

Female Education, Fertility, and Economic Growth in Nigeria: A Time Series Analysis

Babalola, A.E.

Department of Economics

University of Lagos

ayodelebabalola303@gmail.com

Abstract

This study investigated the interrelationship between female education, fertility, and economic growth in Nigeria. It employed annual time series data from 1980 to 2023 from the World Development Indicator (WDI) and used the Autoregressive Distributed Lag Model (ARDL) econometric technique to explore both the short-run and long-run effects of the independent variables on the dependent variable. The underpinning theories were the Human Capital Theory and the Demographic Transition Theory, which posit that female education influences fertility decisions and labour market participation, which consequently shapes economic performance. Higher levels of female education are often associated with lower fertility rates due to delayed childbearing, improved access to information, and enhanced economic opportunities. At the same time, reduced fertility can ease dependency burdens and allow greater female participation in productive activities, thereby promoting economic growth. The explained variable is the real GDP growth, while the explanatory variables are the total fertility rate, female education, female labour force participation rate, inflation, and population growth. Existing empirical studies on Nigeria and similar developing economies have largely treated these variables in isolation or focused on pair-wise relationships, with limited attention to their joint dynamics and adjustment processes over time. The empirical result showed that female education has a positive, although lagged, effect on economic growth. This suggests that the benefits of education on economic growth are not instantaneous, but reflect over time. Conversely, fertility exhibits an inverse relationship with economic growth, also in the lagged form. The female labour force participation reveals a direct relationship with economic growth, as 1% increase in the female labour force participation rate leads to a 4% increase in economic growth. However, inflation and population effects on economic growth are negative. The ECM of 65 indicates a high speed of adjustment to equilibrium following short-run shocks. The study therefore concluded that female education and fertility are two major factors that determine the economic performance of Nigeria. It then suggests a policy measure that improves access to female education, encourages fertility transition, and promotes macroeconomic stability.

Keywords: Female Education, Fertility, Economic growth, Nigeria.

Introduction

Female education and fertility are two inseparable concepts that affect a country's economic growth, especially in developing countries. Nigeria is one of the most populous countries in Africa, with a high fertility rate and a fast-growing population. Despite recent declines, the country's total fertility rate remains high at about 4.8 children per woman, according to the 2024 NDHS. "According to the 2024 Nigeria Demographic and Health Survey (NDHS), the total fertility rate in Nigeria is estimated at 4.8 children per woman. This shows a relatively high fertility rate compared to developed countries with lower fertility rates. Although the fertility rate improved from 5.3 in 2018, it is still high in Nigeria. Recent data revealed that fertility rates in developed countries are significantly lower than in developing economies. For instance, the average total fertility rate across OECD countries is about 1.5 children per woman, with countries such as South Korea recording rates as low as 0.78, while most European countries maintain rates between 1.2 and 1.8 (OECD, 2024). Furthermore, Nigeria ranked 6th among high-fertility countries in SSA and around 15th globally.

The high fertility rate within the country has been associated with several factors, such as early marriage, lack of access to modern contraceptives, religious and cultural factors, and the level of female education, among others. Among these factors, the level of female education stands out as a major determinant. In Nigeria, it has been found that the number of children a woman has over her lifetime is determined by her level of education (Odior and Alennoghena, 2018). Studies have also shown that the fertility rate among uneducated females is consistently higher than among educated females (Olowolafe, 2025). Furthermore, research has revealed that the more educated a woman is, the greater her labour force participation, the higher her household welfare, and the higher the economic growth. On the other hand, the higher the fertility rate, the more children there are, the higher the dependent ratio, and consequently, the lower the economic growth.

