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MILITARY SPENDING AND HEALTH OUTCOMES IN NIGERIA

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Abstract

This study examines the association between military expenditure and population health in Nigeria from 1990 to 2023. Military expenditure as a percentage of GDP is drawn from SIPRI through the World Development Indicators (WDI); life expectancy, under-five mortality, real GDP per capita and fertility are obtained from WDI. We estimate trend-adjusted ordinary least squares models with heteroskedasticity and autocorrelation consistent standard errors and use annual first differences as the principal sensitivity check. A secondary model adds domestic general government health expenditure for 2000–2023. In the trend-adjusted level model, a one-percentage-point higher military expenditure share is associated with 0.750 additional years of life expectancy ($p = 0.032$), but not with a statistically discernible change in under-five mortality ($p = 0.494$). The life-expectancy association disappears in first differences (0.046 years, $p = 0.777$) and in the shorter health-expenditure specification ($p = 0.937$). A dynamic change model finds no joint military effect, while a 2000–2023 subsample changes the life-expectancy sign; serial correlation remains in mortality models. The data therefore do not establish a robust impact of military spending on health outcomes. Security benefits, fiscal displacement, reverse causality and common trends remain plausible competing explanations. Policy should evaluate security effectiveness alongside protected health financing rather than infer that a change in military allocations alone will improve health.

Keywords: military expenditure; life expectancy; under-five mortality; Nigeria; health financing; time series

1.0 Introduction

Nigeria faces simultaneous demands for internal security and essential health services. Armed conflict and insecurity can disrupt clinics, supply routes, vaccination campaigns and livelihoods, especially where the state has limited capacity. Military expenditure may preserve access to services if it produces effective protection, but it may also divert fiscal space from primary care, disease control and other determinants of health. Neither mechanism has an automatic sign in aggregate data (Fan, Liu, & Coyte, 2018; Ikegami & Wang, 2023).

The question is distinct from whether Nigeria should finance security. Military expenditure is an input whose social return depends on composition, procurement, deployment and the security threats it addresses. Health outcomes are slow-moving products of many inputs and accumulated investments. A rise in the military-to-GDP ratio can reflect a larger defence allocation, a smaller GDP denominator or both; its correlation with national health trends cannot by itself reveal a budgetary substitution or a security benefit.

Existing studies mostly evaluate whether military expenditure crowds out health spending across countries. They reach different conclusions according to fiscal capacity, country sample and spending measure (Lin, Ali, & Lu, 2015; Fan et al., 2018; Coutts et al., 2019; Ikegami & Wang, 2023). Fewer

estimates trace the relationship to final population health for Nigeria. This paper contributes a transparent single-country assessment of life expectancy and under-five mortality over 1990–2023, using consistent annual public series and reporting sensitivity to trend, dynamics, spending controls and sample period.

The research questions are whether higher military burden is associated with longer life expectancy or lower under-five mortality, and whether any association survives plausible time-series specifications. The working null is no conditional association. The analysis treats estimates as observational: insecurity may simultaneously increase military spending and worsen health, while national income and demographic transitions change over time. We therefore distinguish statistical association from the causal impact suggested by the broad topic.

2.0 Literature review

The economic framework begins with a constrained government budget. At a fixed revenue and borrowing envelope, additional military outlays may displace health or other social expenditures. Yet governments can borrow, raise taxes or cut another item, so the opportunity cost is conditional rather than mechanically one-for-one. Dabelko and McCormick (1977) and Harris, Kelly, and Pranowo (1988) develop the defence and welfare trade-off; Ikegami and Wang (2023) stress that fiscal capacity determines whether a crowding-out pattern is visible.

A second mechanism runs from security to health. Effective protection can keep facilities open, maintain transport corridors and reduce the fear that prevents patients and workers from reaching care. Conflict, displacement and lost income may otherwise harm nutrition, immunisation and treatment adherence. The relevant quantity is the marginal effectiveness of security spending, which an aggregate defence appropriation does not measure. Karaye, Stone, and Horney (2022) document strong household predictors of child survival in a northern Nigerian armed-conflict setting.

Human-capital theory treats health as a durable stock produced with medical care, time and household resources (Grossman, 1972). Income affects nutrition and access to treatment, while education and public goods shape prevention. Deaton (2003) emphasises the relationship among income, inequality and population health. Military spending can therefore affect outcomes indirectly through fiscal services, household incomes and security, potentially with long lags that are difficult to identify in short annual samples.

