# Are Migration Remittances and Development Assistances Pathways to Improve Nigeria Health Outcomes?

**Collins U. Udedi[1], Ebele S. Nwokoye[2]**

**Department of Economics, Nnamdi Azikiwe University Awka Nigeria**

**DOI: https://doi.org/10.51244/IJRSI.2026.13010144**

**Received: 17 January 2026; Accepted: 22 January 2026; Published: 07 February 2026**

## ABSTRACT

The impacts of migrant remittances and official development assistances (ODAs) on health outcomes in Nigeria between 2000 and 2024, were investigated. Despite increasing remittances and ODAs inflows in Nigeria, its developmental impact remain uncertain among researchers. Anchored on the Grossman health capital model and the two-gap theory, the study employs Auto-Regressive Distributed Lag (ARDL) and Nonlinear ARDL (NARDL) techniques to assess the impacts of remittances, health-specific and non-health-specific ODAs, environmental conditions, and institutional quality on Nigeria's health outcomes. The findings reveal that remittances and ODAs do not significantly improves health outcomes, even after accounting for institutional quality. It then concluded that remittances and ODAs are ineffective pathways for improving health outcomes in Nigeria and recommends prioritizing education and technical aids on targeted health programmes, such as community health base insurances, doctor without boarders' initiatives for health improvement in Nigeria.

**Keywords:** Nigeria Health outcomes, Official-Development-Assistance, Remittances **JEL Code:** l10, F35, F22, O20

## INTRODUCTION

Health outcomes are measurable changes in the health status of individuals or population as a result of healthcare interventions, behavioral changes, socio-economic activities and environmental conditions. The World Health Organization (WHO, 2021), the Centers for Disease Control and Prevention (CDC, 2020) and Organization for Economic Co-operation and Development (OECD, 2022) ascribe health outcomes to outcomes of effectiveness and efficiency of health system, policies and interventions, which result in change in mortality, morbidity and quality of life. Health outcomes therefore, are indicators of healthcare systems and its broader determinants influencing human longevity and quality of life. They are commonly measured with indicators such as infant mortality, maternal mortality, life expectancy, disease specific mortality, disability-adjusted life years (DALYs) among others (World Bank, 2022; WHO, 2023). Beyond self-fulfilling significances, health outcomes represent a key element of human development, reflecting the ability of societies to ensure equitable access to quality healthcare and economic productivity. Therefore, its sustainability and quality have continued to be at the center for policy makers and international community.

Improved health outcomes are not just the foundation for economic productivity but also developmental sustainability (WHO, 2021). Continuous improving of health outcomes have become a global priority as United Nations Sustainable Development Goal 3 (SDG-3) underscores this fact and advocated for healthy lives and well-being for all by 2030 (Jeetoo & Jaunky, 2023). Among the various determinants of improved health outcomes, financial resources such as migrant remittances and official development assistance (ODA) have received significant scholarly attention. However, the impact of these financial resources in developing countries remains contentious. While some researchers assert that they exert pro-cyclical effects amplifying existing economic trends others argue for their counter-cyclical role in cushioning economic shocks (Lange & Vollmer, 2017; Pu, Zeng, & Luo, 2021; Depken et al., 2021). This study aligns with the latter debate, seeking to explore the extent to which these inflows, alongside institutional quality, contribute to health outcomes in low-income ECOWAS countries.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

Migration in Nigeria presents a dual narrative of a brain drain of healthcare professionals on one side, and a potential development lifeline through migrant remittances on the other. While the emigration of skilled personnel poses a threat to health system, remittances may act as a redemptive force, bolstering household income and improving access to healthcare services. However, findings in literature remain inconclusive. On one hand, studies such as Maju et al. (2019) and Eggoh et al. (2015) assert that increased migrant remittances and official development assistance (ODA) enhance access to affordable or even cost-free medical services in developing countries. On the other hand, critics argue that, when subjected to cost-effectiveness analysis (CEA), the drawbacks of these financial inflows may outweigh its benefits. This scholarly divide underscores a critical gap in understanding the true impact of remittances and aids on health outcomes. The need to shift from GDPfocused measures to human development indicators particularly infant mortality and life expectancy may have become appropriate; as they will provide deeper insights into the quality and equity of health outcomes, thereby offering a more accurate evaluation of the developmental role of remittances and ODAs (Afolabi & Oladokun, 2022).

Infant mortality reflects the social, economic and environmental conditions in which children (and others in society) live. It is not a rate strictly speaking but a probability of death derived from a life table and expressed as rate per 1000 live births. It, also, reflects local conditions in which the population lives (WHO, 2023). According to Olonade et al., (2019), it is an indicator that did not only show the level of infant and maternal health in Nigeria, but a reflection of overall health conditions of Nigerian population. Life expectancy reflects an average number of years a person is expected to live based on the mortality rate of a given population (WHO, 2023). It has been considered in most health economics literature as one of the primary health outcomes due to its positive effects on economic productivity despite its shortcoming. Nigeria is ranked very low among other ECOWAS countries with life expectancy rate of 54.7 years while Ghana is 63.78 years, Senegal 67.4 years, yet Nigeria is among the highest recipient of remittances and ODAs in the continent (Adebanji et al. 2020, Eze, Okpara & Madichie, 2020).

Migrant remittance is one of the derived outcomes from migration, it is a transfer of private funds from diaspora to their countries (International Organization for Migration, 2023). Migrant remittances, a critical byproduct of international migration, represent a significant financial lifeline for many developing countries. Despite accounting for up to 9.2% of Nigeria's GDP, the developmental impact has remains contested (African Union, 2020; UNDP, 2019). While some scholars argue that remittances spur economic by increasing per capita income and shared growth, others caution that they may contribute to remittance-induced inflation while marginally enhance equity (Depken et al., 2021); Yadeta & Hunegnaw, 2022).

Similarly, Official Development Assistances (ODAs) comprising foreign financial and technical support has seen a steady increase in Nigeria, as reported that ODAs to Nigeria has been increasing with the reception of $2.5 billion in 2016, $3.4 billion in 2017, $3.3 billion in 2018, $3.5 billion in 2019 which increased by 5.3 % in 2020 and by 13.6% in real terms from 2021 to 2023 (World Bank Report, 2020). Yet, its actual developmental impacts is still unclear. Proponents of ODA-led-development believe that ODAs increases accessibility and affordability of health services (Maju et al., 2019), while opponents question their cost-effectiveness, arguing that its negative impact outweigh its benefits based on cost effectiveness analysis (Eggoh et al., 2015). This study responds to these debates by disaggregating ODAs into health-specific (HODAs) and non-health-specific (NODAs) components, aiming to assess their differentiated impacts on health outcomes and institutional quality moderating its impact in Nigeria, to address a critical gap in development policy framework.

