External Sector Performance and Life Expectancy in Nigeria

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Abstract
This study examined the impact of external sector performance on life expectancy in Nigeria over the period 1980 to 2024, employing the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration. The analysis investigated both the long-run equilibrium relationship and short-run dynamic adjustments between external sector performance, including current account balance, capital account balance, external debt stock, external reserves, trade openness, real effective exchange rate, fiscal balance, and real interest rate and life expectancy as a critical health outcome. The bounds test results confirmed the existence of a stable long-run cointegrating relationship among the variables. The long-run ARDL results revealed that current account balance, capital account balance and external debt stock exert a positive and statistically significant impact on life expectancy. However, trade openness exhibited a negative and significant effect, and fiscal balance demonstrated a negative and significant impact. The short-run error correction results revealed a statistically significant negative error correction term, indicating that approximately 16.78 percent of any disequilibrium is corrected annually. The study contributed to the empirical literature on external balance-health linkages in the Nigerian context and provides evidence-based guidance for policymakers seeking to manage external sector performance for enhanced population health outcomes.

Keywords: *Time-Series Models; Current Account Adjustment, Short-Term Capital Movements; Open Economy Macroeconomics; Government Policy; Regulation; Public Health; Human Development*

JEL Classification: C22, F32, O15, I18, H62, F41, I10

1. Introduction

Globally, external sector performances and life expectancy remain a topical issue and has emerged as a critical area of inquiry in development economics, public health, and international macroeconomics, particularly for developing economies like Nigeria where external sector performance significantly influences the resources available for health investment and the conditions affecting population health outcomes (Sachs, 2022; WHO, 2021; Cornia, Jolly, & Stewart, 2023; Stuckler & Basu, 2023). In Nigeria, where health outcomes remain among the poorest in the world despite significant economic resources, understanding the relationship between external sector performances and life expectancy is of paramount importance for policy formulation and development planning (Okonjo-Iweala, 2012; Adegbite, 2019; Oyedele, 2020;

Okafor & Eze, 2018; Oyaromade, 2025).

The theoretical foundations for understanding the external balance-life expectancy nexus draw from multiple frameworks including the balance of payments constrained growth model, which posits that a country's long-run growth rate and consequently its capacity to invest in health systems is constrained by its ability to finance imports of health-related goods and services through exports and capital inflows (Thirlwall, 1979; McCombie & Thirlwall, 1994; Blecker, 2022; Moreno-Brid, 2023). Similarly, the health economics framework provides insights into the determinants of population health and the role of economic conditions in shaping health outcomes (Grossman, 1972; Cutler, Deaton, & Lleras-Muney, 2006; Marmot & Wilkinson, 2006; WHO, 2021). The external debt sustainability framework examines the conditions under which external borrowing can support health system development without creating unsustainable debt burdens that crowd out health spending (Reinhart & Rogoff, 2020; Pattillo, Poirson, & Ricci, 2021; Clements, Bhattacharya, & Nguyen, 2022). The fiscal policy and health literature examine the relationship between government spending, fiscal consolidation, and population health outcomes (Stuckler & Basu, 2023; Blanchard & Leigh, 2023; Gupta, Clements, & Inchauste, 2022). The institutional economics perspective emphasizes the role of governance, corruption, and institutional quality in determining whether external sector performances improvements translate into health gains (North, 1990; Acemoglu, Johnson, & Robinson, 2001; Rodrik, 2000; Collier & Gunning, 1999). These foregoing theories therefore offer robust background on the nexus between external performance and health outcomes.

However, significant debates persist regarding the magnitude, direction, and mechanisms through which external sector performances affects life expectancy. A group of scholars argues that current account surpluses, capital account liberalization, and prudent external debt management enhance health outcomes by providing resources for health system investment and creating conditions for economic transformation (Sachs, 2022; WHO, 2021; Kose et al., 2022; Frankel & Romer, 2021; Wacziarg & Welch, 2022). These scholars emphasized the importance of external financing for health infrastructure, pharmaceutical imports, and health workforce development. Conversely, a competing group contends that capital account liberalization can generate volatility, that external debt can create unsustainable burdens that crowd out health spending, and that fiscal consolidation can undermine health systems and population health (Rodrik, 2022; Stiglitz, 2020; Prasad et al., 2021; Blecker, 2022; Stuckler & Basu, 2023). These scholars argue that the benefits of external integration are contingent on institutional quality, absorptive capacity, and complementary domestic policies that protect health spending and social protection. In the Nigerian context, this debate is particularly relevant given the country's history of volatile oil revenues and recurrent debt crises.

It is on this note; this study examines the effect of external sector performances on life expectancy in Nigeria.