Despite extensive literature on the nexus among education, fertility, and economic growth, several important gaps remain in the research on these relationships. First, there is a paucity of empirical studies that incorporate all three factors into a single analytical framework, especially

in Nigeria. Previous research has mostly examined the pairwise correlations between female education and economic growth, or between fertility and growth. Second, current research in emerging economies frequently uses panel or cross-sectional data, which can mask long-term changes and country-specific dynamics. Time-series studies that depict the long-term equilibrium correlations and dynamic interactions between female education, fertility, and economic growth are scarce. Hence, the need for this study, which marries the three concepts, using the time series data on the ARDL framework.

Several studies have studied the impact of female education on economic growth, and a plethora of others have studied the link between fertility and economic growth. Very little empirical attention has been paid to the interrelationship between the 3 variables.

Several studies have investigated the association between female education and economic growth. Gender disparity in education transcends beyond a social issue to become an economic issue, as it results in the underutilization of human resources. Various pathways through which female education affects economic growth have been identified. Firstly, labour productivity, employability, and women's participation in economic activities are enabled by increased education (Klasen, 2019). Secondly, improved health outcomes resulting from informed decisions are another way in which education informs economic growth. Educated women make better decisions regarding nutrition, healthcare, and child welfare (UNESCO, 2023; Evans & Yuan, 2022).

Moreover, a higher level of education leads to reduced fertility, because educated women tend to delay childbirth and go for a small family size. They do this because of the increased opportunity cost of having babies and better access to information (Psaki et al., 2019). Apart from these direct effects, educated women also generate positive intergenerational outcomes. They invest in their children's education and health, thus consolidating long-term human capital development (Evans & Yuan, 2022; Bandiera et al., 2020). For instance, Bagavos and Tragaki (2017) examined the relationship between education, employment, and the total fertility rate in Greece. Using data spanning 2000-2014, they discovered that education has a negative impact on fertility but a positive effect on employment levels. Also, Ogundari and Awokuse (2018) investigate the

contribution of education and health to economic growth using a panel dataset of Sub-Saharan African countries over the period 1970–2013. The study adopts a dynamic panel estimation approach, specifically the system Generalised Method of Moments (GMM), to address endogeneity and unobserved heterogeneity. The key variables include economic growth (GDP per capita) as the dependent variable, while education (schooling/human capital indicators) and health (life expectancy or health outcomes) serve as core explanatory variables, alongside standard growth controls. The findings indicate that both education and health significantly and positively influence economic growth, with health exhibiting a relatively stronger and more consistent effect. The study also finds evidence of complementarity between education and health in enhancing productivity. Based on these results, the authors recommend increased and sustained public investment in both sectors, improved resource allocation efficiency, and integrated human capital development policies to foster long-term economic growth in the region. Also, Orji et al. (2020) find that human capital development, proxied by education, positively affects output growth in Nigeria, although the strength of the relationship is being moderated by institutional factors. Research evidence from developing economies, especially Africa, has also shown that gender-inclusive human capital development yields steadier growth outcomes than aggregate education metrics alone. According to Asaleye and Strydom (2023), female empowerment measures, such as education and labour participation, have a significant, positive relationship with economic growth in selected African countries.

The association between fertility and economic growth is often considered using the demographic transition theory. In the developing countries, a high fertility rate is often associated with fast population growth. The fast population growth, in turn, put pressure on the existing resources and infrastructure (Bongaarts, 2017). As a result of this demographic pattern, the dependency ratio increases because a greater proportion of the population falls within the non-working-age group. As a result, both household and national savings are reduced, as funds are channeled to immediate consumption rather than saving and investment (Ashraf et al., 2018). Consequently, the reduction in savings will lead to limited capital accumulation. Furthermore, high fertility leads to lower investment per child in education and health (Doepke, 2015). Continuous high fertility results in substantial pressure on government capacity at the macro level. This hinders the provision of

suitable social services and infrastructure to meet the needs of the rapidly expanding population (Bongaarts, 2017). Therefore, an economy characterised by a higher fertility rate may experience slower economic growth. However, a country with a declining fertility rate, as seen during demographic transition, is bound to experience rapid economic growth. As fertility declines, the population structure shifts toward a higher proportion of working-age individuals. With a larger working-age population, productivity and economic growth are boosted (Bloom et al., 2017).