Gross Domestic Product (GDP) per capita remains a core indicator of living standards and is theoretically linked to health outcomes through increased access to healthcare services. However, despite fluctuations in Nigeria's GDP per capita between 2017 and 2023, corresponding improvements in health outcomes have not been observed (NBS, 2023; WHO, 2023). This disconnect suggests the influence of additional factors such as institutional quality, education, and environmental conditions. Institutional quality entails fulfilling the required task rightfully in most economical way. It is a reflective of effective governance, accountability, and rule of law has been measured using various indices including the Corruption Perception Index and the Transparency, accountability and corruption in public sector (TA&C) index (Olatunde et al., 2019; Limazie & Woni, 2024). In this study, it will be assessed using principal component analysis (PCA) of six governance indicators.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

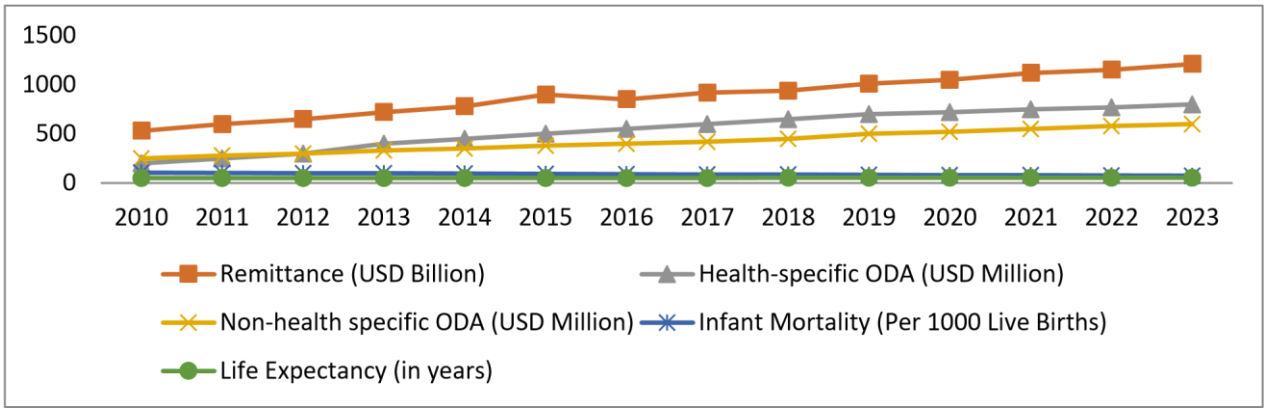
Education is the process of developing our minds and prepare for life. It inculcates acquisition of knowledge through skills and learning. While it's long-term impact on health outcomes is widely recognized (Barro, 2013), debate continues over whether educational spending yields stronger health returns than GDP growth (Usman & Adeyinka, 2019). Environmental quality also plays a crucial role, in influencing health outcomes both directly through exposure to harmful pollutants and indirectly by affecting ecosystem (WHO, 2021). It can be measured with different indicators including $CO_2$ emissions and ecological footprint which offer a measurable insight into the sustainability of human-environment interactions (Nwokolo, Meyer, & Ahia, 2023).

In pursuit of economic productivity and sustainable ecosystem, Nigerian policymakers introduced range of health policies aimed at improving public health outcomes and universal health coverage. The National Health Policy (NHP, 2016) was to provide a comprehensive framework for strengthening health systems and enhancing population health. Similarly, the National Health Insurance Act (NHIA, 2022) was to reduce out-of-pocket health expenditures and expand insurance coverage nationwide. Furthermore, to address persistent challenges such as high maternal and child mortality rates and the dual burden of communicable and non-communicable diseases, the Second National Strategic Health Development Plan (NSHDP II) was launched, emphasizing multi-sectorial collaboration for holistic health improvements, the 'Save One Million Lives' initiative (2012), both targeting maternal and child health. These policies demonstrate Nigeria's multi-faceted approach to achieving healthrelated development goals and improving the overall well-being of its citizens.

Despite these policies and initiatives in the mix of substantial Official Development Assistance (ODAs) and migrant remittances, health outcomes has remain alarmingly poor. Nigeria continues to record high rates of infant mortality and low life expectancy, signaling a persistent health crisis. The HIV/AIDS epidemic alone affects an estimated 1.9 million Nigerians (UNAIDS, 2019). Infant mortality remains deeply concern, with one in every eight children not surviving to their fifth birthday, reflecting a rate of 132 deaths per 1,000 live births (Ogbuoji & Yamey, 2019). Life expectancy in Nigeria stands at 54.3 years significantly lower than peer countries such as Ghana (63.78 years), Senegal (69.35 years), and Guinea (58 years), and far below the U.S. average of 77.43 years (United Nations, 2021; WHO, 2022).

These stark disparities underscore a troubling disconnect between the increasing inflow of migrant remittances and official development assistance and the actual health outcomes achieved. The situation raises critical questions about the effectiveness, governance, and absorptive capacity of health systems in utilizing these resources to drive measurable improvements.

**Figure1: Trends between migrant remittance, health specific official development assistance, non-health specific development assistance, life expectancy and infant mortality in Nigeria 2010-2023.**




Sources World Bank and UNICEF 2024

This paradox as seen in Fig 1, challenges the theoretical assumption that argues that increasing financial inflows, lead to improved health outcomes (Grossman, 1972). The apparent disconnect, as illustrated by the trends, raises concerns about the real developmental impact of these external financial resources. While some studies have explore the impact of public and private health financing on health outcomes, they often exclude migrant remittances and ODAs from their models (Zhou, Bassey, Yan, and Aderemi, 2023; Oladosu, Chanimbe, and Anaduaka (2022); Mustapha et al. 2021) thereby leaving a critical gap in literature. Moreover, the limited

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

effectiveness of these inflows may be suggestive that quality institutions are necessary condition for translating financial inflows into health outcomes.

Therefore, this study seeks to investigate the impact of these inflows on health outcomes in Nigeria, analyze the moderation role of institutional quality on the inflows. Incorporate education as a control variable, recognizing the role of health awareness in influencing personal health behavior. It will also use Auto-Regressive Distributed Lag (ARDL) and Non-linear ARDL (NARDL) models to capture potential asymmetries and dynamics in the interactions of health outcomes and the inflows. The study questions the impacts of these inflows, in the absence of strong institutional frameworks. Additionally, it probes whether reliance on such inflows might inadvertently suppress domestic investment, innovation, and sustainable growth in the health outcomes promotions. These objectives drive this investigation.

This research will offer empirical evidence critical to Nigerian health policymakers and contribute to ongoing academic debates on the effectiveness of financial inflows in developing countries. It also aims to narrow the gaps in empirical literature by applying a non-linear modeling approach to assess the asymmetric dynamics of developmental impact of remittances and ODAs. More importantly, the findings will serve as a valuable tool for donor agencies and remittance-sending communities in conducting post-ODAs impact assessments.

## REVIEW OF THE RELATED LITERATURE

### Review of theoretical literature

### The Grossman Health Capital and Demand Theory (1972)

The health production theory by Grossman (1972) asserts health as a stock that depreciates with consumption and appreciates with investment. It provides an economic framework linking health, behavior, and financial decisions, assuming individuals make rational, informed choices about health investments. Despite its limitations, the theory remains widely applied in health research and underpins models like Andersen's (1989), making it relevant for exploring how financial inflows like remittances and aids impacts health outcomes. It has been widely used by researchers such as Zhou et al. (2023) study of public health financing as determinant on under-five mortality and life expectancy in the ECOWAS Sub-Region.

### Two-gap Theory

The two-gap model created by Chenery and Strout (1966) as quoted in Todaro & Smith, (2012), states that the tragedy of poverty and a severe lack of savings results in countries seeking developmental assistance abroad, and by extension causing the citizens to migration for better economic opportunity, which has its developmental consequences. The relationship between these three factors, ODAs, migrant remittances and health outcomes, is the tragedy of poverty and the ODAs is meant to reduce such poverty (health poverty). Similarly, Asiedu et al. (2012) opined that the Harrod-Domar model underscores the importance of foreign inflows because, bridging the finance gap is very vital for long-term growth and that borrowings and development aids from outside sources are the most viable means to fill this finance gap. Therefore, are ODAs and remittances filling this developmental gap? This theory was built on the assumption of limited savings, high investment requirements for infrastructure, limited foreign earnings, import dependency and export constraints as well as no substitution between domestic and foreign resources.

