



FERTILITY TRENDS AND ECONOMIC UNCERTAINTY IN NIGERIA

Abiola L. AINA Ph.D

Department of Economics, Ajayi Crowther University, Oyo, Nigeria

Email: al.aina@acu.edu.ng

ABSTRACT

This study examined the effect of economic policy uncertainty (EPU) on fertility in Nigeria using monthly data covering the period from April 2016 to June 2023. The variables considered include fertility rates, EPU, inflation, GDP per capita, secondary school enrollment, and unemployment. The Non-linear Autoregressive Distributed Lag (NARDL) model was employed to capture the asymmetric short-run and long-run effects of policy uncertainty on fertility trends, while wavelet coherence analysis was utilized to investigate the time-frequency relationship among the variables. The findings revealed that EPU significantly influences fertility decisions, with prolonged uncertainty aligning with sustained declines in fertility rates. Moreover, the study established that GDP per capita, inflation, secondary school enrollment, and unemployment all reduce fertility, reflecting the combined impact of economic constraints, rising living costs, educational attainment, and labor market insecurity on household fertility choices. The study therefore recommends that policymakers ensure stability in economic policies to foster confidence in long-term decision-making among households. In addition, targeted measures should be implemented to curb inflationary pressures, reduce unemployment, and strengthen social protection systems in order to alleviate the economic burden on families. Furthermore, while educational expansion remains critical for human capital development, it should be complemented with comprehensive reproductive health programs to balance the demographic transition process.

Keywords: *Fertility, economic policy uncertainty, Nonlinear ARDL, Unemployment, GDP per capita.*

JEL CODE: E32, E64, J11, J13, O55

1.0 INTRODUCTION

Nigeria is experiencing one of the fastest rates of population growth globally, with its population rising from about 45 million in 1960 to over 223 million in 2023 and projected to exceed 376 million by 2054 (United Nations, 2024). Fertility remains persistently high, averaging 5.1 births per woman, compared to the global average of 2.5 (Adebola et al., 2023; Ezirim et al., 2023; Tettehfiio et al., 2022). Although successive governments have introduced policies such as the National Population Policy (1988) and the National Policy on Population for Sustainable Development (2004), fertility reduction has been slow, placing enormous pressure on healthcare, education, employment, and welfare systems (Ali & Kamraju, 2023). The demographic transition in Nigeria thus lags behind global trends, raising concerns about its impact on human capital accumulation, gender equality, and the attainment of the Sustainable Development Goals (SDGs), particularly targets 3.7 and 5.6 on reproductive health.

At the same time, the economic environment in Nigeria has been marked by recurrent shocks that generate high levels of

uncertainty. Economic Policy Uncertainty (EPU), defined as the difficulty in predicting the timing, content, and consequences of economic policy (Baker et al., 2016), has increased due to multiple disruptions, including the 2016 recession, the COVID-19 pandemic, the 2023 naira redesign, subsidy removals, and exchange rate devaluations. These episodes heightened inflationary pressures, eroded household incomes, and distorted long-term planning. In such contexts, family formation and fertility decisions become more sensitive to perceptions of instability, as households weigh the risks of childbearing against volatile economic prospects (Ariyo, 2024).

Empirical evidence on the relationship between uncertainty and fertility, however, remains inconclusive. Studies from advanced economies suggest that recessions, unemployment, and economic uncertainty tend to depress fertility, often through postponement or reduced completed fertility (Adserà, 2005; Sobotka et al., 2011; Aassve et al., 2012; Kreyenfeld et al., 2012). More recent research indicates that the effects are heterogeneous, shaped by cultural norms, opportunity costs, and the design of social protection systems (Vignoli et al., 2020;

Comolli, 2023). In developing countries with weak labor markets and limited social insurance, such as Nigeria, uncertainty could either reinforce high fertility as a risk-spreading strategy or suppress it due to constrained resources.

Against this backdrop, Economic Policy Uncertainty provides an issue for understanding fertility dynamics in Nigeria. While prior studies have examined the demographic transition and socio-economic determinants of fertility, little is known about how fluctuations in policy-driven uncertainty affect reproductive behavior in Sub-Saharan Africa. Building on Tumala et al. (2023), who applied the news-based EPU index of Baker et al. (2016) to Nigeria, this study investigates the asymmetric short- and long-run effects of EPU on fertility trends.

The study contributes to the literature in three main ways. First, it introduces Economic Policy Uncertainty as an alternative proxy for business cycle fluctuations in fertility research within Nigeria. Second, it employs an asymmetric framework to capture whether positive and negative shocks to uncertainty exert differential effects on fertility outcomes. Third, it provides evidence from a high-fertility, policy-volatile context, where

demographic pressure poses significant developmental challenges. By addressing these gaps, the study aims to generate insights for policymakers seeking to balance economic reforms with sustainable population management.

