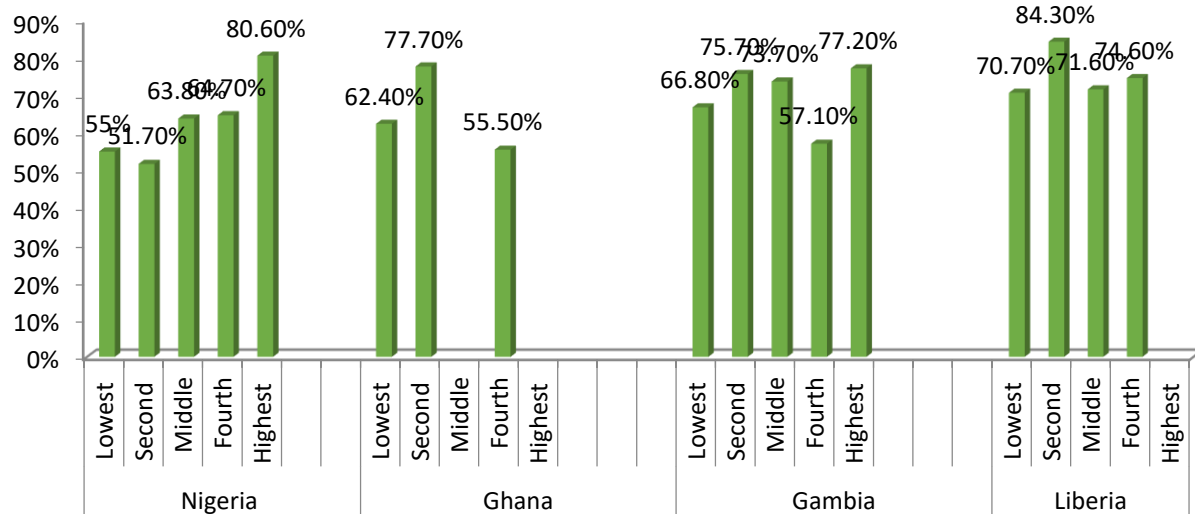
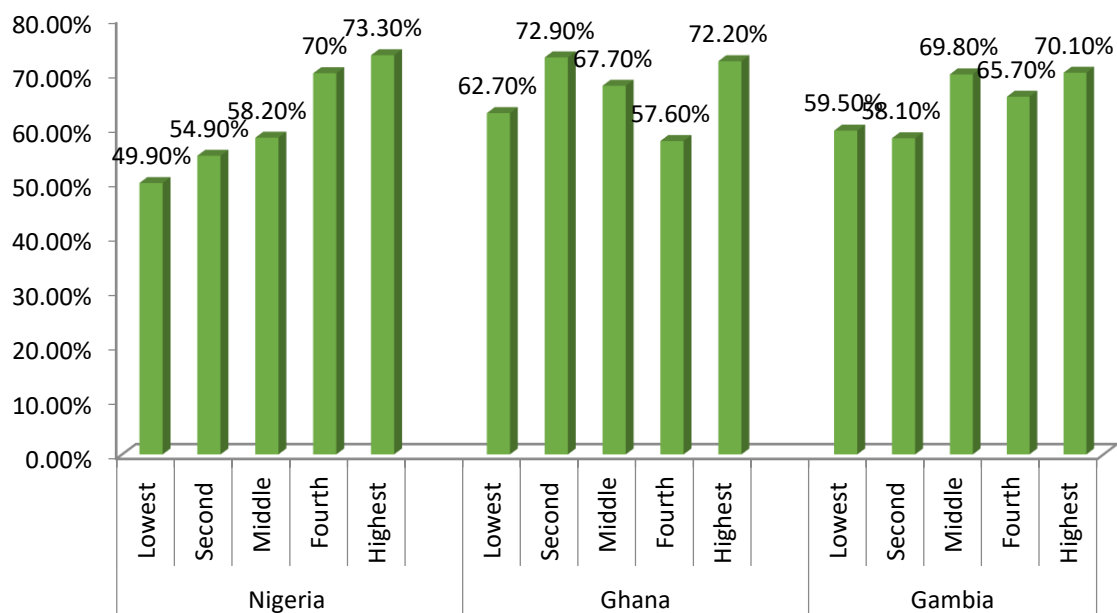