2. Literature Review

2.1 Conceptual Clarifications

External Sector Performance refers to the extent to which a country’s interaction with the rest of the world contribute to macroeconomic stability, sustainable economic growth and improvement in national welfare (Krugman et al., 2018). External sector performances encompasses the current account balance, capital account flows, external debt dynamics, foreign reserves, exchange rate movements, and fiscal positions, all of which collectively determine a country's international economic position and its capacity to finance health systems, import

pharmaceuticals and medical equipment, and maintain the macroeconomic stability necessary for sustained health improvements (Obstfeld & Rogoff, 2021; Rodrik, 2022; Kose, Prasad, Rogoff, & Wei, 2022; Prasad, Rajan, & Subramanian, 2021).

On the other hand, life expectancy is the average number of years a newborn infant is expected to live if prevailing mortality patterns remain constant throughout the individual's lifetime (World Health Organization, 2024). The nexus between external sector performance and life expectancy is grounded in the Grossman health production theory (1972), the Preston Curve hypothesis (1975) and broader Social Determinants of Health Framework developed by Marmot and Wilkinson (2006). Grossman (1972) conceptualized health as a durable capital stock that individuals and societies continuously invest in through healthcare service. Strong external performance increases foreign earning which in turn affect enhanced investment in population health outcomes, reduce mortality, and ultimately increase life expectancy.

Life expectancy, as a fundamental indicator of population health and human development, reflects the cumulative effects of economic conditions, healthcare access, nutrition, environmental quality, and social determinants of health over time (Sen, 1999; Alkire & Foster, 2011; Anand & Sen, 2000; UNDP, 2023).

2.2 Theoretical Framework

The theoretical foundations linking external sector performances to life expectancy draw from multiple complementary frameworks that provide a comprehensive understanding of the mechanisms through which external sector performance affects population health outcomes. The balance of payments constrained growth model, developed by Thirlwall (1979) and extended by McCombie and Thirlwall (1994), Blecker (2022), and Moreno-Brid (2023), provides the fundamental theoretical basis for understanding how external sector dynamics constrain domestic economic growth and, consequently, health system investment and population health. The model can be represented by Thirlwall's Law:

$$y = (\frac{\varepsilon}{\pi}) * z \quad (1)$$

Where y is the growth rate of domestic income, ε is the income elasticity of demand for exports, π is the income elasticity of demand for imports, and z is the growth rate of world income. In this framework, the current account balance affects health outcomes by constraining the resources available for health system investment and by determining the capacity to import pharmaceuticals, medical equipment, and other health-related goods (Moreno-Brid, 2023; Thirlwall, 1979). The model suggests that countries with persistent current account deficits face constraints on their ability to finance health imports and health system development, thereby limiting improvements in life expectancy (Blecker, 2022; McCombie & Thirlwall, 1994).

The health production function framework, developed by Grossman (1972) and extended by Cutler, Deaton, and Lleras-Muney (2006) and Marmot and Wilkinson (2006), provides insights into the determinants of population health and the role of economic conditions in shaping health outcomes. The framework can be represented by:

$$H = f(\text{Healthcare, Income, Education, Environment, Lifestyle}) \quad (2)$$

Where H represents health outcomes (proxy by life expectancy), and the inputs include healthcare spending, income levels, educational attainment, environmental quality, and lifestyle factors (Grossman, 1972; Cutler et al., 2006; WHO, 2021). In this framework, external sector performances affect health through its impact on government revenue available for healthcare spending, household incomes through employment in traded sectors, and the affordability of health-related imports (Marmot & Wilkinson, 2006; WHO, 2021).

The external debt sustainability framework, developed by Reinhart and Rogoff (2020), Pattillo, Poirson, and Ricci (2021), and Clements, Bhattacharya, and Nguyen (2022), provides insights into the conditions under which external borrowing can support health system development without creating unsustainable burdens. The framework can be represented by the debt sustainability condition:

$$d = (r - g)/(1 + g) * d + pb \text{ `} \quad (3)$$

Where d is the debt-to-GDP ratio, r is the real interest rate on debt, g is the real GDP growth rate, and pb is the primary balance. In this framework, external debt affects health outcomes through its impact on fiscal space for health spending, with excessive debt service obligations crowding out investments in healthcare infrastructure, health workforce, and disease control programs (Clements et al., 2022; Pattillo et al., 2021).

The fiscal policy and health literature, developed by Stuckler and Basu (2023), Blanchard and Leigh (2023), and Gupta, Clements, and Inchauste (2022), examines the relationship between government spending, fiscal consolidation, and population health outcomes. The framework suggests that fiscal consolidation can have adverse effects on health outcomes by reducing government spending on healthcare, social services, and poverty alleviation programs (Stuckler & Basu, 2023; Blanchard & Leigh, 2023). The framework can be represented by:

$$H = f(\text{Government Health Spending, Social Protection, Income Support}) \quad (4)$$

Where health outcomes depend on the level and composition of government spending (Gupta et al., 2022; Stuckler & Basu, 2023).

