

THE EFFECT OF HEALTH AID ON HEALTH INEQUALITY IN NIGERIA: AN AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) APPROACH

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Abstract

Health inequality remains a persistent challenge in Nigeria, where external health aid represents a critical source of health financing. This study investigates the effect of health aid on health inequality in Nigeria using descriptive statistics, unit root tests, bounds testing and the Autoregressive Distributed Lag (ARDL) approach. Diagnostic tests for autocorrelation and heteroskedasticity were conducted to ensure econometric validity. Results indicate that health aid exerts a negative but statistically insignificant effect on health inequality in both the short and long run. The findings suggest that increasing health aid alone has had limited impact on reducing health disparities in Nigeria during the period under review.

Keywords: Autoregressive Distributed Lag (ARDL), GDP per capita, Health aid, Health expenditure, Health Inequality, Institutional Quality.

INTRODUCTION

Health inequality is a critical development challenge in Nigeria, with far-reaching consequences for individuals, communities and the wider economy. Despite various interventions to improve health outcomes, Nigeria continues to face high maternal and child mortality, a heavy burden of infectious diseases and a rising prevalence of non-communicable diseases (Federal Ministry of Health, 2017). Disparities in health outcomes and access to care across regions and socioeconomic groups further widen existing inequalities (World Health Organization, 2019a).

The WHO (2019a) defines health inequality as the unfair and systematic differences in the

distribution of health resources, opportunities, and outcomes across different population groups.

The National Demographic and Health Survey (2018) indicated that Nigeria's maternal mortality ratio stands at 512 deaths per 100,000 live births, with notable regional and socioeconomic disparities. Additionally, the survey highlights that only 43% of births are assisted by trained health professionals, further underscoring these disparities (National Demographic and Health Survey, 2018). The impact of health inequality on individuals, communities, and the broader society is significant. Health inequality can lead to reduced economic productivity, increased poverty, and decreased human development (WHO, 2019b). In Nigeria, health inequality is

Development assistance for health can promote equity by improving access to essential resources such as nutritious food, safe water and sanitation, education, and medical care, thereby reducing health disparities (Akinbode & Bolarinwa, 2020). However, while high-income countries allocate a substantial share of GDP to health infrastructure and achieve better health outcomes, Nigeria allocates a relatively low proportion of national income to health, which exacerbates inequalities and increases reliance on external health aid.

Despite considerable health assistance from bilateral donors, multilateral agencies such as the Global Fund for AIDS, Tuberculosis and Malaria (GFATM) and GAVI, and private foundations including the Bill and Melinda Gates Foundation, Nigeria continues to experience marked health inequalities. With the country lagging behind Sustainable Development Goal targets on health equity (UNDP, 2017), it is imperative to examine whether health aid has effectively reduced health inequality.

LITERATURE REVIEW

Conceptual Review

The relationship between health aid and health inequality is complex. Depending on its design and implementation, health aid may either reduce or widen health disparities (Mishra et al., 2009). When well-targeted, it can improve

access for disadvantaged groups (Levine, 2004); when poorly designed, it may exacerbate inequalities (Hanlon, 2009).

Health aid influences health inequality through three main channels: service delivery, health system strengthening and capacity building (WHO, 2019). These involve direct provision of services (Bryce et al., 2005), improvements in infrastructure, human resources and health information systems (Travis et al., 2004), and development of local capacity to manage services (Potter & Brough, 2004).

The impact of health aid on inequality depends on aid modality, funding levels, institutional quality and implementation effectiveness (Kilby, 2000). For example, program-based aid tends to be more effective than project-based aid (Walt et al., 1999), and aid earmarked for specific programs often outperforms general budget support (Sridhar & Gómez, 2011). Effectiveness also hinges on country ownership and alignment with national priorities (WHO, 2005; Whitfield, 2009).

Empirical Review

A growing body of literature examines the link between health aid and health inequality, with a focus on low- and middle-income countries in sub-Saharan Africa. Findings are mixed: some studies report that health aid worsens inequality, others find weak or no association, while a number show positive effects conditional on institutional quality. Table 1 summarizes key empirical studies relevant to Nigeria.