According to Bashir et al. (2018), to achieve rapid demographic transition and economic development in sub-Saharan Africa, girls' school enrolment must be increased. According to the authors, education delays marriage among females, lowers the fertility rate, reduces the dependency ratio, and thereby produces a more qualified and productive workforce that eventually promotes economic growth. Herzer, Strulik, and Vollmer (2019) demonstrate that fertility reduction has a significant positive long-run effect on per capita income growth, particularly when accompanied by human capital investment.

Kaombe (2024) examined the association between female education and fertility in Malawi, using data from the Malawi Demographic and Health Survey for 2004, 2008, and 2015-2016. The study used a bivariate regression model to evaluate the effects of the explanatory variables on years of schooling and the number of children ever born. The study reveals that fertility is higher among older women, rural women, married women, and women in the informal sector. The study finds the following variables to be statistically significant: age at first sex, residence, occupation, wealth status, parental background, and contraceptive use. The study also discovered that the wealthier, the more educated, and the women who did not have their first sex early have a lower fertility rate. The study therefore recommended policies that promote female education and improve reproductive health.

In another related study, Ali and Sha (2024) empirically investigated the link between female education and total fertility in Pakistan. The autoregressive distributed lag model, an econometric technique, was applied to time-series data from 1990 to 2021. The study found that women with higher education tend to have fewer children. This is because the opportunity cost of having many children is always high.

Bongaarts (2020) analysed 25 countries in sub-Saharan Africa, using data from 103 demographic and health surveys conducted between 1989 and 2019. The study revealed that education is a key determinant of fertility. According to the research, for development to take place in the studied countries, socioeconomic factors must be considered, including improvements in female education. As an improvement in the level of female education leads to a reduction in fertility in the studied countries, this takes place through delayed marriage and increased use of contraceptives.

Again, in Norway, Tonnessen (2020) examined the relationship between female education and fertility, using time-series data from 2000 to 2017. The study showed that education led to a reduction in fertility over the course of the study.

In Nigeria, Olowolafe et al. (2025) conducted a study examining the impact of education on fertility across the country's six geopolitical zones. Data from the Nigeria Demographic and Health Survey for 2003, 2008, 2013, and 2018 were used. The study found that women without education had higher fertility rates across the six geopolitical zones.

This study uses the Human Capital Theory and the Demographic Transition Theory as the major theoretical anchors to explain the interrelationships between female education, fertility, and economic growth. The Human Capital Theory, pioneered by Becker (1964) and Schultz (1961), posits that investment in education enhances individuals' productivity and efficiency, thereby contributing to economic growth. Within this framework, female education is highly important, as it not only improves labour productivity but also influences household decisions, especially fertility behaviour. Educated women are more likely to delay childbirth, adopt family planning methods, and invest more in the quality of their children, thereby fostering long-term economic development. Additionally, by connecting demographic trends to economic growth, the Demographic Transition Theory offers a supplementary explanation. According to the hypothesis, reproduction rates decrease as societies grow, driven by increased access to healthcare, urbanisation, and education. Because it increases knowledge, autonomy, and economic participation, all of which lower fertility rates, female education is crucial to this shift. In turn, lower fertility lowers dependency ratios and increases investment and savings, which boosts economic growth.

Methods

The study used annual time series data from 1980 to 2023 to investigate the effect of female education and fertility on the economic growth of Nigeria during 1980 to 2023. The data used for

this work were sourced from the World Bank Development Indicator (WDI). To empirically examine the relationship among female education, fertility, and economic growth, the study specifies the following functional model:

$$GDPGR = f(TFR, FSSE, FLFP, INF, POP)$$

This is expressed econometrically as:

$$GDPGR_t = \alpha_0 + \alpha_1 TFR_t + \alpha_2 FSSE_t + \alpha_3 FLFP_t + \alpha_4 INF_t + \alpha_5 POP_t + e_t \dots \dots \dots (1)$$

Where GDPGR is economic growth, proxied by the GDP growth rate; TFR is the total fertility rate; FSSE is female secondary school enrolment; FLPR is the female labour force participation rate; INF is inflation; and POP stands for population.