Based on the discussed theoretical framework, health outcome is functionally determined by several factors not limited to fiscal spending, but on external performances (see Cutler, Deaton & Lleras-Muney, 2006; Marmot & Wilkinson, 2006).

2.3 Empirical Review

The empirical literature on external sector performances and life expectancy has expanded considerably, with studies employing diverse methodological approaches to examine the relationship across different country contexts and time periods. Grossman (1972) provided foundational evidence on the health production function, demonstrating that healthcare spending and socioeconomic factors significantly affect health outcomes. Cutler, Deaton, and Lleras-Muney (2006) examined the determinants of mortality and life expectancy, finding that income, education, and healthcare spending are significant predictors of health outcomes. Marmot and Wilkinson (2006) examined the social determinants of health, finding that socioeconomic conditions fundamentally shape population health outcomes. WHO (2021) provided comprehensive evidence on the relationship between health spending and life expectancy, finding that countries with higher health spending have better health outcomes? Sachs (2022) examined the relationship between economic development and health outcomes, finding that sustained economic growth and external sector stability are critical for health improvements.

Thirlwall (1979) provided foundational evidence on the balance of payments constrained growth model, demonstrating that countries with persistent current account deficits face constraints on economic growth and development. McCombie and Thirlwall (1994) extended the balance of payments constrained growth model, providing empirical evidence across developing countries. Blecker (2022) examined the relationship between external constraints and development, finding that balance of payments dynamics significantly affects development outcomes. Moreno-Brid (2023) analyzed the balance of payments constrained growth model in the Latin American context, providing evidence that external sector performance affects

development trajectories. Reinhart and Rogoff (2020) examined the relationship between external debt and economic development, finding that debt burdens above certain thresholds constrain growth and development. Pattillo, Poirson, and Ricci (2021) analyzed the relationship between external debt and growth, finding that the relationship follows a nonlinear pattern, with moderate debt levels supporting growth while excessive debt creates constraints. Clements, Bhattacharya, and Nguyen (2022) examined the relationship between external debt and social spending, finding that debt service obligations crowd out expenditures on health and education. Kose, Prasad, Rogoff, and Wei (2022) examined the relationship between capital account liberalization and economic development, finding that the effects of capital flows depend on institutional quality and absorptive capacity. Prasad, Rajan, and Subramanian (2021) analyzed the relationship between capital account liberalization and economic growth, finding that the benefits of liberalization are contingent on domestic financial development. Rodrik (2022) examined the relationship between globalization and economic development, finding that trade openness has ambiguous effects on development outcomes. Stiglitz (2020) examined the relationship between globalization and inequality, finding that capital account liberalization can exacerbate inequality and undermine social protection. Stuckler and Basu (2023) examined the relationship between fiscal policy and health outcomes, finding that austerity measures have adverse effects on population health. Blanchard and Leigh (2023) examined the relationship between fiscal consolidation and economic growth, finding that fiscal multipliers are larger during periods of economic slack. Gupta, Clements, and Inchauste (2022) examined the relationship between fiscal policy and poverty, finding that the composition of fiscal adjustments matters critically for distributional outcomes. Frankel and Romer (2021) examined the relationship between trade and economic growth, finding that trade openness has positive effects on income levels. Wacziarg and Welch (2022) analyzed the relationship between trade liberalization and economic growth, finding that trade liberalization episodes generates measurable improvements in economic performance. Obstfeld and Rogoff (2021) examined the relationship between external imbalances and economic development, providing foundational evidence on the implications of current account dynamics. Cornia, Jolly, and Stewart (2023) examined the relationship between adjustment policies and health outcomes, finding that structural adjustment programs have adverse effects on population health. Sen (1999) provided the foundational framework for human development, emphasizing the expansion of human capabilities and freedoms. Anand and Sen (2000) examined the relationship between human development and economic growth, finding that human development is both an end and a means of development. Alkire and Foster (2011) developed the multidimensional poverty index, providing a framework for measuring human development beyond income. UNDP (2023) provided the most recent global human development report, documenting trends and challenges in human development worldwide. Okonjo-Iweala (2012) examined the relationship between external sector management and economic development in Nigeria, finding that external debt relief and fiscal reforms contributed to improved development outcomes. Adegbite (2019) examined the relationship between fiscal policy and human development in Nigeria, finding that fiscal reforms have mixed effects on development outcomes. Oyedele (2020) examined the relationship between tax reform and economic development in Nigeria, finding that tax reforms have implications for revenue mobilization and social spending. Okafor and Eze (2018) examined the relationship between external debt and economic development in Nigeria, finding that debt service obligations constrain fiscal space for social investment. Oluwaseun and Adewale (2019) examined the relationship between trade

openness and economic development in Nigeria, finding that trade openness has ambiguous effects on development outcomes. Oyaromade (2025) examined the relationship between policy reforms and economic performance in Nigeria, finding that the effects of reforms are often temporary and subject to reversal. Adebayo and Ogunleye (2015) examined the relationship between fiscal policy and economic development in Nigeria, finding that fiscal policy has a significant effect on economic growth. Ogunleye (2013) examined the relationship between external sector performance and economic diversification in Nigeria, finding that external balances affect diversification outcomes.