Table 1: Empirical Studies on the Effect of Health Aid on Health Inequality

S/N	AUTHOR(S)	OBJECTIVE(S)	SCOPE	ESTIMATION TECHNIQUE(S)	FINDINGS	CRITIQUE/RELEVANCY TO NIGERIA
1	Kizhakethalackal, Mukherjee & Alvi (2013)	Examined the impact of multilateral health aid on infant mortality across different quantiles	112 developing countries (1974-2005)	Quantile regression technique	The results showed health aid significantly reduces infant mortality .	The study lacks modern econometric methods such as panel ARDL, Sys GMM, and OLS, but remains relevant to Nigeria
2	Burfeind (2014)	Compared socioeconomic disparities in child mortality	47 Developing Countries (2000-2009)	Regression analysis	Achieved a 40% reduction in infant mortality and a 2% decline in under-5 mortality.	Much relevant to SSA
3	Bendavid & Bhattacharya (2014)	Investigated the link between health aid and improvements in population health.	140 aid-recipient Countries (1974-2010).	Panel data analyses/fixed effects	Found that health aid positively impacts health outcomes.	The study focused on developing countries and is also relevant to the country of study.
4	Hsiao & Emdin (2014)	Analyzed the relationship between development assistance for health and mortality from malaria, HIV, and Tuberculosis	120 developing countries	Generalized Method of Moments (GMM) and Regression Analysis	Development assistance for Health (DAH) was linked to lower rates of death for both malaria and HIV in their studies, but no statistical evidence that TB DAH helps to reduce TB mortality	The study focuses on developing countries and is also relevant to Nigeria.
5	Lee & Lim (2014)	Studied health and allocation patterns.	112 countries (1995-2011)	Dynamic Panel Data (DPD)	Health aid significantly rises when the health status of recipient countries declines	The study lacks modern econometric techniques like panel ARDL, Sys GMM, OLS, etc. However, the study is very relevant to Nigeria
6	Gyimah-Brempong & Iza (2015)	Examined health aid effects on health outcomes and domestic health spending	48 African Nations (1990 - 2012)	Difference GMM analysis	Health aid significantly improved health outcomes in African countries, particularly those with stronger governance systems.	Much relevant
7	Mallaye & Yogo (2015)	Assessed the impact of health aid on health outcomes	34 sub-Saharan African countries (1990-2012)	Ordinary least squares (OLS)	Health aid leads to better health outcomes, particularly in lowering HIV prevalence and child mortality	Highly relevant to SSA
8	Negeri & Halemariam (2016)	Investigated health development assistance effects on health in Sub-Saharan Africa	43 SSA Countries (1990 – 2010))	Difference GMM analysis	Health aid had a significant positive impact on health in SSA	Much relevant
9	Adeyanju et al. (2017)	Studied maternal and child health care disparities across socioeconomic status	Nigeria (1990-2008)	Concentration curves and indices	Maternal health inequalities arose from various factors, with disparities in child care and maternal care shifting oppositely over time.	Highly relevant

10	Kébré (2018),	Analyzed the effects of aid on health	43 SSA Countries (1990-2014)	Sys-GMM estimator and panel data	Aid significantly reduces crude and infant mortality, HIV/AIDS prevalence rates	Much relevant to Nigeria
11	Ndikumana & Pickbourn (2018)	Studied foreign aid's influence on diarrhea mortality in children under five children	47 sub-Saharan African countries	Panel data regression with Sargan-Hansen Test	Increased health aid and public spending link to lower diarrhea mortality in children under five	Much relevant to Nigeria
12	Kotsadem et al (2018)	Assessed development aid effect on infant mortality	Nigeria (1990, 2003, 2008, 2010 and 2013)	Quasi-experimental approach	Found reduced infant mortality, intergroup conflict, and horizontal inequality where aid operations were active.	Highly relevant to Nigeria
13	Banchani & Swiss (2019)	Analyzed aid impacts on maternal health	130 low- and middle-income countries (1996-2015)	Two-way fixed effects panel regression model	Aid targeted at the reproductive health sector significantly lowers maternal mortality.	Based on developing countries and relevant to Nigeria
14	Doucouliagos et al. (2019)	Examined health aid's impact on infant mortality	96 recipients' countries (1995-2015)	Ordinary Least Squares (OLS)	Statistically significant reduction in infant mortality linked to health aid in countries with improved government efficiency	Focused on developing countries and relevant to Nigeria
15	Eikefet (2019)	Investigated official development assistance for health effects on infant mortality	Uganda (1988-2013)	Quasi-experimental difference-in-differences	Proximity to active health aid project is linked to lower infant mortality across most models	The study focused only on Uganda and is relevant to Nigeria
16	Novignon et al. (2019)	Reviewed health aid and health outcomes in Sub-Saharan Africa	20 SSA Countries (1990-2015)	GMM econometric analysis	Health aid has a significantly positive effect on health outcomes	Much relevant to Nigeria
17	Mohamadian mansour (2020)	Studied the impact of official development assistance and health aid on developing countries	25 Developing countries (1955-2017)	Dynamic Ordinary Least Squares (DOLS)	Long-term health outcomes improved with increased healthcare GDP share, doctor availability, income, education index, and urbanization rate	Based on developing countries and relevant to Nigeria
18	Zouunkifirou (2020)	Investigated international health aid impacts on health outcomes in Sub-Saharan Africa	SSA Countries (2000-2017)	Dynamic panel data (DPD)	Health aid more positively influences health status in nations with better governance	Highly relevant to Nigeria
19	Nwude et al (2020)	Analysed official development assistance and income per capita effects on health	81 Developing countries (1998-2017)	Dynamic two-step System Generalized Method of Moments (GMM)	Health outcomes in underdeveloped countries improve significantly with rising per capita income, rather than aid.	Much relevant to Nigeria