The empirical link between public health outlays and outcomes is itself not mechanical. Filmer and Pritchett (1999) show that country income and broader social conditions matter strongly for child mortality, and that the measured public-spending coefficient can be modest. Spending composition, leakage, service quality and who receives care all matter. A comparison between defence and health budget totals alone is consequently insufficient to establish a change in life expectancy or child survival.

International evidence on spending substitution is heterogeneous. Lin et al. (2015) find that defence and social welfare expenditure can move together in OECD countries. Fan et al. (2018), using a much broader 197-country panel over 2000–2013, find evidence that military burden crowds out public and total health expenditure. Differences in income, fiscal resources and institutions offer plausible reasons for the contrast; neither result transfers directly to Nigeria’s health outcomes.

Coutts et al. (2019) examine military burden, health spending and terrorist casualties in countries of the Middle East and North Africa and report no statistically significant military-burden effect on health burden. Their finding cautions against treating the guns-and-butter hypothesis as universal. It also illustrates the importance of measuring threat exposure, since governments often increase security allocations precisely when violence rises.

Ikegami and Wang (2023) analyse 116 countries in 2000–2017. They distinguish the demand for health care from domestic government health spending and find crowding out when fiscal capacity is taken into account, concentrated in less wealthy countries. This distinction matters for Nigeria, where private and out-of-pocket finance can move differently from public appropriations. An observed health outcome integrates both public and private responses.

Evidence specific to conflict-affected northern Nigeria is especially relevant to external validity. Karaye et al. (2022) use Demographic and Health Survey information to study determinants of under-five mortality in an armed-conflict setting and identify household wealth and maternal education as major predictors. Their household design differs from an annual national time series; it supports controlling for broader social change and cautions against attributing regional child mortality to one national fiscal ratio.

Measurement further complicates the empirical comparison. SIPRI defines military expenditure more broadly than a single ministry allocation and revises its estimates as source information improves (SIPRI, 2026). Under-five mortality is an estimated probability per 1,000 live births, while life expectancy is a period summary of age-specific mortality. National series smooth and aggregate diverse local exposures, and the defence-to-GDP ratio is sensitive to GDP revisions and downturns (World Bank, 2026).

The literature yields an empirical prediction of ambiguous sign. A negative health association could indicate fiscal displacement or conflict-related reverse causation; a positive association could reflect successful protection or common growth and epidemiological trends. The gap addressed here is the stability of the Nigeria-specific association across outcome definitions, temporal transformations, a health-financing control and a model allowing delayed responses. None of these observational checks substitutes for an exogenous spending shock or a credible counterfactual.

3.0 Data and methods

3.1 Design and data. The unit is Nigeria in calendar year t, 1990–2023. The balanced primary sample has 34 annual observations. The outcomes are life expectancy at birth in years (LE) and the natural logarithm of under-five mortality per 1,000 live births (lnU5). Military burden (MIL) is SIPRI military expenditure as a percentage of GDP, distributed in the World Development Indicators (WDI). Covariates are log real GDP per capita in constant 2015 US dollars (lnGDP), total fertility in births per woman (FERT), and a linear year index. Domestic general government health expenditure as a share of GDP (GHE) enters a secondary 2000–2023 model because its series begins in 2000.

Variable	WDI code	Definition
MIL	MS.MIL.XPND.GD.ZS	Military expenditure, % of GDP; SIPRI
LE	SP.DYN.LE00.IN	Life expectancy at birth, years
U5	SH.DYN.MORT	Deaths before age five per 1,000 live births
GDPpc	NY.GDP.PCAP.KD	Real GDP per capita, constant 2015 US$
FERT	SP.DYN.TFRT.IN	Total fertility, births per woman
GHE	SH.XPD.GHED.GD.ZS	Government health expenditure, % GDP; WHO

3.2 Conceptual estimand and specification. The baseline conditional association in levels is

$Y_t = \alpha + \beta MIL_t + \gamma lnGDP_t + \delta FERT_t + \tau(t-1990) + \varepsilon_t$, estimated separately for LE and lnU5. β is the difference associated with a one-percentage-point higher military share at given contemporaneous

controls and linear time, not an intervention effect. In the lnU5 equation, 100β is the approximate percentage change in under-five mortality. A secondary level model adds GHE; because GHE may mediate fiscal displacement and the sample falls to 24 years, this coefficient is not directly comparable as a controlled direct causal effect.