The remaining sections of the paper are structured as follows: Section 2 reviews Nigeria's fertility policies and the evolution of EPU; Section 3 outline the methodology used; Section 4 presents empirical results and discussion; and Section 5 concludes and provide possible recommendations.

2.0 Conceptual Issues

Economic Policy Uncertainty (EPU) refers to the difficulty individuals, firms, and investors face in predicting the direction, stability, and outcomes of government economic policies. It captures situations where uncertainty arises from ambiguity in fiscal, monetary, trade, or regulatory policies, as well as from political events and institutional changes. According to Baker, Bloom, and Davis (2016), EPU is shaped by three core elements: (i) policy-related disagreements or ambiguity regarding future economic actions, (ii) unpredictability in the timing and implementation of policies, and (iii) uncertainty over the consequences of

these policies for households and businesses. High levels of EPU create an environment of hesitation, as economic actors delay consumption, investment, hiring, and other long-term commitments due to fear of adverse future outcomes.

Fertility refers to the actual reproductive performance of a population, typically measured by the number of live births per woman of childbearing age within a specific period, often expressed through indicators such as the total fertility rate (TFR) (Effiong et al, 2022). Unlike fecundity, which denotes the biological capacity to reproduce, fertility reflects realized childbearing and is shaped by a complex interaction of biological, social, cultural, and economic factors, including access to healthcare and family planning, education, income levels, gender norms, and government policies. As a key determinant of population growth and demographic transition, fertility has profound implications for labor supply, human capital development, and long-term economic and social development

2.0.1 Policies Targeting Fertility Trends in Nigeria

Policies targeted at fertility rates in Nigeria have evolved over the years, beginning with

the National Population Policy of 1988, which aimed to reduce the number of children per woman from six and above to four by 1995 through expanded family planning initiatives. However, statistics from the World Development Indicators (WDI) revealed that births per woman remained above six between 1988 and 1995, highlighting the ineffectiveness of the policy in the medium term. A more comprehensive framework, the National Policy on Population for Sustainable Development (2004), adopted in 2005, sought to reduce fertility, the proportion of early marriages, the population growth rate, and infant mortality by scaling up education and family planning services nationwide. Although fertility rates fell gradually below six births per woman during the policy's implementation, they remained higher than global averages. Additionally, the 2015 law prohibiting child and early marriages was enacted to support fertility reduction, but weak enforcement due to cultural and religious factors undermined its impact. Population growth averaged 2.64 percent between 2004 and 2015, compared to 2.50 percent from 1993 to 2003, reflecting the continued effects of the earlier demographic surge. Infant mortality declined from 99.8 deaths per 1,000 live births in 2004

to 69 in 2015, while modern family planning usage among married women rose modestly from 27.4 percent in 2003 to 31.3 percent in 2013.

Subsequent interventions included the National Family Planning Blueprints (2014–2018 and 2020–2024) developed by the Federal Ministry of Health. These blueprints aimed to reduce maternal morbidity and mortality, address unmet family planning needs aggravated by rapid population growth and cultural barriers, and promote women’s empowerment (Federal Ministry of Health, 2014; 2020). The 2014–2018 strategy achieved partial success, in part due to the complementary legal framework against child marriages introduced in 2015, though gaps in implementation persisted. The renewed 2020–2024 blueprint placed stronger emphasis on scaling up modern contraceptive prevalence, enhancing service delivery, and addressing the persistent shortage of quality family planning commodities, which remained critical in meeting fertility-reduction goals. Together, these blueprints reinforced the national agenda to expand reproductive health access while aligning with broader health and development strategies.

More recently, fertility-related outcomes have been shaped by broader health-sector reforms, notably the Maternal, Newborn, and Child Health (MNCH) Policy (2021–2025), which sought to reduce preventable maternal and child deaths while contributing to Nigeria’s progress toward the Sustainable Development Goals (SDGs). Similarly, the was designed to provide protection from financial hardship in a system heavily reliant on out-of-pocket payments, though its reach remained limited due to concentration in the formal sector. Despite these policies, Nigeria continues to record high maternal mortality, averaging 1,115 deaths per 100,000 live births between 2014 and 2020, compared to 570 deaths in Sub-Saharan Africa over the same period.

2.0.2 Overview of the Economic Policy Environment of Nigeria

From 1960 to date, the policy response to economic policy uncertainty has been varied and linked to cyclical issues. In the post-independence period, emphasis was placed on development planning. The advent of the oil boom in the 1970s led to expansionary policies and the establishment and nationalization of firms. The 1980s were

characterized by an economic downturn which led to the introduction of austerity measures and the Structural Adjustment Programmes (SAP). The 90s were characterised by the continued implementation of SAP policies, political instability, and attempts to diversify the economy through liberalization. The late 90s was characterised by a return to democracy and economic reforms through the implementation of the National Economic Empowerment Development Strategy (NEEDS) and banking sector reforms that shored up the capital base of banks to 25 billion naira. The 2010s were characterized by oil price volatility that led to the first recession the country experienced in 25 years in 2016 and countercyclical measures, the COVID-19 pandemic and recovery in 2020s led to a global economic slowdown and the government introduced a stimulus package to support business and households and continued diversification efforts.