20	Furuoka et al. (2020)	Analyzed health development assistance allocation for STD control in Africa	54 African countries (2002-2011)	Descriptive statistics, matrix scatter plot analysis, and Pearson correlation test	Health aid allocations have a significant and positive effect on STD incidence	Relevant to Nigeria
21	David et al. (2021)	Studied child health inequality in Sub-Saharan Africa	33 SSA Countries (2009 - 2016)	Ordinary Least Squares (OLS)	Health inequality correlates with age across countries, except in Chad	Highly relevant to Nigeria
22	Muhammad & Ahmad (2021)	Assessed the effect of foreign aid on health outcomes	Nigeria (1996-2019)	Autoregressive Distributed Lag (ARDL)	Foreign aid improves health outcomes both in the short and long run	Focused on Nigeria
23	Akinbode & Oseni (2024)	Investigated health aid effects on life expectancy in Sub-Saharan Africa	46 Sub-Saharan Africa (SSA) countries	Sys-GMM Technique	Health aid does not significantly affect life expectancy in SSA	Relevant to Nigeria
24	Meshach (2024)	Analyzed determinants of health inequity in Sub-Saharan Africa	15 Sub-Saharan African (SSA) Countries (2010-2019)	Generalized Method of Moments (GMM)	Factors such as government health expenditure, net official flows from the World Food Programme, and income poverty significantly affect health inequity	Much relevant to Nigeria
25	Dingle et al. (2024)	Reviewed the level of aid for reproductive, maternal, newborn, and child health	20 donors and 16 Low-income countries (2002-2017)	Muskoka2 method	Low- and middle-income countries receive more aid, though funding shortages and future financial risk persist	Lacks modern econometric methods but is relevant to Nigeria

Source: Authors (2025)

Theoretical Framework

This study is anchored in Grossman's (1972) Health Capital Theory, which conceptualizes health as a form of human capital that individuals and households invest in to improve health outcomes and productivity.

Mathematically, the Health Capital Model is stated as:

$$H = f(E, M, A) \quad (1)$$

Where:

H = Health Stock

E = Education

M = Medical Care

A = Other factors that affect health

The model can be extended to incorporate health aid. We assume that health aid (A) improves health outcomes (H) by enhancing access to medical care (M).

$$H = f(E, M(A), A) \quad (2)$$

This framework implies that health aid improves outcomes by expanding access to medical care. However, its effectiveness is mediated by education, income, and institutional capacity. To analyze distributional effects, we consider the marginal benefit (MB) of health aid when targeted at disadvantaged groups:

$$MB = \frac{\partial H}{\partial A} \quad (3)$$

If MB is higher for disadvantaged groups than for better-off groups, health aid reduces inequality; if the reverse holds, it widens inequality.

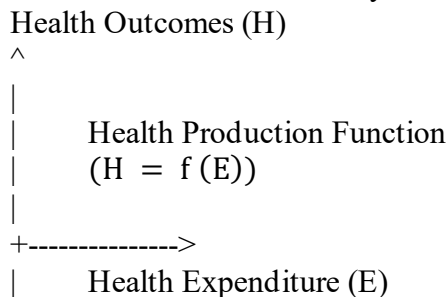
The theoretical link is illustrated diagrammatically below.