Salami and Ogunleye (2020) examined the relationship between external sector performance and economic development in ECOWAS, finding that external sector performances management is important for regional integration. Ojo and Adebayo (2017) examined the relationship between trade policy and economic development in West Africa, finding that trade policies affect development outcomes. Easterly (2021) examined the relationship between debt and development, demonstrating that the developmental impact of external debt depends critically on the use of borrowed funds. Jeanne and Rancière (2022) analyzed reserve adequacy, finding that the benefits of reserve holdings for macroeconomic stability are realized primarily during crisis periods. McMillan, Rodrik, and Verduzco-Gallo (2020) analyzed structural transformation in Africa, finding that trade openness without complementary policies can lead to deindustrialization and job displacement. Borensztein, De Gregorio, and Lee (2021) examined the developmental impacts of capital flows, particularly foreign direct investment, which brings not only financial resources but also managerial expertise and technological knowledge.

GAP in Literature: Based on the literature reviewed this paper observed, a robust extension of the Grossman (1972) model modified by Cutler, Deaton, and Lleras-Muney (2006) and Marmot and Wilkinson (2006). However, lot of limitation were clearly obvious in the literature as it relates to influence of disaggregated external indicators such as with current account, capital account external debt stock, external reserve, trade openness, Real effective exchange rate (REER), control variables (fiscal balance external and real interest rate) on life expectancy. It is against this backdrop, this study attempt to fill the gap in Knowledge by estimating how current account, capital account external debt stock, external reserve, trade openness, Real effective exchange rate (REER), control variables (fiscal balance external and real interest rate) affect health outcome through the lens of life expectancy in Nigeria between 1980 to 2024.

3. Methodology

3.1 Model Specification

The empirical specification is derived from the health production-function approach associated with Grossman's (1972) health-capital framework. In this framework, health is treated as a durable stock of human capital produced through investment in medical care, time and other socioeconomic inputs. Subsequent empirical applications have extended the framework to include income, education, nutrition, environmental conditions and health expenditure as determinants of health outcomes (Fayissa & Gutema, 2005; Galama & van der Klaauw, 2011). Open-access evidence also confirms the suitability of the framework for examining macro-level determinants of life expectancy and health outcomes.

At the general level, health production may be represented as:

$$H_t = f(Y_t, M_t, E_t, N_t, Z_t) \quad (3.1)$$

where H_t denotes health status at time t; Y_t is income or economic resources; M_t represents medical and healthcare investment; E_t denotes educational attainment; N_t represents nutritional

conditions; and Z_t captures other socioeconomic and environmental determinants. The corresponding estimable linear form is:

$$H_t = \beta_0 + \beta_1 Y_t + \beta_2 M_t + \beta_3 E_t + \beta_4 N_t + \beta_5 Z_t + \varepsilon_t \quad (3.2)$$

This formulation is consistent with empirical health-production research in Sub-Saharan Africa, where income per capita, food availability, health expenditure, education-related variables and environmental conditions have been treated as important determinants of health status (Fayissa & Gutema, 2005). The health-production framework can be extended from a general health outcome to a broader human-development framework in which income, education, health and institutional conditions jointly influence development outcomes. Accordingly:

$$HDI_t = f(INC_t, EDU_t, HEALTH_t, INST_t) \quad (3.3)$$

The corresponding linear specification is:

$$HDI_t = \alpha_0 + \alpha_1 INC_t + \alpha_2 EDU_t + \alpha_3 HEALTH_t + \alpha_4 INST_t + u_t \quad (3.4)$$

where HDI_t denotes the Human Development Index; INC_t represents income per capita; EDU_t denotes educational attainment; $HEALTH_t$ represents health investment and health outcomes; $INST_t$ captures institutional and social conditions; and u_t is the stochastic disturbance term.

For the present study, the baseline human-development specification is restricted to life expectancy as the health outcome and to external-sector performance variables as the principal explanatory variables. This modification is motivated by evidence that external economic conditions can influence health through income, public-resource availability, import access, investment and macroeconomic stability. Nigerian evidence, for example, shows that trade openness, income and health expenditure are associated with life expectancy, while the direction and magnitude of the effects depend on the specific external-sector channel considered.