2.1 Theoretical Framework

The theoretical framework for this study is the Becker's Economic Theory of Fertility (Becker, 1960). This theory argues that fertility decisions, like other economic choices, can be analyzed within an economic

framework, where individuals weigh the costs and benefits of having children much like other consumer durables. Becker's key contribution is the insight that people consider both the quantity and quality of children, creating a trade-off between the two, such as choosing between having more children or investing more resources in each child's education and health. A major strength of the theory lies in its adaptability, allowing the incorporation of economic variables such as income, inflation, employment, and educational attainment into the analysis of fertility behavior. In the context of Nigeria, economic policy uncertainty (EPU) can affect households' expectations of future income and financial stability, which in turn can influence fertility decisions. Using Becker's framework, this study examines how EPU, along with GDP per capita, inflation, secondary school enrollment, and unemployment, may shape short-run and long-run fertility trends.

Furthermore, Becker's theory provides a lens to understand the broader socioeconomic implications of fertility patterns. In Nigeria, where rapid population growth and resource constraints are pressing challenges, families may adjust both the timing and number of children in response to economic

uncertainties, aligning with the theory's predictions. This framework also highlights the role of economic incentives and constraints in shaping reproductive behavior, offering valuable policy insights.

2.2 Empirical Review

Enemuwe (2024) investigated the factors influencing fertility outcomes in Nigeria, highlighting the persistent population growth despite a continuous decline in fertility since the 1950s. The study emphasized that while fertility rates have been decreasing, rapid population expansion in certain regions continues to pose developmental challenges, making it crucial to understand the determinants of fertility in Nigeria. Using data from the 2018 Nigeria Demographic and Health Survey (NDHS) and employing zero-inflated Poisson regression models, the study examined the relative impact of various socioeconomic, demographic, and proximate factors on fertility outcomes. The findings revealed that women's sociodemographic and economic characteristics, such as age, education, income, and employment status, significantly influence fertility decisions. Furthermore, proximate factors including contraceptive use, marital status, and

abortion were also found to have a strong association with fertility levels.

Van Wijk and Billari (2024) examined the postponement of parenthood in wealthy societies over the past two decades, focusing on the role of economic conditions. The study highlighted that although young adults' economic situations are often cited to explain delayed childbearing, neither "subjective" perceptions of economic uncertainty nor "objective" income measures adequately account for this trend. The authors proposed that the economic prerequisites for parenthood have increased over time, meaning that individuals now perceive a higher level of income or economic stability as necessary before having their first child. Using individual-level longitudinal data from seven countries in the Comparative Panel File, the study found that perceived economic uncertainty was not consistently linked to the timing of parenthood, nor did its effect change over time. These findings suggest that factors beyond immediate economic conditions, such as evolving societal expectations and long-term financial aspirations, play a crucial role in fertility decisions.

Olowolafe et al. (2023) investigated fertility patterns, timing of childbearing, and fertility trends in Nigeria between 2003 and 2018, motivated by projections that the population could rise from 200 million in 2019 to 450 million by 2050 if fertility remains unchanged. Using the 2003, 2008, 2013, and 2018 Nigeria Demographic and Health Surveys (NDHS) with cross-sectional designs and two-stage cluster sampling of women aged 15–49, the study analyzed fertility timing through mean ages at birth across birth orders and employed the Gompertz Relational Model to assess age patterns and refined fertility levels. Findings revealed only a minimal decline in fertility during the period, as mean children ever born (CEB) among women aged 40–49 dropped slightly from 6.7 in 2003 to 6.1 in 2018, while the mean age at first birth rose marginally from 21.3 to 22.5 years, with South East and South West recording the highest values and North East and North West the lowest.

Gozgor et al. (2021) examined the precautionary saving motive, which predicts that rising income uncertainty increases savings while reducing both consumption

and fertility, by employing the World Uncertainty Index as a novel measure of economic uncertainty. Using data from 126 countries covering the period 1996–2017, their analysis provided strong empirical evidence that heightened uncertainty is associated with a decline in fertility rates, consistent with theoretical expectations. The results were found to be robust across different model specifications, econometric techniques, and the inclusion of several control variables, reinforcing the reliability of the findings.