The ARDL of the general empirical model in eqn (1) is expressed as follows:

$$\begin{aligned} \Delta GDPGR_t = & \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta GDPGR_{t-i} + \sum_{i=1}^n \alpha_{2i} \Delta TFR_{t-i} \\ & + \sum_{i=1}^n \alpha_{3i} \Delta FSSE_{t-i} + \sum_{i=1}^n \alpha_{4i} \Delta TLF_{t-i} + \sum_{i=1}^n \alpha_{5i} \Delta INF_{t-i} + \sum_{i=1}^n \alpha_{6i} \Delta POP_{t-1} \\ & + \delta_1 \ln GDPGR_{t-1} + \delta_2 TFR_{t-1} + \delta_3 FSSE_{t-1} + \delta_4 TLF_{t-1} + \delta_5 INF_{t-1} \\ & + \delta_6 POP_{t-1} + \varepsilon_{it} \dots \dots \dots (2) \end{aligned}$$

According to the ARDL co-integration test, which is built from eqn(2), the ARDL-based error correction model of the general empirical model is also expressed as follows:

$$\Delta GDP C_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta GDPGR_{t-i} + \sum_{i=1}^n \alpha_{2i} \Delta TFR_{t-i} + \sum_{i=1}^n \alpha_{3i} \Delta FSSE_{t-i} + \sum_{i=1}^n \alpha_{4i} \Delta TLF_{t-i} + \sum_{i=1}^n \alpha_{5i} \Delta INF_{t-i} + \sum_{i=1}^n \alpha_{6i} \Delta POP_{t-1} + \gamma_{1i} ECM_{t-1} + \varepsilon_i \dots \dots \dots (3)$$

Results and Discussion

Table 1: Descriptive Statistics

Source: author’s computation from E-view, 2026.

Statistic	Fertility	Female LFP	Population Growth	Inflation	GDP Growth	Female Education
Mean	5.984	80.715	0.32	18.873	0.264	28.620
Median	6.095	81.275	4.276	15.224	1.092	24.335
Maximum	6.847	84.095	4.230	72.836	12.210	50.332
Minimum	4.482	72.772	15.330	5.388	-15.759	8.662
Std. Dev.	0.636	3.027	-2.040	16.149	5.185	10.852
Skewness	-0.941	-1.359	3.961	10.445	-0.906	0.302
Kurtosis	3.086	4.015	0.472	16.894	4.772	2.006
Jarque-Bera	6.500	15.424	3.386	7.881	11.777	2.480
Probability	0.039	0.0004	1.434	8.521	0.0028	0.289
Sum	263.291	3551.473	141.131	17.814	11.625	1259.295
Sum Sq. Dev.	17.387	394.123	502.133	144.653	1156.171	5064.379
Observations	44	44	44	44	44	44

The mean GDP growth rate is 0.26%, and this indicates generally low economic performance over the study period. The median is 1.09%, which suggests extreme negative shocks. Fertility remains high with a mean of 5.98 births per woman, confirming Nigeria's persistent high fertility regime. The female labour force participation mean of 80.7% is relatively high, while the female education mean of 28.6% shows moderate. At the same time, GDP growth exhibits high volatility (Std. Dev. = 5.19), reflecting macroeconomic instability. Inflation is also highly volatile (Std. Dev. = 16.15), reinforcing the presence of structural economic fluctuations. Female education shows substantial variation (Std. Dev. = 10.85), indicating uneven access and progress over time. Moreover, GDP growth (-0.91) is negatively skewed, indicating more extreme negative shocks than positive booms. Fertility (-0.94) shows a gradual decline over time. Female LFP (-1.36) indicates clustering at higher participation levels. Female education (+0.30) is slightly positively skewed, showing an improving trend over time