Figure 17: Treatment of fever by wealth



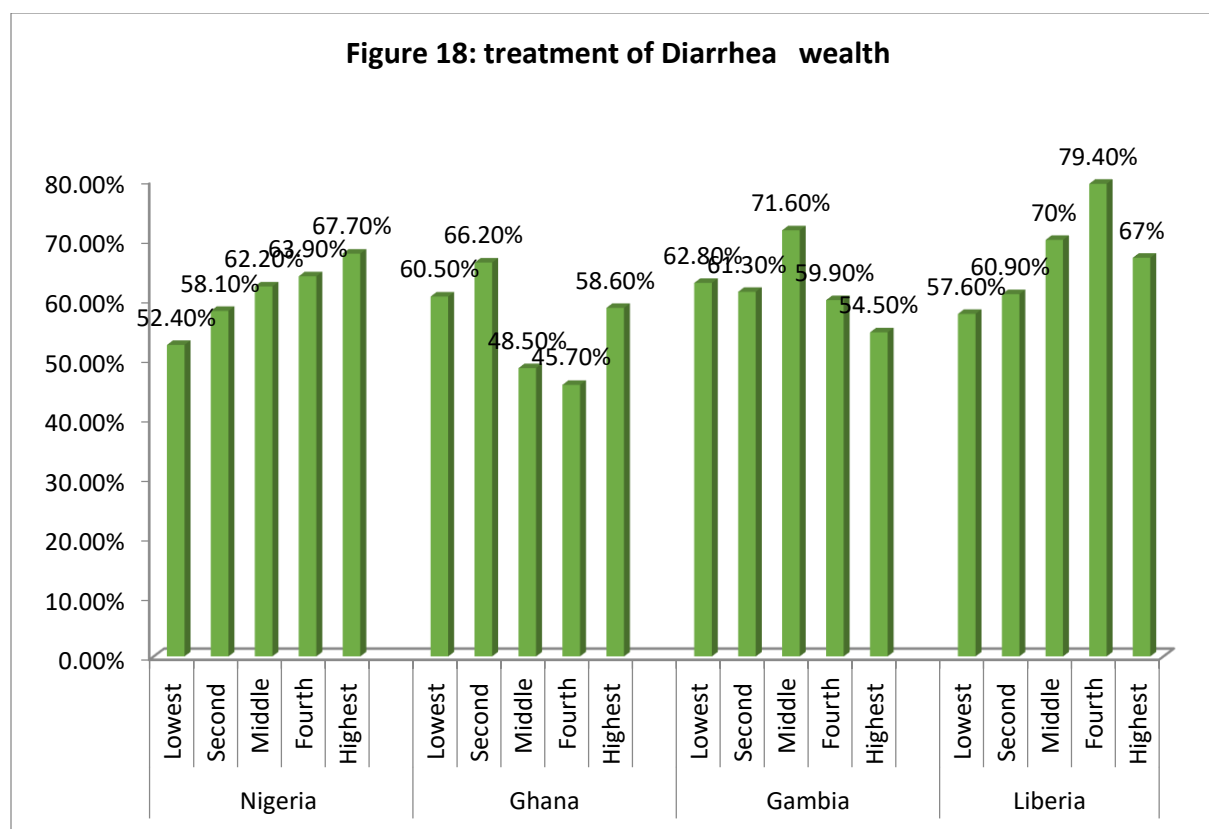


Figure16-18: Treatment of fever, diarrhea, and ARI by the wealth of mothers

Treatment of childhood diseases based on the sex of the child

Figures 19 to 21 show treatments by sex of child. The figure shows that for all the treatments, there is no significant disparity within countries by the sex of the child. However, there are large differences between countries. Male and female children in Liberia are more treated for ARI compared to other countries. The least is Nigeria. Males and females in Liberia utilize ARI treatments compared to other countries. This is also applicable to fever and diarrhea treatment. While inter-country disparities are still substantial, the small within-country variations by sex imply that gender bias in the demand for child healthcare may not be as common in these nations.