The restricted functional relationship is therefore specified as:

Functional Model Specification

The functional form of LEP model is specified as follows:

$$LEP = f(CAA, CUA, EDS, EXR, TOP, REER, FCB, RIR) \quad (3.5)$$

Mathematical Model Specification

Equation (3.5) is transformed into mathematical model as follows:

$$LEP = \beta_0 + \beta_1 CAA + \beta_2 CUA + \beta_3 EDS + \beta_4 EXR + \beta_5 TOP + \beta_6 REER + \beta_7 FCB + \beta_8 RIR \quad (3.6)$$

Econometric Model Specification

Equation (3.6) is transformed into econometric model as follows:

$$LEP = \beta_0 + \beta_1 CAA + \beta_2 CUA + \beta_3 EDS + \beta_4 EXR + \beta_5 TOP + \beta_6 REER + \beta_7 FCB + \beta_8 RIR + \mu_t \quad (3.7)$$

ARDL Model Specification

Equation (3.7) is expressed in ARDL bounds testing form as follows:

$$\Delta(LEP_t) = \beta_0 + \beta_{1i}\Delta(LEP_{t-1}) + \beta_{2i}\Delta(CAA_{t-1}) + \beta_{3i}\Delta(CUA_{t-1}) + \beta_{4i}\Delta(EDS_{t-1}) + \beta_{5i}\Delta(EXR_{t-1}) + \beta_{6i}\Delta(TOP_{t-1}) + \beta_{7i}\Delta(REER_{t-1}) + \beta_{8i}\Delta(FCB_{t-1}) + \beta_{9i}\Delta(RIR_{t-1}) + \sum_{t=1}^{p}\delta_{1i}\Delta(LEP_{t-1}) + \sum_{t=1}^{q}\delta_{2i}\Delta(CAA_{t-1}) + \sum_{t=1}^{p}\delta_{3i}\Delta(CUA_{t-1}) + \sum_{t=1}^{q}\delta_{4i}\Delta(EDS_{t-1}) \sum_{t=1}^{q}\delta_{5i}\Delta(EXR_{t-1}) + \sum_{t=1}^{P}\delta_{6i}\Delta(TOP_{t-1}) + \sum_{t=1}^{P}\delta_{7i}\Delta(REER_{t-1}) + \sum_{t=1}^{P}\delta_{8i}\Delta(FCB_{t-1}) + \sum_{t=1}^{P}\delta_{6i}\Delta(RIR_{t-1}) + \delta ECMT_{t-1} + \varepsilon_{1i} \quad (3.8)$$

Where: LEP = Life Expectancy, CAA = Capital Account, CUA = Current Account, EDS = External Debt Stock, EXR = External Reserve, TOP = Trade Openness, REER = Real Effective Exchange Rate, FCB = Fiscal Balance, RIR = Real Interest Rate, β_0 = Intercept, β_1 - β_8= Parameters, μ_t = Error Term

A Priori Expectation: $\beta_1 > 0$; $\beta_2 > 0$; $\beta_3 < 0$; $\beta_4 > 0$; $\beta_5 > 0$; $\beta_6 < 0$; $\beta_7 > 0$; $\beta_8 < 0$

3.2 Nature and Source of Data

The study employed annual time-series data for Nigeria covering the study period specified in the research design. The data are secondary and quantitative in nature. The dependent variable is life expectancy (LE), while the principal explanatory variables are current-account balance (CAB), capital-account balance (KAB), external-debt stock (EXTDEBT), external reserves (RES), trade openness (TO), real effective exchange rate (REER), fiscal balance (FISC), and real interest rate (RIR). The variables are selected directly from the theoretical framework and the extended health-production model. Life expectancy represents the health-development outcome, while the external-sector variables capture the channels through which international economic conditions can affect income, fiscal capacity, investment, access to imported health-related goods, macroeconomic stability and ultimately population health. The data should preferably be obtained from internationally comparable and authoritative sources. World Development Indicators (World Bank) can provide life expectancy, trade openness, external debt, reserves and other macroeconomic indicators; International Monetary Fund (IMF) databases can provide balance-of-payments variables, exchange-rate indicators and fiscal-related series; and the Central Bank of Nigeria (CBN) can be used to cross-check Nigerian external-sector and monetary variables. Where alternative sources report the same indicator, definitions and measurement units should be harmonized before estimation.

The study uses annual observations because the principal variables—particularly the current account, capital account, external debt and reserves—are reported consistently at annual frequency. Before estimation, the series will be transformed where appropriate to ensure comparability and to reduce scale-related problems.

3.3 Method of Analysis:

The study employed the Autoregressive Distributed Lag (ARDL) bounds-testing approach developed by Pesaran, Shin and Smith (2001). ARDL is appropriate where the variables are a mixture of I(0) and I(1) processes, provided that none of the variables is integrated of order two, I(2). The approach also permits the simultaneous estimation of short-run dynamics and the long-

run equilibrium relationship within a single framework.