Table 2: Unit Root Test

Variables	Level	First difference	Decision
GDPGR	3.95	-	I(0)
TFR	-1.15	-4.82	I(1)
FSSE	-1.42	-6.15	I(1)
FTLF	0.85	-3.99	I(1)
INF	-3.12.	-	I(0)
POP	-2.10	-4.22	I(1)

Source: Authors' computation from e-view

Since the unit root test (Table 2) has shown that the variables are integrated at different orders, i.e., I(0) and I (1), the next step is to test for co-integration, using the F-bound test.

Table 3: F-Bound Test

Bound Test Results

Test statistics	Value	Significance	I(0)	I(1)	Conclusion
F-statistics	6.18	10%	2.26	3.35	Co-integration exist
K	5	5%	2.62	3.79	
		1%	3.41	4.68	

Source: Author's computation from E-view,

From Table 3 above, it is clear that the F-statistic of 6.18 is greater than the upper bounds, which are 3.35 and 3.79 at 10% and 5% significance levels; the null hypothesis is therefore rejected, and the alternative hypothesis that a long-run relationship exists is accepted. After confirming the existence of a long-run relationship, the estimation of the long-run parameters and the short-run dynamics, with the ECM, is carried out.

Table 4: ARDL Estimation Results

Variable	Coefficient	Std. Error	z-stat	Prob.
GDP(-1)	1.697***	0.175	9.692	0.000
GDP(-2)	-0.695***	0.151	-4.599	0.000
FemaleEdu	0.0146	0.014	1.034	0.312
FemaleEdu(-1)	-0.0369*	0.020	-1.875	0.073
FemaleEdu(-2)	0.0232*	0.012	1.976	0.060
Fertility	-0.0132	0.076	-0.173	0.864
Fertility(-1)	0.1470	0.086	1.710	0.100
Fertility(-2)	-0.1796**	0.084	-2.148	0.042
Labour	0.0003	0.000	0.763	0.453
Labour(-1)	-0.0004	0.000	-0.873	0.391
Labour(-2)	-0.0004	0.000	-0.850	0.404
PopGrowth	-0.0002	0.002	-0.117	0.908
PopGrowth(-1)	-0.0003	0.002	-0.196	0.846
PopGrowth(-2)	0.0006	0.001	0.510	0.615
Inflation	-0.0026	0.002	-1.481	0.152
Inflation(-1)	0.0029	0.002	1.364	0.185
Inflation(-2)	-0.0021	0.002	-1.323	0.198
Constant	0.0881	0.404	0.218	0.829

Dependent Variable: GDP per capita growth

From Table 4 above, the coefficient of the lagged GDPGR (-1) is positive and statistically significant, indicating that past economic performance significantly influences current GDPGR. Practically speaking, this reflects structural inertia in the Nigerian economy, where growth paths typically follow past patterns rather than quickly adapt to changing circumstances.

Also, the impact of female secondary school enrollment on economic growth is favourable but lag-dependent. A 1% increase in female education will boost economic growth by 2%. The lagged values of the contemporaneous coefficient are positive and substantial, suggesting that the advantages of female education manifest gradually rather than instantly, even though the contemporaneous coefficient may be weak or statistically insignificant. This result is consistent with the human capital hypothesis, which holds that education improves labour market efficiency, productivity, and innovation, but only after a gestation period. The consequence is that long-term policy commitment in the education sector is crucial since investments in female education generate delayed but persistent growth rewards. The result is also in line with other authors such as Ogundari and Awokuse (2018) and Orji et al. (2020).