Figure 19: ARI treatment by Sex

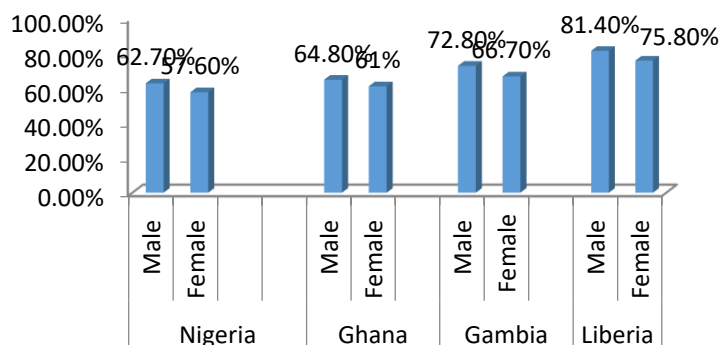


Figure 20: Treatment of Fever by sex

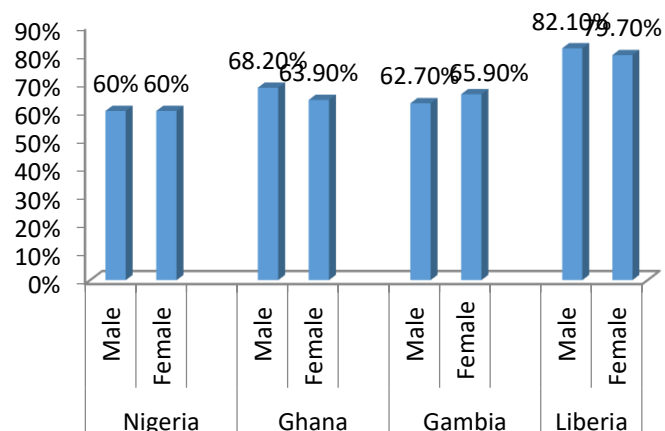


Figure 21: Diarrhea treatment by child sex

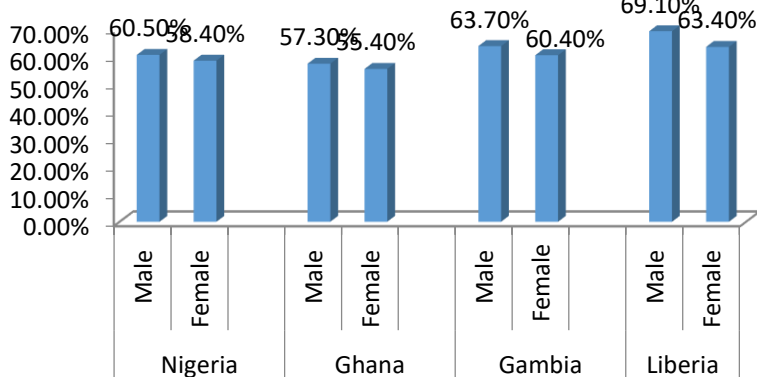


Figure 19-21: Treatment of fever, ARI, and diarrhea by sex of child

Determinants of treatments of diarrhea, fever, and ARI in Nigeria

In the sections discussed above, it is observed that Nigeria has the lowest percentage of children treated with ARI, fever, and diarrhea. It is therefore important to examine in detail the Nigerian data for other likely factors affecting the treatment of diarrhea, ARI, and fever. This section seeks to utilize the latest DHS data (DHS 2018) in Nigeria to examine factors that influence treatments. These factors are socioeconomic and non-socioeconomic. Remember that in the Nigerian DHS data, ARI treatment is captured by the treatment of fever /cough. Therefore, ARI and fever have the same dependent variable.

Descriptive statistics of variables in the regression model.

Table 2 presents descriptive statistics for all the variables in the logit regression model. The table shows that children medically treated with fever/cough were 66.4%, while 33.5% were not medically treated for fever and cough. 59.8% of children were treated for diarrhea, while 40.1% were not treated. Out of women who were sampled to receive information of treatment for their children, 4% of them were between the ages of 15-19, 19% were between the ages of 20-24, 27% were 25-29, 22.5% were 30-39 years, 7% were 40-44% while 2.6% were 40-44 years of age, respectively. The majority of the respondents were between 25 and 29 years old. Regionally majority of the respondents are from the North West (30.3%). In addition, more respondents were from rural areas (65.4%) compared to urban areas 34.5%. In terms of religion, Muslims were 60.2%, women with no education were 49.7%, and were the largest in the sample, followed by secondary education (31%), and 15.4% of women with primary education. 32.2% of respondents were Hausa women, and were the highest in the sample compared to other ethnic groups. 23.9% of respondents were among the poorest respondents and were the majority. In addition, 67.3% were employed women compared to 32.6% are not working. 50.9% of children in the sample were males, while 49.0% were females. 69.9% of respondents did not see distance to health facility as a big problem. In terms of child age, more children are within the ages of 0, 3, and 4 years, respectively. The descriptive data provide a foundation for the regression analysis by confirming the strong correlation between mother wealth, residence, and education and health-seeking behavior.