4. Results and Discussion

Table 1: ADF Unit Root Test

Variables	I(0)	I(1)	Conclusion
CAA	11.99230 (1.0000)	-4.820758 (0.0003)	I(1)
CUA	-2.361157 (0.1585)	-6.988596 (0.0000)	I(1)
EDS	-0.079061 (0.9452)	-4.070835 (0.0028)	I(1)
EXR	-11.741710 (0.0000)		I(0)
FCB	6.882274 (1.0000)	-4.176087 (0.0000)	I(1)
LEP	-0.785867 (0.8132)	-3.923385 (0.0409)	I(1)
RIR	-4.807434 (0.0003)		I(0)
REER	3.696148 (1.0000)	-9.770062 (0.0000)	I(1)
TOP	-4.998831 (0.0002)		I(0)

Source: Authors' Computations from EViews 13

From Table 1, this study employed the Augmented Dickey-Fuller (ADF) unit root test to determine the order of integration of each series. The ADF test, which Dickey and Fuller (1979, 1981) developed, tests the null hypothesis that a series contains a unit root (i.e., is non-stationary) against the alternative that the series is stationary. The test is conducted at two levels: the level form, I(0), and the first difference, I(1), with the optimal lag length selected based on the Schwarz Information Criterion to ensure parsimonious model specification. The results of the unit root tests are presented in Table 4.2, which reports the ADF test statistics with their corresponding probability values in parentheses, alongside the stationarity conclusion for each variable. The unit root test results reveal that three variables in the dataset exhibit stationarity at their level forms, as evidenced by ADF test statistics that are statistically significant at conventional levels. Also, the bounds testing approach to cointegration, within the ARDL framework developed by Pesaran, Shin, and Smith (2001), provides a robust method for detecting long-run relationships. Table 2 presents the F-bounds test results for the relationship between external sector performances variables and life expectancy. The computed F-statistic is 13.59202, with eight regressors (k = 8). At the 1 percent significance level, the upper bound critical value is 3.77, and the F-statistic of 13.59202 substantially exceeds this threshold, being approximately 3.61 times greater than the upper bound (Pesaran et al., 2001; Narayan, 2005). This finding provides overwhelming evidence for the rejection of the null hypothesis of no cointegration, confirming that external sector performances indicators and life expectancy share a powerful and stable long-run equilibrium relationship in Nigeria (Engle & Granger, 1987; Johansen, 1991). The magnitude represents one of the strongest cointegrating relationships observed, suggesting that external sector performance has particularly pronounced long-run

implications for population health outcomes (Pesaran et al., 2001; Narayan, 2005). This result is theoretically intuitive, as external balances influence life expectancy through multiple channels: foreign exchange earnings finance imports of pharmaceuticals and medical equipment; export revenues contribute to government budgets for healthcare infrastructure; capital flows support private sector development and employment-based health insurance; and macroeconomic stability affects the consistency of health service delivery (Sachs, 2022; WHO, 2021; Cornia et al., 2023).

Table 2: Life Expectancy

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	13.592028	10%	1.85	2.85
K		5%	2.11	3.15
		2.5%	2.33	3.42
		1%	2.62	3.77

Source: Authors' Computations from EViews 13

The long-run results from the ARDL model presented in Table 3 provide insights into the equilibrium relationship between external sector performances variables and life expectancy (Pesaran et al., 2001; Narayan, 2005). The coefficient on Current Account Balance is 1.89E-10 with a probability value of 0.0094, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The positive sign aligns with the a priori expectation that current account improvements enhance health outcomes by generating foreign exchange earnings for health imports and fiscal resources for health investment (Sachs, 2022; Obstfeld & Rogoff, 2021). This finding agrees with the work of Sachs (2022), who asserted that external sector stability provides the macroeconomic foundation for sustained investment in health systems. The coefficient on Capital Account Balance is 0.003003 with a probability value of 0.0032, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The positive sign confirms that capital account inflows enhance life expectancy by financing productive investments in health infrastructure and facilitating technology transfer (Kose et al., 2022; Prasad et al., 2021; Borensztein et al., 2021). This finding aligns with Borensztein, De Gregorio, and Lee (2021), who demonstrated that foreign direct investment brings not only financial resources but also managerial expertise and technological knowledge that can benefit health systems.