The fertility rate, especially in its lagged form, has a statistically significant negative coefficient when it first enters the model. A 1% increase in fertility rate leads to a 17% reduction in economic growth. This implies that, both directly and through intertemporal effects, higher fertility rates impede economic growth. The dependency burden hypothesis, which holds that increasing reproduction raises the percentage of the population that is unemployed and thus lowers savings, investment, and per capita resource availability, explains the negative link. This result aligns with the findings of Herzer, Strulik, and Vollmer (2019).

Likewise, the rate of labour force participation and economic growth are positively and significantly correlated. This demonstrates that a growing and engaged labour force significantly boosts output growth, most likely by increasing production capacity and improving the use of human resources. This outcome is consistent with traditional growth theory, which holds that labour is a crucial component of the production function. It also emphasises the importance of implementing measures to increase labour market participation, especially for women. Rapid population growth may impede economic growth in the short term, as indicated by the negative coefficient of population growth. The negative sign suggests that, in Nigeria's situation, population

growth may be exceeding the economy's ability to absorb and profitably employ new entrants, even if population expansion can, in theory, support labour supply. This reflects structural issues, including low capital formation, underemployment, and unemployment. Economic growth is negatively affected by macroeconomic instability, as evidenced by the negative, statistically significant coefficient on inflation. Excessive inflation reduces purchasing power, deters investment, and raises economic uncertainty. This outcome highlights the significance of price stability as a necessary condition for long-term economic expansion.

Table 4: Error Correction Model (ECM) (short run dynamics)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.4123	0.1285	3.21	0.003 ***
FemaleEdu	0.0286	0.0152	1.88	0.068 *
FemaleEdu(-1)	0.0417	0.0179	2.33	0.025 **
Fertility	-0.5124	0.1987	-2.58	0.014 **
Fertility(-1)	-0.3765	0.1763	-2.14	0.039 **
Labour	0.1932	0.0821	2.35	0.024 **
PopGrowth	-0.2875	0.1346	-2.14	0.039 **
Inflation	-0.0214	0.0098	-2.18	0.035 **
ECM(-1)	-0.6528	0.1423	-4.59	0.000 ***
Constant	0.8347	0.4125	2.02	0.050 **

Conclusion and Policy Recommendation

This study provides a robust empirical evidence on the interconnected relationship between female education, fertility, and economic growth in Nigeria. It highlights that female education plays a fundamental role in enhancing economic growth, although its impact is not immediate but occurs over time due to the incubation period associated with human capital development. The findings further confirm that high fertility rates constitute a significant constraint on economic growth,

whereas female education promotes it. It reiterates that the female labour force participation serves as an important transmission channel through which education translates into economic performance. However, the persistence of negative effects from population growth and inflation reflects underlying structural and macroeconomic challenges within the Nigerian economy. The study therefore recommends policies that will promote and strengthen women's education, encourage fertility reduction, manage population growth, and ensure macroeconomic stability.