Table 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variables					
Fever/cough medical treatment					
No	8215	.3359708	.4723575	0	1
Yes	8215	.6640292	.4723575	0	1
Diarrhea medical treatment					
No	3885	.4015444	.4902738	0	1
Yes	3885	.5984556	.4902738	0	1
Independent variables					
Age of mother					
15-19	33331	.0420029	.2005989	0	1
20-24	33331	.1948336	.3960785	0	1
25-29	33331	.2791395	.448583	0	1
30-34	33331	.2254958	.4179147	0	1

35-39	33331	.1609013	.3674454	0	1
40-44	33331	.071225	.2572041	0	1
45-49	33331	.0264018	.1603295	0	1
Region of respondent					
North central	33331	.1742522	.3793319	0	1
North east	33331	.213765	.409969	0	1
North west	33331	.3032912	.4596868	0	1
South east	33331	.1130479	.3166561	0	1
South south	33331	.0907864	.2873094	0	1
South west	33331	.1048573	.3063741	0	1
Residence of the respondent					
Urban	33331	.3457742	.4756272	0	1
Rural	33331	.6542258	.4756272	0	1
Religion of the respondent					
Christianity	33331	.3943776	.4887239	0	1
Islam	33331	.6021421	.4894631	0	1
Traditionalist	33331	.0034802	.0588917	0	1
Education of the respondent					
No education	33331	.4534517	.497836	0	1
Primary	33331	.1548408	.3617583	0	1
Secondary	33331	.3132819	.4638349	0	1
Higher	33331	.0784255	.268844	0	1
Ethnicity of the respondent					
Ekoi	33331	.0045603	.067377	0	1
Fulani	33331	.0960067	.2946049	0	1
Hausa	33331	.3228226	.4675625	0	1
Ibibio	33331	.013621	.115913	0	1
Igala	33331	.0095407	.0972107	0	1
Igbo	33331	.1337194	.3403557	0	1
ijaw/izon	33331	.0194714	.1381767	0	1
kanuri/beriberi	33331	.0247817	.1554617	0	1
Tiv	33331	.0224716	.1482136	0	1
Yoruba	33331	.0959167	.2944814	0	1
Others	33331	.2560979	.4364831	0	1
Wealth status of the respondent					
Poorest	33331	.2390567	.4265139	0	1
Poorer	33331	.2276259	.4193061	0	1
Middle	33331	.2107648	.4078578	0	1
Richer	33331	.1816027	.3855225	0	1

Richest	33331	.1409499	.347975	0	1
Respondent currently working					
No	33331	.3266329	.4689887	0	1
Yes	33331	.6733671	.4689887	0	1
husband/partner's education level					
No education	31659	.3645725	.4813177	0	1
Primary	31659	.1454563	.3525658	0	1
Secondary	31659	.3459364	.4756801	0	1
Higher	31659	.1440349	.3511306	0	1
covered by health insurance					
No	33331	.9781885	.1460699	0	1
Yes	33331	.0218115	.1460699	0	1
getting medical help for self: distance to health facility					
Big problem	33331	.3012211	.4587954	0	1
Not a big problem	33331	.6987789	.4587954	0	1
Sex of child					
Male	33331	.5091356	.499924	0	1
Female	33331	.4908644	.499924	0	1
Current age of child in years					
0	30171	.2082463	.4060607	0	1
1	30171	.1971098	.3978225	0	1
2	30171	.1902158	.3924778	0	1
3	30171	.2006563	.400498	0	1
4	30171	.2037718	.402808	0	1