Consider a health production function linking health outcomes (H) to health expenditure (E):

$$H = f(E) \quad (4)$$

Figure 1 illustrates the health production

function, with health expenditure on the x-axis and health outcomes on the y-axis:

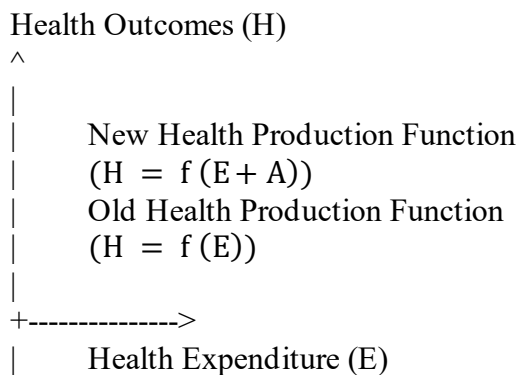


The curve shows diminishing returns: health outcomes improve with higher expenditure but at a decreasing rate. Health aid can shift the production function upward by improving the efficiency of health spending. The augmented production function is:

$$H = f(E + A) \quad (5)$$

Where: A indicates health aid

Figure 2 shows the effect of health aid on the production function:



The figure indicates that health aid improves outcomes by raising the productivity of health expenditure.

METHODOLOGY

Following Baltagi (2005), Williamson (2008), Mishra et al. (2009), and Novignon et al. (2019), we adapt the Solow growth framework to suit our research objectives and data availability. The functional form is specified as:

$$HINQ = f(HAID) \quad (6)$$

Introducing other control variables used in these studies, equation (6) becomes:

$$HINQ = f(HAID, GDP_{pc}, HEXP, INSQ) \quad (7)$$

Health inequality is measured using the Atkinson Index (HINQ) based on infant mortality. Developed by Atkinson (1970), this index is suitable for capturing variations in health and socioeconomic status in low-income settings (Ravishankar et al., 2009; Wagstaff et al., 2003).

The Autoregressive Distributed Lag (ARDL) model specification for the functional impact of health aid, GDP per capita, health expenditure, and institutional quality prevalence on health inequality in equation (7) can be written in econometric form as:

$$HINQ_{it} = \beta_0 + \sum [\beta_j HINQ_{(i,t-j)}] + \sum [\alpha_k HAID_{(i,t-k)}] + \sum [\gamma_l GDP_{PC(i,t-1)}] + \sum [\vartheta_m HEXP_{(i,t-m)}] + \sum [\theta_n INSQ_{(i,t-n)}] + u_{1(i)} + u_{2(t)} + \varepsilon_{it} \quad (8)$$

Where: β , α , γ , ϑ , and θ are the coefficients of the variables, while j , k , l , m , and n are the lag lengths for each variable. $\mu_{1(i)}$ and $\mu_{2(t)}$ represent the country and time effects, respectively, and ε_{it} is the idiosyncratic error term. This ARDL model specification allows us to examine the

short-run and long-run relationships between health inequality and the explanatory variables.

The model can be estimated using a suitable econometric technique, such as the bounds testing approach. The ARDL model in (8) can be represented in a more compact form as:

$$\Delta HINQ_{it} = \beta_0 + \sum [\beta_j \Delta HINQ_{(i,t-j)}] + \sum [\alpha_k \Delta HAID_{(i,t-k)}] + \sum [\gamma_l \Delta GDP_{PC(i,t-1)}] + \sum [\vartheta_m \Delta HEXP_{(i,t-m)}] + \sum [\theta_n \Delta HAP_{(i,t-n)}] + \lambda ECT_{(i,t-1)} + u_{1(i)} + u_{2(t)} + \varepsilon_{it} \quad (9)$$

Where Δ denotes the first difference operator, ECT is the error correction term, which represents the long-run relationship between the variables, and λ is the coefficient of the error correction term, which represents the speed of adjustment to equilibrium. This representation allows us to examine the short-run dynamics and the long-run relationship between health inequality and the explanatory variables.

Sources of Data

The study uses annual time-series data for Nigeria covering 2001-2020. Variables include health aid (OECD CRS, 2021), GDP per capita (World Bank WDI, 2021), health expenditure (WHO, 2021) and institutional quality (World Bank WDI, 2021).