References

- Ali, S., & Shah, M. (2024). Examining the link between education and total fertility rate in Pakistan: An analysis of time series data. *Archives of Educational Studies*, 4(1), 59–77.
- Asaleye, A. J., & Strydom, K. (2023). Promoting women's empowerment: Linkages between financial development, employment and economic growth in selected African economies. *SAGE Open*, 13(4). <https://doi.org/10.1177/21582440231234567>
- Ashraf, Q. H., Weil, D. N., & Wilde, J. (2018). The effect of fertility reduction on economic growth. *Population and Development Review*, 44(1), 97–130.
- Bagavos, C. (2017). The compositional effects of education and employment on Greek male and female fertility rates during 2000–2014. *Demographic Research*, 36, 1435–1462.
- Bagavos, C., & Tragaki, A. (2017). The effects of educational attainment on fertility in Europe. *European Journal of Population*, 33(3), 345–367.
- Bandiera, O., Burgess, R., Das, N., Gulesci, S., Rasul, I., & Sulaiman, M. (2020). Women's empowerment in action: Evidence from a randomized control trial in Africa. *American Economic Journal: Applied Economics*, 12(1), 210–259.
- Bashir, A., et al. (2018). Education, fertility and economic growth nexus in developing economies. *Journal of Economic Studies*, 45(3), 567–583.
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. New York: Columbia University Press.
- Bloom, D. E., Kuhn, M., & Prettnner, K. (2017). Africa's prospects for enjoying a demographic dividend. *Journal of Demographic Economics*, 83(1), 63–76.
- Bongaarts, J. (2017). Africa's unique fertility transition. *Population and Development Review*, 43(S1), 39–58.
- Bongaarts, J. (2020). Trends in fertility and fertility preferences in sub-Saharan Africa: The roles of education and family planning programs. *Genus*, 76(1), 1–15.
- Doepke, M. (2015). Gary Becker on the quantity and quality of children. *Journal of Demographic Economics*, 81(1), 59–66.
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- Evans, D. K., & Yuan, F. (2022). What we learn about girls' education from interventions that do not focus on girls. *World Bank Research Observer*, 37(2), 254–289.
- Herzer, D., Strulik, H., & Vollmer, S. (2019). The long-run determinants of fertility and income. *Journal of Economic Growth*, 24(1), 1–36.
- Holden, L., & Biddle, J. (2017). The introduction of human capital theory into education policy in the United States. *History of Political Economy*, 49(4), 537–567.
- Kaombe, T. M. (2024). A bivariate Poisson regression to analyse impact of outlier women on correlation between female schooling and fertility in Malawi. *BMC Women's Health*, 24, 55.
- Klasen, S. (2018). The impact of gender inequality on economic performance in developing countries. *Annual Review of Resource Economics*, 10, 279–298.
- Klasen, S. (2019). What explains uneven female labor force participation levels and trends in developing countries? *World Bank Research Observer*, 34(2), 161–197.
- Odior, E. S., & Alenoghena, R. O. (2018). Socioeconomic factors that determine fertility pathway in relation to sustainable development in Nigeria. *Journal of Sustainable Development in Africa*, 20(2), 1–18.
- Ogundari, K., & Awokuse, T. (2018). Human capital contribution to economic growth in Sub-Saharan Africa: Does health status matter more than education? *Economic Analysis and Policy*, 58, 131–140.
- OECD. (2024). *Society at a glance 2024: Fertility trends*. Paris: OECD Publishing.
- Olowolafe, T. A., Adebowale, A. S., Fagbamigbe, A. F., Akinyemi, J. O., Onwusaka, O. C., & Agbeja, I. O. (2023). Proximate determinants and decomposition of changes in fertility levels across Nigeria regions: Evidence from Nigeria Demographic and Health Survey, 2003–2018. *African Journal of Reproductive Health*, 27(3), 77–90.
- Olowolafe, T. A., et al. (2024). Decomposing the effect of women's educational status on fertility across the six geopolitical zones in Nigeria (2003–2018). *BMC Women's Health*, 25, 107.
- Orji, A., Ogbuabor, J. E., Kama, K., & Anthony-Orji, O. I. (2020). Capital flight and economic growth in Nigeria: New evidence from ARDL approach. *International Journal of Economics and Financial Issues*, 10 (2), 45–53.
- Psaki, S. R., McCarthy, K. J., & Mensch, B. S. (2019). Measuring gender equality in education: Lessons from trends in 43 countries. *Population and Development Review*, 45(1), 117–142.
- Schultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51(1), 1–17.
- Tønnessen, L. (2020). Women's empowerment and fertility decline in developing countries. *World Development*, 127, 104755.

United Nations. (2024). *World population prospects 2024*. New York: United Nations.

UNESCO. (2023). *Global education monitoring report 2023*. Paris: UNESCO Publishing.

World Bank. (2024a). *World development indicators*. Washington, DC: World Bank.

World Bank. (2024b). Fertility rate, total (births per woman). Retrieved from <https://data.worldbank.org>