3.3 Nonstationarity and short-run models. We inspect Augmented Dickey–Fuller (ADF) tests with an intercept and trend for levels and an intercept for first differences, choosing augmentation lags by AIC (Dickey & Fuller, 1979). Low power and possible breaks preclude declaring cointegration from these tests. The main robustness specification is $\Delta Y_t = a + b\Delta MIL_t + c\Delta lnGDP_t + d\Delta FERT_t + u_t$. It examines within-year changes and removes additive deterministic linear trends. To allow persistence and a delayed military response, we also estimate $\Delta Y_t = a + \rho\Delta Y_{t-1} + b_0\Delta MIL_t + b_1\Delta MIL_{t-1} + c\Delta lnGDP_t + d\Delta FERT_t + u_t$. The joint null $b_0 = b_1 = 0$ is assessed with a Wald test. The dynamic sample has 32 observations, and two military lags/terms are pre-specified to avoid a broad lag search in a short sample.

3.4 Inference and diagnostics. All regression intervals and p-values use Newey–West heteroskedasticity and autocorrelation consistent (HAC) covariance estimates with a two-year Bartlett lag (Newey & West, 1987); this does not correct biased coefficients from omitted dynamics. We report coefficient estimates, standard errors, 95% confidence intervals, model R^2, and the two-lag Breusch–Godfrey residual serial-correlation test. The dynamic specification also receives a Breusch–Pagan heteroskedasticity check and Durbin–Watson statistic. We repeat the first-difference model over 1990–2019 and 2000–2023 to display sensitivity to COVID-era years and a shorter modern period. These windows are descriptive and are not formal break tests.

3.5 Identification and reproducibility. The causal effect is not identified by national observational time series. Insecurity can cause both higher MIL and worse health, common national reforms can affect both series, and GDP can enter the denominator of MIL and the control simultaneously. Fertility and public health spending may be endogenous. National outcomes also hide regional differences and health effects may have longer lags. The WDI API extraction was made on 27 September 2026 for Nigeria (NGA), with no interpolation or imputation, and the exact CSV and Python script are supplied. The 2023 endpoint preserves the government health expenditure robustness sample. Revisions to WDI/SIPRI vintages may alter estimates.

4.0 Results

4.1 Descriptive patterns. Between 1990 and 2023, life expectancy rose by 8.729 years, while under-five mortality declined by 90.8 deaths per 1,000 births. Military burden was 0.833% of GDP in 1990 and 0.843% in 2023, but fluctuated substantially in between (sample standard deviation 0.186 percentage points). A common favourable health trend alongside a near-equal military endpoint gives no direct evidence about the effect of reallocating spending.

Indicator	Mean	SD	1990	2023
Military burden, % GDP	0.587	0.186	0.833	0.843
Life expectancy, years	49.600	2.968	45.733	54.462
Under-five mortality / 1,000	151.944	35.174	207.6	116.8
Real GDP per capita, US$	1,953.27	430.43	1,577.20	2,280.68

Fertility, births/woman	5.785	0.584	6.459	4.482

4.2 Integration and specification risk. Trend-inclusive ADF p-values in levels are 0.254 for MIL, 0.063 for LE, 0.097 for lnU5, 0.952 for lnGDP and 0.185 for FERT. First differences reject a unit root for MIL (0.021), LE (<0.001), lnU5 (<0.001) and lnGDP (0.022), but not FERT (0.483). These short-sample results are mixed, particularly for fertility; they neither establish a stable long-run equilibrium nor support causal long-run multipliers. The level estimates are retained as descriptive comparisons with the transformed models.

4.3 Main associations. Table 2 reports β. The trend-adjusted life-expectancy coefficient is 0.7496 years per one-percentage-point MIL (95% CI 0.0633 to 1.4359; p = 0.0323). The corresponding lnU5 coefficient is −0.0096 (p = 0.4937), about −0.96% per percentage point with substantial uncertainty. In first differences, neither outcome is statistically associated with a contemporaneous change in MIL: LE b = 0.0459 (p = 0.7774) and lnU5 b = −0.0029 (p = 0.6799). A non-significant estimate is not proof of zero effect; the intervals include meaningful positive and negative possibilities.

Outcome and model	N	MIL coefficient	HAC SE	p	95% interval
LE, level + trend	34	0.7496	0.3501	0.0323	0.0633 to 1.4359
LE, differences	33	0.0459	0.1623	0.7774	−0.2722 to 0.3639
LE, level + GHE	24	−0.0219	0.2771	0.9370	−0.5650 to 0.5212
lnU5, level + trend	34	−0.0096	0.0140	0.4937	−0.0370 to 0.0178
lnU5, differences	33	−0.0029	0.0071	0.6799	−0.0169 to 0.0110
lnU5, level + GHE	24	0.0246	0.0140	0.0784	−0.0028 to 0.0520

The level LE regression also estimates lnGDP at 3.3556 (p < 0.001), FERT at 0.5145 (p = 0.143) and trend at 0.2563 (p < 0.001), with R^2 = 0.9895. The lnU5 model has lnGDP −0.2405 (p < 0.001), FERT −0.1677 (p < 0.001) and trend −0.0260 (p < 0.001), with R^2 = 0.9974. High level-model R^2 values largely reflect shared trends and should not be interpreted as identification. The mortality fertility sign is counterintuitive in levels; in differences its coefficient is −0.1446 (p < 0.001), illustrating unstable partial correlations and possible co-trending.