Regression results for fever and diarrhea in Nigeria

Table 3 shows regression results for fever treatment, while Table 4 shows that of diarrhea. The results with stars show the level of significance at 1%, 5%, and 10%, respectively. Table 3 shows that the age of respondents is not a significant factor for fever treatment. Fever treatment is influenced by region, residence, religion, ethnicity, wealth, husband's education, distance to health facility, and child age. The results show that the north central region is less likely to treat fever/cough compared to the south west, but the south-south and south east are more likely to treat fever compared to the south west. In terms of education, women with no education are less likely to treat fever/cough compared to women with higher education. Wealth seems to have significance by 1% for all categories of wealth. The richest wealth

category is more likely to treat fever compared to other wealth categories. Distance to health facility and employment status are highly significant factors in the treatment of fever/cough. Table 4 shows that diarrhea treatment is influenced by region, education, wealth status, and distance to the health facility. Other factors are not significant.

Notably, the importance of the distance to the medical facility supports the enabling variables predicted by Andersen's model, indicating that infrastructural closeness is still a major bottleneck. Programs for maternal education and accessible health finance are necessary, as evidenced by the persistently detrimental effects of low wealth and educational status on treatment uptake.

Table 3: Factors affecting fever treatment

Variable	Coef.	Marginal effect
Dependent variable (fever treatment)		
Independent variable		
Age of respondent (Ref: 45-49)		
15-19	0.091	0 .019
20-24	0.122	0 .026
25-29	-0.013	-0.0028
30-34	-0.042	-0.009
35-39	-0.144	-0.032
40-44	-0.0023	-0.0005
Region of respondent (South West)		
North central	-0.404	-0.092**
North east	.0530509	0.0115253
North west	0.271	0.058
South east	0.531**	0.106**
South south	0.760***	0.145***
Residence of respondent (ref: rural)		
Urban	0.169**	0.036**
Religion of respondent (ref: Islam)		
Christianity	-0.507***	-0.113***
Traditionalist	1.056**	0.180***
Education of respondent (ref: higher education)		
No education	-0.564***	-0.121***
Primary	-0.260	-0.058
Secondary	-0.207	-0.046
Ethnicity of respondent (ref: Hausa)		
Ekoi	-0.003	-0.0006

Fulani	-0.304***	-0.069***
Ibibio	-1.066***	-0.257***
Igala	-0.245	-0.055
Igbo	-0.661***	-0.154***
ijaw/izon	0.0359581	0.0078
kanuri/beriberi	0.055	0.012
Tiv	0.9204***	0.163***
Yoruba	-0.746***	-0.177***
Others	-0.172**	-0.038*
Wealth status of respondent (ref: richest)		
Poorest	-0.790***	-0.179***
Poorer	-0.773***	-0.178***
Middle	-0.776***	-0.179***
Richer	-0.492***	-0.113***
Respondent is currently working (ref: no)		
Yes	0.342***	0.076***
Husband/partner's education level (ref: higher)		
No education	-0.412***	-0.090***
Primary	-0.165	-0.037
Secondary	-0.159	-0.035
Covered by health insurance (ref: yes)		
No	-0.171	-0.036
Getting medical help for self: distance to health facility (ref: big problem)		
Not a big problem	0.4479236***	0.0999429***
Sex of child (ref: female)		
Male	-0.005	-.001
Current age of child in years (ref: 0 age)		
1	-0.155*	-.034*
2	-0.013	-.003
3	0.039	0.008
4	-0.103	-.023
_cons	1.875609	
Number of observations	7818	
Prob > chi2	0.0000	
Pseudo R2	0.0665	
Wald chi2(42)	583.25	

Table 4: Factors affecting diarrhoea utilization

Variable	Coef.	Marginal effect
Dependent variable (Diarrhea treatment)		
Independent variable		
Age of respondent (Ref: 45-49)		
15-19	-0.343	-0.084
20-24	-0.233	-0.056
25-29	-0.112	-0.027
30-34	-0.167	-0.040
35-39	-0.3325825	-0.081
40-44	-0.187	-0.045
Region of respondent (South West)		
North central	0.262	0.060
North east	0.932***	0.214***
North west	0.992***	0.222***
South east	0.386	0.088
South south	0.816**	0.172***
Residence of respondent (ref: rural)		
Urban	0.275828	0.0065
Religion of respondent (Islam)		
Christianity	-0.210	-0.051
Traditionalist	0.999	0.199*
Education of the respondent		
No education	0.456**	0.109
Primary	0.636***	0.141***
Secondary	0.646***	0.145***
Ethnicity of respondent (ref: Hausa)		
Ekoi	1.162	0.223
Fulani	-0.426***	-0.104***
Ibibio	-0.317	-0.077
Igala	0.351	0.079
Igbo	-0.089	-0.022
ijaw/izon	0.266	0.061
kanuri/beriberi	-0.210	-0.051
Tiv	1.069***	0.211***
Yoruba	-0.544**	-0.133**
Others	-0.132	-0.032
Wealth status of respondent (ref: riches)		
Poorest	-1.008***	-0.242***
Poorer	-0.964***	-0.233***
Middle	-0.804***	-0.196***
Richer	-0.766***	-0.188***
Respondent is currently working (ref: no)		