### Stylized Facts of on official development assistance and health outcome in Nigeria 2024

| Country | GDP per capita (current US$) 2023 | Human Development index (HDI) (scale 0-1) 2024 | Official development (current % of ODAs received in West Africa US$) 2024 | Health outcome (infant mortality rate per 1000 births) 2024 |
|---|---|---|---|---|
| **Benin** | 800 | 0.40 | 0.69 | 83 |
| **Burkina Faso** | 600 | 0.38 | 9.15 | 78 |

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

| | | | | |
|---|---|---|---|---|
| **Cabo Verde** | 3000 | 0.42 | 1.11 | 23 |
| **Ghana** | 2,200 | 0.45 | 14.97 | 60 |
| **Guinea** | 730 | 0.37 | 4.43 | 96 |
| **Nigeria** | 2,049 | 0.36 | 28.28 | 118 |
| **Senegal** | 1,400 | 0.42 | 11.64 | 47 |
| **Togo** | 666 | 0.43 | 0.78 | 54 |

**Table 2.1: West African Countries, ODA, HDI and health outcomes at Glance**

Source: World Bank Development Indicator 2024, W.H.O 2024.

Despite the significant inflow of Official Development Assistances (ODAs) in Nigeria in 2024, the country still ranked lowest in health outcomes and human capital development (WHO, 2024). Table 2.1, Nigeria's Human Development Index (HDI) stood at a mere 36%, with alarming infant mortality rate of 118 deaths per 1,000 live births. In contrast, to other regional countries such as Ghana and Senegal, with lower ODA shares of 14.97% and 11.64% respectively, ranking higher (WDI, 2024).

This paradox questions the effectiveness and absorptive capacity of ODAs in Nigeria's development. Lange and Vollmer (2017) and Pu, Zeng, and Luo (2021) have debated whether financial inflows such as ODAs have procyclical or counter-cyclical effects on development outcomes. Aime (2010) assert that aids are ineffective in improving health outcomes, after reviewing the effect of ODAs on health outcomes of developing countries. The study attributed the ineffectiveness of aids to the recipient country to the factors indigenous to the recipient country. This study differs from this submission, but rather aligned with the Niyonkuru (2016) argued that aids ineffectiveness in developing countries may be as a result of hidden agenda by the donors who may present stringent and unbearable conditionality to the recipient countries, which place the vulnerable country in a more precarious condition as well as defective policy framework.

**Empirical Literature**

Djeunankan and Tekam (2022) found that remittances significantly and positively influence life expectancy in developing countries. Using variables like GDP per capita, health expenditure, and fertility rate, and employing GMM and fixed effects models, the study shows remittances help finance health, especially where public systems fall short, a view supported by Acharya and Leon-Gonzalez (2012). However, the study notes potential biases from pooled data and unobserved factors like culture or institutions.

Ramkissoon and Deonanan (2023) examined the impact of remittances on infant mortality in 122 developing countries from 2003 to 2018, using dynamic panel estimation. They found that remittances significantly increased infant mortality, contrasting with studies like Djeunankan and Tekam (2022), which reported positive health impacts, and Hao et al. (2023), which found no significant effects in sub-Saharan Africa. These mixed findings suggest that the impact of remittances on health outcomes varies by region, emphasizing the need for a context-specific approach.

Akter et al. (2023) investigated the influence of GDP per capita, health expenditure, industrialization, education, and environmental sustainability on infant mortality across G-7 countries. Utilizing the Generalized Method of Moments (GMM) panel regression model, the study revealed a significant negative relationship between GDP per capita and child mortality, indicating that higher income levels contribute to improved child health outcomes. Nonetheless, the study underscores the importance of multidimensional strategies in addressing infant mortality.

Odjesa and Ighodaro (2021) examined the socio-economic factors influencing infant mortality in Nigeria using ARDL analysis on data from 1980–2019. They found that GDP per capita, health expenditure, and female literacy reduce infant mortality, while urbanization and access to clean water are especially critical. The findings align with UNICEF (2021) and Akinlo and Sulola (2019), emphasizing the role of maternal education, skilled birth

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

attendance, and household income. However, the study's reliance on secondary data overlooks informal and regional health dynamics, highlighting the need for more nuanced, localized research. Overall, it supports a multi-sectorial approach to improving child health.

Nwude et al. (2020) analyzed the effects of official development assistance (ODA) and income per capita on health outcomes in 81 developing countries using Two-step System GMM. They found that while ODA slightly improves life expectancy and reduce infant mortality; the effects are statistically insignificant, aligning with Easterly's (2006) criticism of aid inefficiency in Africa. In contrast, income per capita shows a stronger, significant influence on health outcomes. The study is limited by not disaggregating ODA and ignoring governance quality, which could affect aid effectiveness. It emphasizes the need for policy-specific approaches and better aid utilization across sectors.

Adebanji et al. (2020) investigated the impact of development assistance on infant mortality rate in Nigeria. Using Auto-Regressive Distributed Lag (ARDL) technique as a model of analysis and GDP per capita, health expenditure infant mortality rate, and education as variable under consideration; the study found that in the long run ODA have negative statistical significant on infant mortality in Nigeria. The finding resonates with Eze, Okpara and Madichie, (2020) on the impact of foreign aid on development in Nigeria. Using disaggregated approach of foreign aid. The study found that it is only aids directed to education that have positive and significantly to development.

Okonjo and Adeyemi (2018) examined the impact of developmental aids on infant mortality at the subnational level in Nigeria, using variables such as household income, maternal education, access to health services, and regional poverty. Employing fixed-effects panel regression and instrumental variable (IV) techniques, they found that aid was more effective when combined with local health workers and community delivery systems, but had minimal impact when not directed toward health infrastructure. Their findings align with Kotsadam et al. (2018), who also reported positive health outcomes from well-targeted aid. Despite its insights, the study noted challenges in using IV methods due to data and bias issues.

## RESEARCH METHODS

### Theoretical Framework

The theoretical framework combines Grossman's Health Capital Theory (1972) and the Two-Gap Theory of Saving-Investment. Together, these theories underscore that improving health and development in low-income countries like Nigeria requires both domestic investment in health and external financial support. This can be stated in equation as:

$$H = f(M, T^{H}; E) \quad 3.1$$

Where H are health outcomes, M is market inputs (health expenditure, GDP per capital, remittances, official development assistances, $T^{H}$ is time devoted to health production which is the real cost, E is the efficiency which can be measured. Also, from the two-gap theory of saving-investment of Harrod-Domar which was further popularized by Chenery and Strout (1966) also, analyzes foreign inflows finance (loans, grants, assistances or remittances) as supplementing domestic resources in order to relieve savings or foreign exchange bottlenecks for development including health. Therefore presume in the model equilibrium saving equals investment at all time as:

$$S_t = I_t \quad 3.2$$

This model is not always true, in reality, actual saving is usually less than investment (saving gap); therefore, remittances and ODAs can serve as external funds used to augment the low saving level of the developing countries with investment as:

$$S_t + \text{Remi}_t + \text{ODAs}_t = I_t \quad 3.3$$

Then this implies that equation 3.2 can be equated to equation 3.3. Thus

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

The capital stock equation where capital stock depends on saving can then be written as:

$H = f(M, T^H; E) = I_t$. 3.4

To capture the basic objective of the study, equation 3.3 can be modified as

$H = A(Remi_t + ODAs_t)^{\delta}$ 3.5

To linearize the equation for analysis, as was used Olayungbo and Ahmod (2019), equation 3.5 is modified as:

$H = A + \delta In(Remi_t + ODAs_t)$. 3.6

The health outcomes are proxy by infant mortality and life expectancy. The migrant remittance (RMI), ODAs, disaggregated into health-specific official development assistance (hSODA) and non-health specific official development assistance (nSODA), Real GDP per capita which captured economic structures of each country (GDPp), environmental quality (EnvQ), education (Primary Sch. Enrollment) used as a control variable (EduP), and institutional quality (InsQ) were considered as the moderating variables. Therefore, Equation (3.6) can be modified to capture these variables as:

**Basic Model 1**

$H_t = A + \delta In(RMi_t + hSODA_t + nSODA_t + nEduP_t + GDPp_t + EnvQ_t + InsQ_t)$ 3.7

Equation (3.6) gives rise to our econometric model 1 for analysis as specify thus:

$IFaM_t = \delta_o + \delta_1 InRMI_{t-1} + \delta_2 InhSODA_t + \delta_3 InnSODA_t + \delta_4 \text{In}nEduP_t + \delta_5 InGDPp_t + \delta_6 InEnvQ_t + \delta_7 InSQ_t + {}_{it}$ 3.8

Where $InIFaM_t$ is infant mortality, InRMI is log of migrant remittance, InhODA is log of health-specific official development assistance, InSODA log of non-health specific official development assistance, InEduP is education (Primary Sch. Enrollment), GDPP is the log of GDP per capita, InEvQ is the log of environmental quality and InSQ is the institutional quality at time t.

For the life expectancy:

**Basic Model II**

$InLifEx_t = \delta_o + \delta_1 InRMI_{t-1} + \delta_2 hSODA_t + \delta_3 InnSODA_t + \delta_4 \text{In}nEduP_t + \delta_5 InGDPp_t + \delta_6 InEnvQ_t + \delta_7 InsQ_t + {}_t$ 3.9

Where $InLifEx_t$ is log of life expectancy in time t, every other variable as defined in equation 3.14

$\delta_o$: is intercept (constant) term, $\delta_1, \delta_2, \delta_3, \delta_4, \delta_5, \delta_6, \delta_7$ are parameters to be estimated and $_t$ is disturbance term/error term.

The basic models are specified in equation 3.8 and 3.9

To capture the moderating role of institutional quality on the health outcomes (infant mortality and life expectancy), equation 3.10 and 3.11 will be modified as:

**Mediating and moderating role model 1:**

$IFaM_t = \delta_o + \delta_1 InRMI * InsQ_{it-1} + \delta_2 inhSODA * InsQ_{it} + \delta_3 InnSODA * InsQ_{it} + \delta_4 InnEduP_{it} + \delta_5 InGDPp_{it} + \delta_6 InEnvQ_{it} + {}_{it}$ 3.10

**Mediating and moderating role model 1I:**

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

$InLifEx_t = \delta_0 + \delta_1 InRMI * InSQ_{t-1} + \delta_2 inhSODA * InSQ_t + \delta_3 InnSODA * InSQ_t + \delta_4 \mathrm{In}nEduP_t + \delta_5 InGDPp_t + \delta_6 InEnvQ_t + {}_t$ 3.11

**Table 1: Summary of measurement and sources of data**

| Variables | Measurement | Sources |
|---|---|---|
| $IFaM$ | Mortality rate, infant (per 1,000 live births) | WDI, 2024 |
| $LifEx$ | Number of live births (national estimate, per 100,000 live births) | WDI, 2024 |
| $RMI$ | Personal remittances, received (Billion US$) | WDI, 2024 |
| $hSODA$ | Net official flows from UN agencies, UNICEF (current US$) | WDI, 2024 |
| $nSODA$ | Non-health Specific ODA (Billion US$) | WDI, 2024 |
| $EduA$ | School enrollment, primary (% gross) | WDI, 2023 |
| $GDPp$ | GDP per capita (constant 2021 international $) | WDI, 2024 |
| $EnvQ$ | Global hectares (gha) or acres | (GFN), 2023 |
| $InsQ$ | Index using (PCI) (Ratio) | WGI,2024 |

Source: Researchers' compilations

**Method of Estimation and Estimation technique**

The study apply both the Autoregressive Distributed Lag (ARDL) model by Pesaran, Shin and Smith (2001)and the Nonlinear ARDL (NARDL) model by Shin et al. (2014) to assess potential mediating effects of ODA.

Preliminary analyses include descriptive statistics, correlation matrix, and Augmented Dickey-Fuller (ADF) tests for stationary. A Bounds test for cointegration is used to determine long-term relationships among variables, with decisions based on the F-statistic compared to critical bounds. If cointegration is established, ARDL analysis is used to estimate both short- and long-term effects of remittances and ODA on health outcomes. In other to find answers to the research questions and the objectives as specified in the econometric model (3.8, 3.9, 3.10 and 3.11) the ARDL model by Pesaran, Shin and Smith (2001) are adopted and it is specified thus:

The generalized ARDL (p, q) model is:

$$Y_t = \gamma_{0i} + \sum_{i=1}^{} \delta_i Y_{t-i} + \sum_{i=0}^{q} \beta_i X_{t-i} + \varepsilon_t \quad 3.12$$

Where $Y_t$ is a vector and variables in $(X_t)$ [1] are allowed to be purely I (0) or 1(1) or co-integrated; β and δ are coefficients; γ is the constant k; í = 1, p, q are optimal lag orders; $\varepsilon_t$ is a victor of the error terms, unobservable zero mean white noise vector process (serially uncorrelated or independent).

The dependent variable is a function of its lagged value, the current and lagged values of other exogenous variables in the model. The lag lengths of p, q may not necessarily be the same. p lags : used for the dependent variable, q lags : used for exogenous variables. To estimate the increasing and decreasing impacts of official development assistances, on health outcomes, the standard ARDL model in equation (3.12) is expanded to include both $X_t^+$ and $X_t^-$ as separate regressors thus NARDL model. Shin et al (2014) extended the traditional ARDL by decomposing the target variable ($hSODA\ and\ nSODA$.) for the moderating impact.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

**Post-estimation Analysis**

Post-estimation diagnostics were conducted on the two models to assess their stability and reliability. The Breusch–Godfrey LM was used to test for serial correlation, while the Breusch–Pagan–Godfrey test was for hetroskedastic test. The Ramsey RESET test was used to test for possible functional form misspecification.

**Justification of the model**

The ARDL technique is employed due to its potency to handle variables of mixed order of integration and the ability to estimate both short run and long run impacts (Pesaran et al. 2001). It yields high quality results even if the sample size is small and Nigeria been less than 100yrs makes ARDL most appropriate in such a small sample size as well as capturing the objective of this study. It also allows dependent and explanatory variables to have different optimal lags. It has also been used by other researchers in determination of most impactful of macroeconomic variables (Adebanji et al. 2020, Akinola, & Asaolu 2022).