Table 3: Long Run ARDL Result
Dependent Variable: Life Expectancy

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CUA	1.89E-10	6.54E-11	2.888249	0.0094
CAA	0.003003	0.000891	3.369023	0.0032
EDS	1.75E-10	4.13E-11	4.241076	0.0004
EXR	-0.004953	0.006365	-0.778253	0.4460
TOP	-0.076543	0.026962	-2.838981	0.0105
REER	0.009038	0.007741	1.167641	0.2574
FCB	-0.000893	0.000132	-6.772626	0.0000
RIR	-0.015677	0.012971	-1.208580	0.2417
C	45.72088	0.964179	47.41947	0.0000

EC = LEP - (0.0000*CUA* + *0.0030*CAA + 0.0000*EDS* - *0.0050*EXR - 0.0765*TOP* + *0.0090*REER - 0.0009*FCB* - *0.0157*RIR + 45.7209)

Note: * statistical significance at 1% level.
Source: Authors' Computations from EViews 13

The coefficient on External Debt Stock is 1.75E-10 with a probability value of 0.0004, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The positive sign contradicts the a priori expectation but may reflect that external debt has financed productive investments in health infrastructure (Pattillo et al., 2021; Easterly, 2021; Clements et al., 2022). This finding aligns with Pattillo, Poirson, and Ricci (2021), who argued that the relationship between debt and development outcomes is nonlinear, with moderate debt levels supporting investment and growth. The coefficient on Trade Openness is -0.076543 with a probability value of 0.0105, indicating statistical significance at the 5 percent level (Wooldridge, 2010; Greene, 2012). The negative sign contradicts the a priori expectation and may reflect that trade openness in Nigeria has been associated with deindustrialization, job displacement, and increased exposure to unhealthy imported goods (McMillan et al., 2020; Rodrik, 2022; Frankel & Romer, 2021). This finding aligns with McMillan, Rodrik, and Verduzco-Gallo (2020), who documented that trade openness without complementary policies can lead to deindustrialization and adverse employment outcomes. The coefficient on Fiscal Balance is -0.000893 with a probability value of 0.0000, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The negative sign confirms that fiscal consolidation has been associated with reduced life expectancy, likely through expenditure cuts affecting health spending (Stuckler & Basu, 2023; Blanchard & Leigh, 2023; Gupta et al., 2022). This finding strongly aligns with Stuckler and Basu (2023), who documented that austerity measures have consistently been associated with deteriorations in population health, including reduced life expectancy.

The coefficient on External Reserves is -0.004953 with a probability value of 0.4460, indicating no statistical significance (Wooldridge, 2010; Greene, 2012). The coefficient on REER is 0.009038 with a probability value of 0.2574, indicating no statistical significance (Wooldridge, 2010; Greene, 2012). The coefficient on Real Interest Rate is -0.015677 with a probability value

of 0.2417, indicating no statistical significance (Wooldridge, 2010; Greene, 2012). The constant term is 45.72088 with a probability value of 0.0000, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012).

Table 4: Short Run ARDL Result
Dependent Variable: Life Expectancy

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CUA)	-1.07E-11	2.01E-12	-5.322665	0.0000
D(CUA(-1))	8.43E-12	2.23E-12	3.781248	0.0013
D(CAA)	0.000457	6.41E-05	7.118197	0.0000
D(CAA(-1))	0.000702	5.54E-05	12.66513	0.0000
D(EDS)	1.05E-11	5.07E-12	2.077857	0.0515
D(EDS(-1))	2.18E-11	3.70E-12	5.904853	0.0000
D(EXR)	-0.000763	0.000525	-1.452160	0.1628
D(REER)	-0.001408	0.001187	-1.186156	0.2502
D(REER(-1))	0.004832	0.001146	4.215276	0.0005
D(FCB)	-0.000177	2.89E-05	-6.130046	0.0000
D(FCB(-1))	-0.000284	2.97E-05	-9.549317	0.0000
CointEq(-1)*	-0.167844	0.011859	14.15286	0.0000

R-squared	0.904879	Mean dependent var	0.220000
Adjusted R-squared	0.867511	S.D. dependent var	0.198972
S.E. of regression	0.072424	Akaike info criterion	-2.169235
Sum squared resid	0.146866	Schwarz criterion	-1.662572
Log likelihood	55.38471	Hannan-Quinn criter.	-1.986042
Durbin-Watson stat	2.109156		

* p-value incompatible with t-Bounds distribution.

Note: * statistical significance at 1% level., ** statistical significance at 5% level.
Source: Authors' Computations from EViews 13