RESULTS

Pre-estimation test

Table 2: Descriptive Statistics

	HINQ	HAID	GDPpc	HEXP	INSQ
Mean	0.6064	317708.7	50.9324	3.6381	1.6700
Median	0.5708	254174.4	51.1210	3.5802	1.6500
Maximum	0.8825	611861.6	55.0180	5.0536	2.1000
Minimum	0.4295	60211.87	46.5100	2.4906	1.4000
Std. Dev	0.1450	167798.2	2.7560	0.6137	0.2003
Skewness	0.5176	0.358661	-0.1246	0.6244	0.4647
Kurtosis	1.9695	2.161808	1.7387	3.1684	2.4374
Jarque-Bera	1.7779	0.963550	1.3775	1.2571	0.9836
Probability	0.4111	0.617686	0.5022	0.5334	0.6115
Sum	12.1284	6036466.	1018.647	69.1237	33.4000

Sum Sq. Dev.	0.3997	5.07E+11	144.3105	6.7787	0.7620
Observations	20	19	20	19	20

Source: Authors' Estimation

Table 2 shows that health inequality averages 0.6064 (SD=0.1450), ranging from 0.4295 to 0.8825, with a distribution consistent with normality based on the Jarque-Bera statistic.

Note: The symbols *, **, and *** represent the significance levels of 1%, 5%, and 10%, respectively, while "N" denotes 'Not Significant'

Stationary Test

The Augmented Dickey-Fuller (ADF) test was conducted to assess the stationarity and order of the data series. The results are shown in the table below.

Table 3 indicates that at the 5% level, HINQ and INSQ are stationary at levels [I(0)], while LNHAID, GDPpc and HEXP become stationary after first differencing [I(1)]. The mixed order of integration justifies the use of the ARDL bounds test for long-run analysis.

Table 3: ADF Unit Root Test Results

Variables	ADF	Prob.	ADF	Prob.	Order	Remark
	Constant, Linear Trend (level)		Constant, Linear Trend (1st diff.)			
HINQ	-4.0468**	0.0277	-0.9476 ^N	0.9234	I(0)	Stationary
LNHAID	-3.3795 ^N	0.0920	-4.2943**	0.0178	I(1)	Stationary
LEXP	0.5218 ^N	0.9980	-3.7885**	0.0477	I(1)	Stationary
HEXP	-3.1681 ^N	0.1216	-5.9917*	0.0009	I(1)	Stationary
INSQ	-3.8584**	0.0357	-3.3187 ^N	0.0987	I(0)	Stationary

Source: Authors' Estimation

ARDL Bound Test

Table 4: ARDL Bound Test

Table 1: ADF Bound Test		
Test Statistic	Value	
F-statistic	6.896526	
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Authors' Estimation.

Table 4 shows that the F-statistic (6.896) exceeds the upper bound at all significance levels, leading to rejection of the null of no cointegration. This confirms the existence of a long-run relationship among the variables.

Results and Analysis of Short-run Dynamics and Long-run Relationship

Table 5 below presents the short-run and long-run estimates of health aid and health inequality in Nigeria.

Table 5: Short and Long-Run Relationship

Short-run Relationship				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(LNHAID)	-0.0043	0.0025	-1.6907	0.1252
D(GDPpc)	-0.0206	0.0114	-1.8044	0.1047
D(HEXP)	0.0054	0.0022	2.4362	0.0376
D(INSQ)	-1.2057	0.4908	-2.4567	0.0364
CointEq(-1)	-0.3620	0.1364	-2.6528	0.0264
$R^2 = 0.99$, F-Statistic = 32519.56, prob. (F-statistic) = 0.000, Durbin-Watson = 2.19				

Long-run Relationship				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHAID	-0.0118	0.0055	-2.1395	0.0611
GDPpc	-0.0569	0.0132	-4.3214	0.0019
HEXP	0.0149	0.0041	3.6519	0.0053
INSQ	0.1174	0.0144	8.1639	0.0000
C	2.0259	0.7657	2.6457	0.0267

Source: Authors' Estimation

Short-run Relationship

In the short run, health aid has a negative but insignificant coefficient (-0.0043, $p=0.1252$), implying that a 1% rise in aid reduces inequality by only 0.0043 units - an effect too small to guide policy. GDP per capita is also negative and insignificant (-0.0206, $p=0.1047$), suggesting that short-term growth has not significantly reduced health disparities. The error correction term is negative and significant (CointEq (-1) = -0.3620, $p=0.0264$), indicating that about 36.2% of short-run disequilibrium is corrected annually.

Long-run Relationship

In the long run, health aid remains negative (-0.0118) but statistically insignificant at 5% ($p=0.0611$), suggesting it alone is unlikely to eliminate health inequalities.

DISCUSSION OF FINDINGS

The insignificant effect of health aid contrasts with evidence from some other sub-Saharan African countries where aid improved outcomes. However, it aligns with Akinbode and Oseni (2022), Nwude et al. (2020), Doucouliagos et al. (2019) and Kotsadam et al. (2018b), who found limited effects of aid on infant mortality in Nigeria.