**Presentation and Analysis of Result**

| | IFAM | LIFEX | RMI | HSODA | NSODA | EDUP | GDPP | ENVQ | INSQ |
|---|---|---|---|---|---|---|---|---|---|
| Mean | 95.75000 | 47.72133 | 2.405378 | 226.9587 | 124.0215 | 1709.198 | 1919.255 | 0.433884 | 14.95333 |
| Median | 103.0500 | 46.38800 | 1.398342 | 149.7000 | 410.0250 | 1603.061 | 1983.666 | 0.482094 | 15.16667 |
| Std. Dev. | 22.08589 | 3.641446 | 2.548633 | 1978.121 | 2.200109 | 7.290753 | 411.6073 | 0.144708 | 1.772031 |
| Skewness | 0.269660 | 0.044847 | 0.557666 | 0.579326 | 3.148219 | -0.123095 | 0.028428 | -0.243818 | -0.887865 |
| Kurtosis | 2.515493 | 2.233269 | 1.875767 | 1.814321 | 15.28062 | 2.209232 | 1.478818 | 1.435486 | 3.963468 |
| Jarque-Bera | 95.75000 | 47.72133 | 2.405378 | 226.9587 | 124.0215 | 1709.198 | 1919.255 | 0.433884 | 14.95333 |
| probability | 0.553598 | 0.511498 | 0.085810 | 0.048094 | 0.000000 | 0.503625 | 0.073764 | 0.048744 | 0.119340 |
| Observations | 54 | 54 | 47 | 53 | 53 | 48 | 54 | 54 | 25 |

**Source: Researcher's computation, 2025**

The descriptive statistics reveal key features of the study's variables. Infant mortality (IFAM) in Nigeria averages 95.75 deaths per 1,000 live births, with moderate variability (standard deviation 22.08). This is slightly rightskewed distribution (skewness 0.27), and a near-normal kurtosis (2.5), indicating more frequent high mortality rates. Life expectancy (LifEx) averages 47.72, with a narrower range and lower variability (standard deviation 3.64). Its distribution is nearly symmetrical (skewness 0.04) and less peaked (kurtosis 2.23), suggesting a relatively stable pattern over time.

The Remittances averaged $2.4 million annually with notable fluctuations and a positive skew, indicating more frequent high values. Health-specific ODA averaged $226.96 million with moderate variation, while non-health ODA showed high variability and peaked at $127.33 million. Institutional quality averaged 14.95 and was negatively skewed, suggesting generally low governance effectiveness. All variables passed the Jarque-Bera normality test, indicating they are normally distributed.

| Model 1 | IFAM | LIFEX | RMI | HSODA | NSODA | EDUP | GDPP | INSQ |
|---|---|---|---|---|---|---|---|---|
| **IFAM** | 1.000000 | | | | | | | |
| **RMI** | -0.632857 | 1.000000 | | | | | | |
| **HSODA** | -0.409339 | 0.536762 | 1.000000 | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NSODA** | -0.337006 | 0.671662 | 0.178788 | 1.000000 | | | | |
| **EDUP** | -0.304317 | 0.458239 | 0.729621 | 0.381144 | 1.000000 | | | |
| **GDPP** | -0.264443 | 0.564270 | 0.253644 | 0.280542 | 0.339007 | 1.000000 | | |
| **ENVQ** | 0.357546 | -0.720263 | -0.289017 | -0.352413 | -0.788798 | -0.235488 | 1.000000 | |
| **INSQ** | -0.791883 | 0.522079 | 0.601923 | 0.391008 | 0.770319 | 0.751951 | 0.779963 | 1.000000 |
| **Model 2** | **LIFEX** | **RMI** | **HSODA** | **NSODA** | **EDUP** | **GDPP** | **ENVQ** | **INSQ** |
| **LIFEX** | 1.000000 | | | | | | | |
| **RMI** | 0.621665 | 1.000000 | | | | | | |
| **HSODA** | 0.407935 | 0.536762 | 1.000000 | | | | | |
| **NSODA** | 0.325186 | 0.671662 | 0.178788 | 1.000000 | | | | |
| **EDUP** | 0.306930 | 0.458239 | 0.729621 | 0.381144 | 1.000000 | | | |
| **GDPP** | 0.262895 | 0.564270 | 0.253644 | 0.280542 | 0.839007 | 1.000000 | | |
| **ENVQ** | -0.350532 | -0.720263 | -0.289017 | -0.352413 | -0.788798 | -0.235488 | 1.000000 | |
| **INSQ** | 0.791303 | 0.522079 | 0.601923 | 0.391008 | 0.770319 | 0.751951 | 0.779963 | 1.000000 |

**Table4.2: Correlation Matrix**

**Source: Researcher's computation, 2025**

The correlation analysis is estimated to ensure that the independent variables do not have a perfect or near perfect correlation. It can be inferred from table 4.2 that none of the coefficient is greater than 0.8 with each other. Therefore, conclusion can be reached that the included variables have no perfect correlation with the independent variable and should not portend a risk of multicollinearity in the model estimated.

**Unit root tests**

Augmented Dickey Fuller (ADF, 1979) tests were performed. All the variable are of order I(0) and I(1) as shown in Table 4.3

| Variables | Adf test at levels | 5% critical value at level | Adf test (first diff) | 5% critical value(first diff) | Order of integration | Remarks |
|---|---|---|---|---|---|---|
| **IFAM** | (-0.533) | (0.876) | (-5.011) | (0.001) | I(1) | Stationary |
| **LIFEX** | (-0.482) | (0.886) | (-3.688) | (0.007) | I(1) | Stationary |
| **RMI** | (-1.464) | (0.542) | (-6.856) | (0.000) | I(1) | Stationary |
| **HSODA** | (-0.374) | (0.501) | (-7.580) | (0.000) | I(1) | Stationary |
| **NSODA** | (-3.378) | (0.0163) | | | I(0) | Stationary |
| **EDUP** | (1.038) | (0.996) | (-3.928) | (0.005) | I(I) | Stationary |
| **GDPP** | (-0.782) | (0.816) | (-5.796) | (0.000) | I(I) | Stationary |
| **ENVQ** | (-1.175) | (0.679) | (-7.479) | (0.000) | I(I) | Stationary |

| | | | | | | |
|---|---|---|---|---|---|---|
| **INSQ** | (-2.531) | (0.120) | (-6.910) | (0.000) | I(I) | Stationary |

**Table 4.3: Unit root (ADF)**

**Source: Researcher's computation, 2025**

**Test for Co-integration**

Given that the series are integrated of order zero and one that is *1(0)* and *1(1),* auto redistributed lag cointegration approach is found most appropriate in ascertaining if there is a long run relationship existing between the variables of the models.

**ARDL Bound Co-integration Test Result**

| **Model I F-Statistics = 19.501** | | **Model II F-Statistics = 4.095** | |
|---|---|---|---|
| Critical Value Bounds | | | |
| **Significance levels** | | **I(0) Bounds** | **I(1) Bounds** |
| Model I | 5% | 2.32 | 3.5 |
| Model II | 5% | 2.32 | 3.5 |

**Table4.4:** ARDL Bounds Test

Source: **Researcher's** compilations, 2025

The co-integrating was evaluated through ARDL Bounds Test. The result as shown in Table 4.4 indicated that the F-Statistics value (19.501, 4.095) for model I and II respectively is greater than their lower and upper critical bounds (2.32, 3.5) at 5% significant value for both models. This indicates an evidence of co-integration among the variables. The conclusion from the result is rejection of null hypothesis of no co-integration. Since the variables are co-integrated, we estimate the long run health outcomes function and the short run dynamic using ARDL technique first before the NARDL for the Asymmetric impact on the Watson (1993).

**Analysis of the ARDL**

The results of the two ARDL models were presented in Table 4.5 and 4.6 for basic model I, moderating and mediating model I and basic model II, moderating and mediating model II respectively. The result provided empirical facts to allow for an extensive interpretation of the relationship between migration remittances, official development assistance, and health outcomes in Nigeria. The models focus on infant mortality (IFM) in Model I and life expectancy (LIFEx) in Model II as dependent variables. Key explanatory variables include remittance (RMI), health-specific official development assistance (HSODA), non-health-specific official development assistance (NHSODA), Education (Primary school enrollment), GDP per capita, environmental quality (ENVQ) and institutional quality (INSQ). The outcome of the analysis is presented in Table 4.5.