4.4 Dynamic short-run models. Including one lag of the dependent change and contemporaneous and one-year-lagged military changes yields the estimates in Table 3. For LE, the lagged dependent change is 0.4700 (p < 0.001); the current MIL change is 0.0348 (p = 0.745) and the lag is 0.2481 (p = 0.123). Their joint Wald p-value is 0.299. For lnU5 the lagged dependent change is 0.8998 (p < 0.001), indicating strong persistence; MIL change coefficients are 0.0008 and 0.0019 with joint Wald p = 0.719. This is evidence of imprecise short-run associations, not equivalence to zero.

Dynamic Δ outcome	N	Current ΔMIL	Lagged ΔMIL	Joint Wald p	BG(2) p
Life expectancy	32	0.0348 (0.745)	0.2481 (0.123)	0.299	0.723
Log under-five mortality	32	0.0008 (0.758)	0.0019 (0.431)	0.719	0.00048

The dynamic LE model has R^2 = 0.537, Durbin–Watson = 2.024, Breusch–Godfrey p = 0.723 and Breusch–Pagan p = 0.079. The dynamic lnU5 model has R^2 = 0.966, Durbin–Watson = 0.697, Breusch–Godfrey p = 0.00048 and Breusch–Pagan p = 0.456: substantial residual serial correlation persists, so its conventional dynamic interpretation is especially fragile despite HAC inference. The level-model

Breusch–Godfrey p-values are 0.000093 for LE and 0.000403 for lnU5, with Durbin–Watson statistics 0.498 and 0.629, respectively. HAC covariance does not repair those dynamics.

4.5 Health-financing and period sensitivity. Adding GHE in the 2000–2023 level sample produces MIL coefficients of −0.0219 for LE (p = 0.937) and 0.0246 for lnU5 (p = 0.078). In the first-difference model restricted to 1990–2019, LE is 0.0905 (p = 0.634) and lnU5 is −0.0053 (p = 0.539); for 2000–2023, LE is −0.2781 (p = 0.0074) and lnU5 is 0.0115 (p = 0.208). The negative LE coefficient in the shorter window is a materially different finding. It may reflect period-specific confounding, a genuine shift or sample noise; overlapping windows and a small number of observations do not resolve which. These estimates reinforce instability rather than establish a harmful causal effect.

5.0 Discussion

The positive life-expectancy association in one level specification is sensitive to modelling choices and inconsistent with a detectable short-run association. It could reflect unobserved security benefits, common trend components, policy responses to conflict, measurement error or omitted public-health changes. The estimates are also too imprecise to rule out effects of practical importance. The shorter specification with government health expenditure is exploratory because health expenditure may transmit part of an effect and because its 24-year sample differs from the main sample.

A national annual aggregate conceals large geographic variation in insecurity and service availability. Spending as a share of GDP can rise when GDP falls even if real defence outlays do not. Fertility and GDP may themselves respond to conflict, and simultaneous decisions on defence and health create endogeneity. The study lacks a credible exogenous military-spending shock, direct security-effectiveness measures and a subnational health panel. It therefore describes associations and cannot quantify a counterfactual reallocation from defence to health. Journal reviewers may reasonably require a stronger design before accepting a causal title or claim.

6.0 Conclusion and policy implications

The 1990–2023 Nigerian data offer no stable evidence that a higher military expenditure share improves or worsens life expectancy or under-five mortality. One positive level coefficient for life expectancy does not persist in first differences or in the health-expenditure subsample. Policymakers should track both the effectiveness of security allocations and the continuity of primary health services, publish comparable functional spending data, and protect care access in conflict-affected areas. Future research should combine state-level conflict exposure, health-service availability and geographically assigned spending with an identification strategy able to separate security benefits from fiscal displacement.

Declarations

Funding: No external funding was used for this analysis. Data availability: All indicators are public WDI series; the extracted CSV and executable Python analysis script accompany this article. Ethics: No human participants or identifiable records were used. Conflict of interest: There is no conflict of interest.

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