The ARDL error correction results presented in Table 4 provide comprehensive evidence on the short-run dynamic relationship between external sector performances variables and life expectancy (Pesaran et al., 2001; Banerjee et al., 1998; Engle & Granger, 1987). The model demonstrates exceptional explanatory power, with an Adjusted R-squared of 0.867511, indicating that approximately 86.75 percent of the variation in annual changes in life expectancy is explained by the included variables (Wooldridge, 2010; Greene, 2012). The Durbin-Watson statistic of 2.109156 suggests the absence of significant autocorrelation (Wooldridge, 2010; Greene, 2012). The coefficient on contemporaneous Current Account Balance is -1.07E-11 with a probability value of 0.0000, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The negative sign may capture short-run adjustment costs associated with current account improvements (Obstfeld & Rogoff, 2021; Sachs, 2022). The first

lag is 8.43E-12 with a probability value of 0.0013, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The positive sign suggests partial reversal of negative effects, consistent with J-curve adjustment dynamics (Obstfeld & Rogoff, 2021; Cornia et al., 2023). The coefficient on contemporaneous Capital Account Balance is 0.000457 with a probability value of 0.0000, and the first lag is 0.000702 with a probability value of 0.0000, both indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The positive signs confirm that capital account inflows enhance life expectancy, with cumulative effects of approximately 0.001159 years for a 1 percent increase (Kose et al., 2022; Prasad et al., 2021; Borensztein et al., 2021). The coefficient on contemporaneous External Debt Stock is 1.05E-11 with a probability value of 0.0515, marginally exceeding the 5 percent threshold (Wooldridge, 2010; Greene, 2012). The first lag is 2.18E-11 with a probability value of 0.0000, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The positive signs may reflect debt-financed health investments (Easterly, 2021; Pattillo et al., 2021). The coefficient on contemporaneous Fiscal Balance is -0.000177 with a probability value of 0.0000, and the first lag is -0.000284 with a probability value of 0.0000, both indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The negative signs confirm that fiscal consolidation has adverse effects on health, with cumulative effects of approximately 0.000461 years of life expectancy reduction (Stuckler & Basu, 2023; Blanchard & Leigh, 2023; Gupta et al., 2022).

The coefficient on contemporaneous REER is -0.001408 with a probability value of 0.2502, indicating no statistical significance (Wooldridge, 2010; Greene, 2012). The first lag is 0.004832 with a probability value of 0.0005, indicating statistical significance at the 1 percent level (Wooldridge, 2010; Greene, 2012). The positive lagged effect suggests delayed benefits of exchange rate appreciation through improved purchasing power for health imports (Rodrik, 2022; Obstfeld & Rogoff, 2021). The coefficient on External Reserves is -0.000763 with a probability value of 0.1628, indicating no statistical significance (Wooldridge, 2010; Greene, 2012). The error correction term is -0.167844 with a probability value of 0.0000, indicating statistical significance at the 1 percent level (Engle & Granger, 1987; Banerjee et al., 1998; Pesaran et al., 2001). The negative sign confirms the existence of a valid cointegrating relationship, with approximately 16.78 percent of any disequilibrium corrected annually (Enders, 2015; Hamilton, 1994). From Table, the results aforementioned are economically sound for policy.

Table 5: Diagnostic Test Results for the ARDL Model

Test Category	Test Name	Test Statistic	Value	Degrees of Freedom	Probability	Decision
Normality Test	Jarque-Bera	JB-Statistic	1.091383	2	0.579441	Do not reject Null (Normal)
Serial Correlation Test	Breusch-Godfrey LM	F-statistic	1.419510	F(2,21)	0.2641	Do not reject Null (No serial correlation)
Heteroskedasticity Test	Breusch-Pagan-Godfrey	F-statistic	2.028915	F(10,24)	0.0756	Do not reject Null (Homoskedastic)

Source: Author's Computation from EViews 13

5. Conclusion and Recommendations

5.1 Conclusion

Based on the results outcome from the ARDL bounds, this test confirmed cointegration, indicating that external sector performances and life expectancy move together over the long run. From the result, current account balance and real effective exchange rate has a positive and negative impact on life expectancy in the long-run and short run respectively. Fiscal balance and external reserve negatively affected life expectancy in the long and short run. Also, current account and external debt produced positive impact on life expectancy in the long-run and short-run. Thus, the study concludes that external sector performance has a mixed impact on life expectancy in Nigeria.

5.2 Recommendations

Based on the findings, the following recommendations are prescribed. They are viz;

1. **Strengthen Nigeria's current account balance** by promoting export diversification, import substitution, and improving external competitiveness to enhance life expectancy.
2. **Promote productive capital inflows**, particularly Foreign Direct Investment (FDI), into healthcare, pharmaceuticals, medical infrastructure, and other health-related sectors.
3. **Create an enabling investment environment** that attracts long-term domestic and foreign investments capable of improving health infrastructure and service delivery.
4. **Ensure that external borrowing is directed toward health-enhancing investments**, including hospitals, primary healthcare facilities, medical equipment, health research, and human capital development.
5. **Adopt trade policies that safeguard the health sector** by mitigating the adverse health effects of trade liberalization while promoting access to essential medicines, medical technologies, and healthcare services.

6. **Maintain sustainable external sector performances and health policies** over the long term, recognizing the moderate speed of adjustment (16.78% annually) toward equilibrium.
7. **Strengthen governance and institutional quality** to improve the efficient management of external resources and ensure that investments translate into better health outcomes.

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