Table 4.5: ARDL Model I (Infant Mortality)

| **Dependent Variable:** infant mortality (IFM) Basic Model I | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| LOG(RMI) | -0.014 | 0.022 | -0.638 | 0.529 |
| LOG(HSODA) | -0.080 | 0.048 | -1.668 | 0.107 |
| LOG(NSODA) | -0.030 | 0.024 | -1.233 | 0.229 |

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

| | | | | |
|---|---|---|---|---|
| LOG(EDUP) | -0.410 | 0.109 | -3.752 | 0.001 |
| LOG(GDPP) | -0.133 | 0.142 | -0.932 | 0.360 |
| LOG(ENVQ) | 1.173 | 0.487 | 2.408 | 0.023 |
| C | 15.047 | 1.470 | 10.233 | 0.000 |
| **MEDIATING MODEL I** | | | | |
| LOG(RMI*INSQ) | -0.016 | 0.040 | -0.403 | 0.693 |
| LOG(HSODA*INSQ) | -0.144 | 0.121 | -1.193 | 0.251 |
| LOG(NSODA*INSQ) | -0.021 | 0.023 | -0.928 | 0.368 |
| C | 9.601 | 2.382 | 4.030 | 0.001 |
| **MODERATING MODEL I** | | | | |
| RMI | -6.608293 | 11.368407 | -0.581286 | 0.5655 |
| HSODA_NEG | 0.000001 | 0.000002 | 0.507210 | 0.6158 |
| HSODA_POS | -0.000002 | 0.000004 | -0.564107 | 0.5770 |
| NSODA_NEG | -0.000000 | 0.000000 | -0.456553 | 0.6514 |
| NSODA_POS | 0.000000 | 0.000000 | 0.527976 | 0.6015 |
| C | 2.511763 | 233.931275 | 0.010737 | 0.9915 |
| $R^2$ = 0.997 | Adj.$R^2$= 0.996 | F-stat= 1808.543 | Prob(F-stat) = 0.000 | D.W= 1.441 |

Source: **Researcher's** computations, 2026

**Model I: Infant Mortality (IFM) as the Dependent Variable**

The analysis shows that migrant remittances, both with (-0.016) and without (-0.014) the influence of institutional quality, have a negative but statistically insignificant (0.693, 0.529) impact on infant mortality in Nigeria. Without institutional moderation, remittances reduce infant mortality by 1.4%, and with it, by 1.6%, indicating a slight improvement. However, the effect remains insignificant, possibly due to remittance recipients prioritizing other needs over health, likely because of poverty and low health literacy. The mediating role of institutions slightly enhances remittances' impact but insignificance, possibly due to poor institutional quality. These findings are consistent with Hao et al. (2023), who found no significant effect of remittances on health outcomes in sub-Saharan Africa, and partially align with Djeunankan & Tekam (2022) and Ramkissoon & Deonanan (2023), who found remittances reduce infant mortality, though with significant results in their studies.

The impact of health-specific official development assistance (HSODA) on infant mortality in Nigeria indicated that while HSODA appears (-0.080) to reduce infant mortality by 8%, the impact is statistically insignificant (0.693). This insignificance may be due to strict conditions attached to the aid, as noted by critics of aid-led development. Furthermore, the expected positive role of institutional quality in enhancing HSODA's effectiveness was not observed; instead, it slightly worsened the impact (-0.144), though still insignificant (0.251). This reflects a poor state of institutions in Nigeria. The findings align with some previous studies (Adebanji et al., 2020) on the negative effect of aid on infant mortality, but differ on significance. It also partially supports studies suggesting that targeted aid can be effective, especially when implemented with local structures (Okonjo & Adeyemi, 2018; Kotsadam et al., 2018). However, the moderation analysis further confirms that HSODA has no statistically significant ((0.6158) impact on infant mortality, indicating that aid is not a reliable tool for health improvement in Nigeria.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

Interestingly, non-health-specific official development assistance (NHSODA) has a negative (-0.030) but statistically insignificant (0.229) impact on infant mortality in Nigeria. Specifically, a 3.0% reduction is associated to increase NHSODA, especially when used for health-related infrastructure like sanitation and clean water. Similarly, when institutions moderate NHSODA, the impact remains a small (-0.021) and insignificant (0.368) with 2.2% reduction. These results support Adebanji et al. (2020), who also found a negative long-term impact of ODA on infant mortality but differed in the significance level. The findings also align with Eze, Okpara, and Madichie (2020), who emphasized that only aid targeted at specific projects significantly contributes to development.

The results in Table 4.5 show that education (measured by primary school enrollment) has a negative (-0.410) and statistically significant (0.001) impact on infant mortality in Nigeria. This means that a rise in education levels is associated with a 41% reduction in infant mortality. This supports findings by Odjesa and Ighodaro (2021), who linked female literacy to lower infant mortality, and aligns with UNICEF (2021), which emphasized the role of maternal education in reducing child deaths. It also echoes Akinlo and Sulola (2019), who found maternal education, skilled birth attendance, and income as key factors in infant survival.

**The Post-Estimation Diagnostics Results Of Model I**

**Table 4.6: Ramsey test of functional form of Model I (Infant Mortality)**

| | | | | |
|---|---|---|---|---|
| Ramsey RESET Test | | | | |
| Equation: Model I | | | | |
| Specification: IFAM IFAM(-1) LOG(RMI) LOG(HSODA) LOG(NSODA) | | | | |
| LOG(EDUP) LOG(GDPP) LOG(ENVQF) INSQ C | | | | |
| Omitted Variables: Squares of fitted values | | | | |
| | | | | |
| | | | | |
| | Value | Df | Probability | |
| t-statistic | 2.501706 | 10 | 0.0714 | |
| F-statistic | 6.258532 | (1, 10) | 0.0714 | |
| | | | | |
| | | | | |

Source: **Researcher's** computations, 2026

The Ramsey reset test (t-20517. P-0.0714) is insignificant at 5% level, which implies that the ARDL model is functionally specified. It also entails that there are no nonlinear terms, omitted variables, or incorrect transformations present in the model.

**Serial Correlation Test of Model I (Infant Mortality)**

Serial correlation

| | | | | |
|---|---|---|---|---|
| Breusch-Godfrey Serial Correlation LM Test: | | | | |
| | | | | |
| | | | | |
| F-statistic | 0.337881 | Prob. F(2,9) | | 0.7220 |
| Obs*R-squared | 1.396816 | Prob. Chi-Square(2) | | 0.4974 |
| | | | | |

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

Source: **Researcher's** computations, 2026

Table 4.8 shows that both F-stat (0.7220) and Obs*$R^2$ (0.4974) probabilities are far above 0.05, so we fail to reject the null hypothesis of no serial correlation. This implies that the model residuals are not autocorrelated and the dynamic structure of the ARDL model I is correctly specified in terms of lag behavior.

**Table 4.8: Heteroskedasticity test of Model I (Infant Mortality)**

| Heteroskedasticity Test: Breusch-Pagan-Godfrey | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| F-statistic | 0.582681 | Prob. F(8,11) | | 0.7734 |
| Obs*R-squared | 5.952770 | Prob. Chi-Square(8) | | 0.6525 |
| Scaled explained SS | 1.433952 | Prob. Chi-Square(8) | | 0.9938 |
| | | | | |

Source: **Researcher's** computations, 2026

All p-values are greater than 0.05, the null hypothesis of homoscedasticity is rejected. This implies constant variance of model I residuals, meaning that the standard errors and t-statistics are reliable. Furthermorr, the model I (infant Mortality) yields a relatively high R-squared, the focus should remain on theoretical coherence, parsimony, and robustness rather than goodness-of-fit alone, since inflated R-squared values can indicate overfitting rather than genuine explanatory strength (Chen and Qi, 2023; Frost, 2020).