Yes	0.292***	.0701***
Husband/partner's education level (ref: higher)		
No education	-0.732***	-0.174***
Primary	-0.534***	-0.131***
Secondary	-0.457***	-0.1103***
Covered by health insurance (ref: yes)		
No	-0.096	-0.023
Getting medical help for self: distance to health facility (ref: big problem)		
Not a big problem	0.315***	0.075***
Sex of child (ref: female)		
Male	0.0009	0.00020
Current age of child in years (ref: 0 age)		
1	-0.238*	-.057*
2	.0197	0.0047
3	-.017	-.0039
4	-0.069	-0.016
_cons	0.662	
Number of observations	3728	
Prob > chi2	0.0000	
Pseudo R2	0.0612	
Wald chi2(42)	266.49	

4.2 Discussion of the Findings

In evaluating the demand for child health care across Nigeria, Ghana, Gambia, and Liberia, this study reveals that fever is the most prevalent childhood illness, followed by diarrhoea, and ARI is the least. Nigeria seems to have the largest burden of all childhood diseases across countries. In terms of treatment, the demand for childhood treatment/care varies across countries, with some countries having more treatment than others. Gambia had the least treatment for fever, while Ghana has the highest usage of ACT/antimalaria (78.30%) compared to the other 3 countries. For other treatments, Liberia has greater treatment for other childhood diseases, while Nigeria has low coverage of healthcare in general. Nigeria's low coverage highlights the structural problems with maternal health awareness and access, while Liberia's greater treatment rate might be a reflection of more effective post-conflict community health worker models. The study also reveals that socioeconomic factors account for differentials in the demand for child health services across countries. The most prominent among them are education, wealth, and residence. These factors are also prominent in the regression results on the determinants of fever, diarrhea, and ARI treatment in Nigeria. This is evident in the literature. Other prominent factors include, distance to health

facilities, region, residence, religion ethnicity, husband education, distance to health facility and child age. This is also in line with the literature. Notably, the importance of the distance to the medical facility supports the enabling variables predicted by Andersen's model, indicating that infrastructural closeness is still a major factor that determines healthcare demand.

5. Conclusion and Recommendation

5.1 Conclusion

The study examines demand for child health care with emphasis on fever, diarrhoea, and ARI in Nigeria, Ghana, Liberia, and Gambia. The study shows that a difference exists in the treatment of fever, diarrhoea, and ARI. The results show that Liberia performs better than other nations in terms of treatment coverage, indicating that community worker models and the robustness of the health system may be key factors. Differential in treatment across countries is driven by socioeconomic factors such as wealth, education, and residence. Child age was not a significant factor. Nigeria is found to have the lowest percentage of treatments. These findings support the applicability of the Grossman and Andersen models for comprehending the use of child health services in various country contexts. Localized determinants must be taken into account in policy responses, and equity-sensitive tactics, including targeted maternal education, conditional cash transfers, and the deployment of rural health workers, must be used.

5.2 Recommendations

To promote demand-side healthcare, specific policy measures are desperately needed, especially considering the high prevalence of avoidable child illnesses in West Africa. Expanding access through the deployment of skilled community health workers should be a top priority for governments and development partners, particularly in underserved and rural areas. They should also fortify health finance mechanisms that lower out-of-pocket costs for low-income households. Furthermore, consistent funding for health literacy and maternal education initiatives is essential for equipping parents with the information and autonomy to seek prompt medical attention for their kids. The region can significantly advance toward reaching SDG 3.2 and enhancing overall child survival outcomes by tackling these behavioral and structural obstacles.

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