Similarly, the short-run effect of GDP per

capita is negative and insignificant, consistent with Nwude et al. (2020), Filmer and Pritchett (1999), and Pritchett and Summers (1996), who found that growth alone does not automatically improve health equity.

Conversely, health expenditure has a positive and significant effect on inequality in the short run, suggesting that higher spending may be widening disparities. This could reflect unequal distribution of resources, leakages, or limited access for poor groups. Vertical donor programs for HIV, TB and malaria, while effective for those diseases, often operate parallel to the national system (McCoy et al., 2009) and may neglect primary and maternal care, thereby worsening inequality.

Post-estimation test.

Post-estimation diagnostics were conducted to verify compliance with econometric assumptions, including tests for autocorrelation and heteroskedasticity.

Serial correlation LM test

The Breusch-Godfrey LM test shows no evidence of serial correlation ($p>0.05$), indicating that autocorrelation is not a concern.

Table 6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.1354	Prob. F (2,7)	0.8756
Obs*R-squared	0.6706	Prob. Chi-Square (2)	0.7151

Source: Authors' Estimation

Test of heteroscedasticity

The Breusch-Pagan-Godfrey test was used to examine whether the variance of the error term is constant over time.

Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.7049	Prob. F (7,10)	0.6698
Obs*R-squared	5.9472	Prob. Chi-Square (7)	0.5459
Scaled explained SS	0.4752	Prob. Chi-Square (7)	0.9995

Source: Authors' Estimation

With p-values above 5% for both F and Chi-square statistics, we fail to reject the null of homoskedasticity. This indicates constant error variance, supporting the robustness of the estimates for forecasting.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study evaluated the influence of health aid on health inequality in Nigeria, utilizing annual time series data from 2001 to 2020. The results from the ARDL model demonstrate that, in the short term, health aid does not have a significant effect on health inequality in Nigeria, despite showing the expected direction. Additionally, findings from the ARDL bound test indicate an insignificant long-term relationship between health aid and health inequality in Nigeria. Therefore, we conclude that increasing health aid in Nigeria does not significantly alleviate health inequalities during the examined period.

Recommendations

Drawing from the empirical findings, the following specific and actionable recommendations are suggested:

1. The governments and donor agencies should improve aid allocation and tracking mechanisms through the creation of a National Health Aid Dashboard within the Federal Ministry of Health to monitor the disbursement, location, and sectoral allocation of donor funds in real-time. Additionally, they must ensure that at least 60% of external health aid is distributed through a Sector-Wide Approach (SWAp) and aligned with state Annual Operational Plans to minimize fragmentation. Also, health aid disbursement should be tied to equity indicators such as coverage of the poorest quintile and functionality of rural health facilities.
2. Efforts should be geared towards strengthening institutional quality and accountability by broadening the application of Public Financial Management reforms, including the Treasury Single Account and Integrated Payroll and Personnel Information System, across all state health ministries to prevent leakage. Also, implementing performance-based financing for primary healthcare facilities, linking payments to verified service provision in underserved local government areas (LGAs). Also, governments should empower state-level accountability mechanisms, including civil society involvement and community scorecards, to oversee aid utilization at the facility level.
3. Government should reorient health expenditure toward equity by increasing health expenditure for primary healthcare and the Basic Health Care Provision Fund to at least 50%, and prioritizing states with higher maternal and child mortality rates. Additionally, the government should introduce health equity impact assessments for all new budget lines to ensure that resources do not favour wealthier urban tertiary hospitals disproportionately.
4. Policies aimed at promoting economic

growth should be implemented to reduce health inequality in Nigeria. This helps the government to enhance domestic resource mobilization and health aid predictability, engage donors in multi-year agreements to enhance the predictability of health aid, facilitating better planning and integration of aid into medium-term expenditure frameworks.

5. Development assistance for health should be implemented to address specific health needs and reduce health inequality in Nigeria. Thus, the government's establishment of State-Level Aid coordination units with the expertise to negotiate, monitor, and evaluate donor-funded projects will strengthen the capacity to reduce health inequality in Nigeria. Moreover, investment in training and retaining health workers in rural areas to ensure that infrastructure funded by aid effectively translates into service delivery.

These strategies (recommendations) prioritize improving institutional quality, targeting, and accountability over merely increasing aid volume. Based on the empirical findings, such institutional and allocative reforms are more likely to yield tangible reductions in health inequality in Nigeria.

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