**Table 4.10:** Model II: ARDL **Long Run Model**

| **Dependent Variable: Life Expectancy (LIFEX)** | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| LOG(RMI) | 0.039 | 0.050 | 0.770 | 0.446 |
| LOG(HSODA) | -0.070 | 0.081 | -0.870 | 0.390 |
| LOG(NSODA) | -0.013 | 0.021 | -0.580 | 0.565 |
| LOG(EDUP) | 0.065 | 0.080 | 0.820 | 0.417 |
| LOG(GDPP) | 0.049 | 0.111 | 0.443 | 0.660 |
| LOG(ENVQ) | -0.100 | 0.097 | -1.024 | 0.312 |
| C | 3.845 | 2.829 | 1.358 | 0.182 |
| **MEDIATING MODEL II** | | | | |
| LOG(RMI*INSQ) | 0.022 | 0.021 | 1.014 | 0.326 |
| LOG(HSODA*INSQ) | 0.034 | 0.034 | 0.980 | 0.342 |
| LOG(NSODA*INSQ) | -0.010 | 0.010 | -0.988 | 0.339 |
| C | 1.992 | 0.685 | 2.906 | 0.011 |
| **MODERATING MODEL II** | | | | |
| RMI | 0.997 | 0.9102 | 1.096 | 0.281 |
| HSODA_POS | -0.000 | 0.000 | -1.135 | 0.264 |
| HSODA_NEG | -0.000 | 0.000 | -1.096 | 0.281 |
| NSODA_POS | -0.000 | 0.000 | -1.020 | 0.315 |
| NSODA_NEG | -0.000 | 0.000 | -1.319 | 0.196 |
| C | 23.203 | 14.510 | 1.599 | 0.119 |

| | | | | |
|---|---|---|---|---|
| $R^2$ = 0.996 | Adj.$R^2$= 0.992 | F-stat= 250.543 | Prob(F-stat) = 0.000 | D.W= 2.794 |

**Source: Researcher's computations, 2026**

**Model II: Life Expectancy (LIFEX) as the Dependent Variable**

Using life expectancy indicator, as presented in table 4.6, shows that while remittances (0.039) in Nigeria are associated with a 3.9% increase in life expectancy, this impact is not statistically significant (0.446). This suggests that households may prioritize spending remittances on needs other than healthcare. The result aligns with Hao et al. (2023), who also found no significant impact of remittances on life expectancy, and partially supports Djeunankan and Tekam (2022), who found a positive but significant effect. It further echoes Ramkissoon and Deonanan (2023), highlighting that remittance can improve health outcomes depending on how they are spent.

The disaggregated official development assistances, the health-specific official development assistance (HSODA) and non-health ODA (NHSODA) have a negative (-0.070, -0.012) but statistically insignificant (0.390, 0.566) respectively impact on life expectancy in Nigeria. Specifically, a 1% increase in HSODA and NHSODA is associated with a 7.0% and 1.2% reduction in life expectancy, respectively. The insignificance may be due to ODAs not being effectively directed toward health infrastructure and the long-term conditions attached to such aid. Interestingly, HSODA has a larger negative effect than NHSODA, contrary to expectations that it should enhance life expectancy.

However, the mediating role of institution indicated that HSODA have a coefficient of (0.004) while the NHSODA has (-0.001) with both variable having insignificant value of (0.343) and (0.142) respectively. This implies that 1% increase in HSODA and NHSODA will cause the HSODA to increase life expectancy by 0.4% while the NHSODA will reduce it by 0.1% even though both are insignificant. The insignificant of these finding may have re-enforced the proponent of the negative impacts of ODAs outweigh its benefits based on cost effectiveness analysis (Eggoh et al., 2015). The result also justified the augments that differentiating ODA will help in correctly determining the impacts of these modes development assistance. This also goes to indicate that if there is any gain from ODAs in health outcomes to be made, then it should be given specifically on health specific projects. It is also vivid from the result in table 4.6, that the moderating role (HSODA) with coefficient of (-0.000000, -0.000000) and insignificant value of (0.2644, 0.281). The (NSODA) shows a coefficient of (0.000000, -0.000000) and insignificant value of (0.315, 0.196). These results implied that neither an increase nor decrease of aids will significantly improve the Nigeria life expectancy.

The result of other variable in Table 4.6 indicated that impact of education, GDP per capita, and the environment on life expectancy in Nigeria. Education and GDP per capita showed positive but statistically insignificant impacts on life expectancy, with coefficients of 0.065, 0.418 and 0.049, 0.660 respectively. This means a 1% increase in either variable could increase life expectancy by 6.5% and 4.9%. These results align with Akter et al. (2023), who found positive effects of GDP per capita on health outcomes in low- and middle-income countries, though they noted statistical significance. Additionally, environmental impact showed a negative but insignificant effect (-0.100, 0.313), suggesting that a 1% rise in environmental degradation may reduce life expectancy by 10%. The insignificance may be due to Nigeria's status as a developing country with abundant undeveloped land. This supports Jalles d'Orey and Prizzon (2019), who discussed how environmental sustainability and climate risks affect child health policy.

**The Post-Estimation Diagnostics Results of Model Ii (Life Expectancy)**

**Table 4.11: Ramsey test of functional form of Model II (Life Expectancy)**

| | | |
|---|---|---|
| Ramsey RESET Test | | |
| Equation: UNTITLED | | |
| Specification: LIFEX LIFEX(-1) LOG(RMI) LOG(HSODA) LOG(NSODA) | | |
| LOG(EDUP) LOG(GDPP) LOG(ENVQF) INSQ C | | |

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

| Omitted Variables: Squares of fitted values | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | Value | df | Probability | |
| t-statistic | 2.108563 | 10 | 0.0612 | |
| F-statistic | 4.446040 | (1, 10) | 0.0612 | |
| | | | | |
| | | | | |

**Source: Researcher's computations, 2026**

In model II (life expectancy), the Ramsey reset test (t-2.1086, p-0.0612 shows an insignificant reset at 5% level, which is a suggestive of no evidence of functional form misspecification. It can be generally interpreted to mean that there is no nonlinearity or omitted variable issues in the model. Therefore, the model is generally acceptable.

**Table 4.12: Serial Correlation for Model II (Life Expectancy)**

| Breusch-Godfrey Serial Correlation LM Test: | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| F-statistic | 0.461049 | Prob. F(2,9) | | 0.6447 |
| Obs*R-squared | 1.858676 | Prob. Chi-Square(2) | | 0.3948 |
| | | | | |
| | | | | |

**Source: Researcher's computations, 2026**

The serial correlation result in Table 4.12 indicated that the p-value (0.6447.0.3948) are not significant, therefore, the null hypothesis of no serial correlation is accepted. The implication of the result is that the ARDL dynamic structure is correctly specified and the residuals are not autocorrelated.

**Table 4.13: Heteroskedasticity test for Model II (Life Expectancy)**

| Heteroskedasticity Test: Breusch-Pagan-Godfrey | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| F-statistic | 2.585202 | Prob. F(8,11) | | 0.0733 |
| Obs*R-squared | 13.05591 | Prob. Chi-Square(8) | | 0.1099 |
| Scaled explained SS | 2.197098 | Prob. Chi-Square(8) | | 0.9744 |
| | | | | |

**Source: Researcher's computations, 2026**

The hetroskedasticity result in Table 4.13, indicated that at 5% level of significant, there is no hetroskedasticity as p-value is not significant (0.0733, 0.1099). This implies that the variance is stable at 5%. Overall, the diagnostic results support the stability and statistical adequacy of the estimated model II for inferences.

## CONCLUSION AND POLICY RECOMMENDATIONS

The study finds that while remittances and development assistance contribute to health outcomes in Nigeria, their impacts are minimal and largely insignificant. Without strong institutional support, official development assistance (ODA) fails to improve life expectancy. The study supports the view that aid hinders development, as both health and non-health ODAs remain ineffective regardless of institutional mediation. Education emerges as the most effective factor in improving health outcomes, significantly reducing infant mortality and slightly increasing life expectancy. While strengthening institutional frameworks is key to effectively using remittances and aid for development, priority should be given to improving education. Aids should be directed to specific health-related projects rather than left to the discretion of economic managers.

## REFERENCES

1. Acharya, R., & Leon-Gonzalez, R. (2012). Remittances and health outcomes in developing countries. Journal of Development Studies, 48(10), 1305–1321.
2. Adebanji, A. O., Aluko, M. A. O., & Adedokun, A. O. (2020). The impact of development assistance on infant mortality in Nigeria. African Journal of Economic Policy, 27(1), 101–121.
3. African Union. (2020). Migration policy framework for Africa and plan of action (2018–2030). AU Commission.
4. Aime, K. B. (2010). Is aid effective in improving health outcomes in developing countries? A critical review. Health Policy and Planning, 25(2), 67–75.
5. Akinlo, A. E., & Sulola, A. O. (2019). The role of maternal education and household income on underfive mortality in Nigeria. International Journal of Health Economics, 8(3), 22–34.
6. Andersen, R. M. (1989). Revisiting the behavioral model and access to medical care: Does it matter? Journal of Health and Social Behavior, 36(1), 1–10.
7. Asiedu, E., Jin, Y., & Nandwa, B. (2012). Foreign aid, education, and human capital. Review of Development Economics, 16(3), 381–402.
8. Barro, R. J. (2013). Health and economic growth. Annals of Economics and Finance, 14(2), 305–342.
9. Chen, Q., & Qi, J. (2023). How much should we trust $R^2$ and adjusted $R^2$: Evidence from regressions in top economics journals and Monte Carlo simulations. Journal of Applied Economics, 26(1), 22–44. https://doi.org/10.1080/15140326.2023.2207326
10. Centers for Disease Control and Prevention. (2020). Health outcomes and performance measures. CDC.
11. Depken, C. A., Stephens, H. M., & Goel, R. K. (2021). Migrant remittances and economic performance in developing countries. Review of Development Economics, 25(1), 84–101.
12. Djeunankan, R., & Tekam, S. (2022). Migrant remittances and life expectancy: A panel data analysis for developing countries. Journal of Health Economics and Management, 7(1), 35–50.
13. Eggoh, J., Houeninvo, H., & Sossou, G. A. (2015). Education, health, and economic growth in African countries. Journal of Economic Development, 40(1), 93–111.
14. Eze, S. N., Okpara, G. C., & Madichie, N. O. (2020). Disaggregated foreign aid and development in Nigeria: An empirical analysis. Journal of African Development, 22(2), 45–61.
15. Frost, J. (2020, March 3). Overfitting regression models: Problems, detection, and avoidance. Statistics By Jim. https://statisticsbyjim.com/regression/overfitting-regression-models (statisticsbyjim.com in Bing)
16. Grossman, M. (1972). On the concept of health capital and the demand for health. Journal of Political Economy, 80(2), 223–255.
17. Hao, Y., Tang, X., & Wang, L. (2023). Migrant remittances and child health in sub-Saharan Africa. Journal of African Economies, 32(1), 1–25.
18. International Organization for Migration. (2023). World migration report. IOM.
19. Jeetoo, C. C., & Jaunky, V. C. (2023). Household energy and health outcomes in sub-Saharan Africa. Energy Policy, 172, 113270.
20. Kotsadam, A., Rød, J. K., & Tjøtta, S. (2018). Development aid and infant mortality: A study of aid effectiveness. World Development, 105, 96–104.
21. Lange, S., & Vollmer, S. (2017). The effect of foreign aid on economic growth: A systematic review. Review of Development Economics, 21(4), 1–31.
22. Limazie, G., & Woni, E. (2024). Governance quality and health outcomes in Sub-Saharan Africa. Journal of African Development Studies, 16(1), 55–74.

23. Maju, M., Hamman, B., & Umar, A. (2019). Foreign aid, remittances and health sector development in Nigeria. Journal of African Economics and Health, 12(1), 20–34.
24. Mustapha, S., Zakari, H. B., & Olaitan, A. (2021). Public health financing and health outcomes in West Africa. African Journal of Public Policy, 8(2), 65–79.
25. National Bureau of Statistics. (2023). Nigeria statistical bulletin. NBS.
26. Niyonkuru, F. (2016). Failure of foreign aid in developing countries: A quest for alternatives. Business and Economics Journal, 7(3), 1–9.
27. Nwokolo, C., Meyer, L., & Ahia, C. (2023). Environmental degradation and human well-being in West Africa. Journal of Environmental Policy, 12(4), 78–91.
28. Nwude, E. C., Uduji, J. I., & Okwo, I. M. (2020). Health expenditure and human development in ECOWAS. International Journal of Social Economics, 47(10), 1305–1321.
29. OECD. (2022). Health at a glance 2022: OECD indicators. OECD Publishing.
30. Odjesa, J., & Ighodaro, C. A. (2021). Institutional quality, public health expenditure and health outcomes in Sub-Saharan Africa. Journal of African Development, 23(2), 85–108.
31. Okonjo, O., & Adeyemi, T. (2018). Development aid and infant mortality at the subnational level in Nigeria. Journal of Development Policy, 19(4), 88–104.
32. Oladosu, A. O., Chanimbe, T. A., & Anaduaka, U. S. (2022). Institutional quality, technological capacity, and health outcomes in Sub-Saharan Africa. African Development Review, 34(3), 412–430.
33. Olatunde, A., Adeyemi, S., & Bello, T. (2019). Institutional quality and healthcare delivery in Nigeria. African Journal of Economic Policy, 26(2), 1–23.
34. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289–326.
35. Pu, Y., Zeng, S., & Luo, X. (2021). Development assistance, governance and health: Evidence from panel data. Journal of Global Health Policy, 5(2), 100–116.
36. Ramkissoon, A., & Deonanan, R. (2023). Remittances and infant mortality in developing countries: A dynamic panel approach. Journal of Health Economics and Development, 9(2), 77–93.
37. Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. In R. C. Sickles & W. C. Horrace (Eds.), Festschrift in honor of Peter Schmidt: Econometric methods and applications (pp. 281–314). Springer.
38. Todaro, M. P., & Smith, S. C. (2012). Economic development (11th ed.). Pearson Education.
39. United Nations. (2021). World population prospects. United Nations.
40. United Nations Development Programme. (2019). Migration and development: A regional perspective. UNDP.
41. United Nations Programme on HIV/AIDS. (2018). Global HIV & AIDS statistics. UNAIDS.
42. World Bank. (2022). Nigeria development update. World Bank.
43. World Health Organization. (2023). World health statistics. WHO.
44. Yadeta, D., & Hunegnaw, M. T. (2022). Do remittances enhance economic resilience? African Economic Review, 30(2), 88–107.
45. Zulu, L. C., & Richardson, R. B. (2013). Charcoal, livelihoods, and poverty reduction: Evidence from subSaharan Africa. Energy for Sustainable Development, 17(2), 127–137.