Ahmed et al. (2021) investigated the impact of the COVID-19 pandemic on maternal, neonatal, and child health (MNCH) care in Bangladesh, Nigeria, and South Africa, noting that global responses to the crisis often undermined existing public health priorities and neglected local contexts, particularly in low- and middle-income countries. Using evidence from March to May 2020, the study found significant reductions in the utilization of essential MNCH services such as antenatal care, family planning, and immunization. These declines were attributed to lockdown measures that heightened fear of contracting the virus and discouraged service use, a shift of focus and resources toward pandemic response at the expense of other health

services, and resource constraints. Collectively, these factors compromised the provision of general healthcare, with serious implications for maternal and child health outcomes.

Khattak (2019) investigated the relationship between economic uncertainty and fertility preferences in Pakistan, where immature financial and labor markets, limited trade openness, and low per capita income exacerbate output risks. Using an ARDL model on time series data, the study examined how demographic and economic variables influence fertility behavior. The findings revealed that fertility rates were positively associated with infant mortality and female labor force participation, but negatively linked with real income, unemployment, inflation, and GDP growth. Specifically, higher unemployment heightened labor market insecurities that discouraged childbearing, while rising real income encouraged investment in luxuries

over larger family sizes, thereby reducing fertility.

Fahlen and Olah (2015) examined the relationship between societal economic conditions, individual perceptions of economic uncertainty, and short-term childbearing intentions across ten European countries with different welfare regimes. Drawing on data from the European Social Survey (2004/05 and 2010/11), the study analyzed both aggregate and individual-level dynamics of fertility intentions. The findings revealed that societal economic conditions, particularly unemployment rates and employment protection policies, influenced short-term fertility intentions, though the effects varied significantly by gender, age, and parity. At the micro level, the study found that perceived economic security played an important role in shaping individuals' childbearing plans, with notable differences across institutional contexts.

3.0 Data and Methodology

Data

To investigate the impact of economic policy uncertainty on fertility in Nigeria, monthly

data spanning April 2016 to June 2023, a timeframe marked by significant economic and policy shocks in Nigeria, including the 2016 recession, the COVID-19 pandemic, the 2023 general elections, and recent fiscal and

monetary reforms was used. The dependent variable in our study is the fertility rate, measured as the total number of births per woman. Economic policy uncertainty serves as the primary independent variable of interest. In line with existing theory, several control variables were incorporated into the model. These control variables include inflation (measured by annual consumer price index), GDP per capita (in current US dollars), secondary school enrollment (% gross), and total unemployment (% of the labor force). All data used in this study were extracted from the World Bank's World

Development Indicators and extrapolated to monthly series for consistency with the EPU monthly series. Economic policy uncertainty data specific to Nigeria were obtained from Tumala et.al (2023).

Model Specification

To determine the asymmetric impact of economic policy uncertainty on fertility, the Nonlinear Autoregressive Distributed Lag (NARDL) model was employed, as developed by Shin, Yu, and Greenwood-Nimmo (2014). The functional form of the model is specified thus:

$$FR_t = \alpha_0 + \sum_{i=1}^p \alpha_i FR_{t-i} + \sum_{j=0}^q \beta_j^+ EPU_{t-j}^+ + \sum_{j=0}^q \beta_j^- EPU_{t-j}^- + \sum_{k=0}^r \delta_k X_{t-k} + \varepsilon_t \quad 1$$

Where FR_t denotes fertility rate, EPU^+ and EPU^- represent the partial sum decompositions of positive and negative changes in economic policy uncertainty respectively, X_t is a vector of control variables such as GDP growth, inflation, unemployment, and secondary school enrollment, while α_i , β_j^+ , β_j^- , and δ_k are the short- and long-run coefficients to be estimated. The model enables the study to

capture whether increases and decreases in economic policy uncertainty exert symmetric or asymmetric effects on fertility decisions over time.

To determine both the short-run and long-run asymmetric impacts of economic policy uncertainty on fertility, the nonlinear ARDL model is re-specified in its error-correction representation as:

$$\Delta FR_t = \phi(FR_{t-1} - \theta^+ EPU_{t-1}^+ - \theta^- EPU_{t-1}^- - \lambda X_{t-1}) + \sum_{i=1}^{p-1} \alpha_i \Delta FR_{t-i} + \sum_{j=0}^{q-1} \beta_j^+ \Delta EPU_{t-j}^+ + \sum_{j=0}^{q-1} \beta_j^- \Delta EPU_{t-j}^- + \sum_{k=0}^{r-1} \gamma_k \Delta X_{t-k} + \varepsilon_t \quad 2$$

where \emptyset represents the speed of adjustment to equilibrium, θ^+ and θ^- denote the long-run coefficients of positive and negative changes in economic policy uncertainty, while β^+ and β^- capture the short-run asymmetric

responses. The inclusion of control variables X_t ensures that other macroeconomic influences such as GDP growth, inflation, and unemployment are accounted for, while ε_t is the error term.

4.0 Results and Analysis

Trend analysis

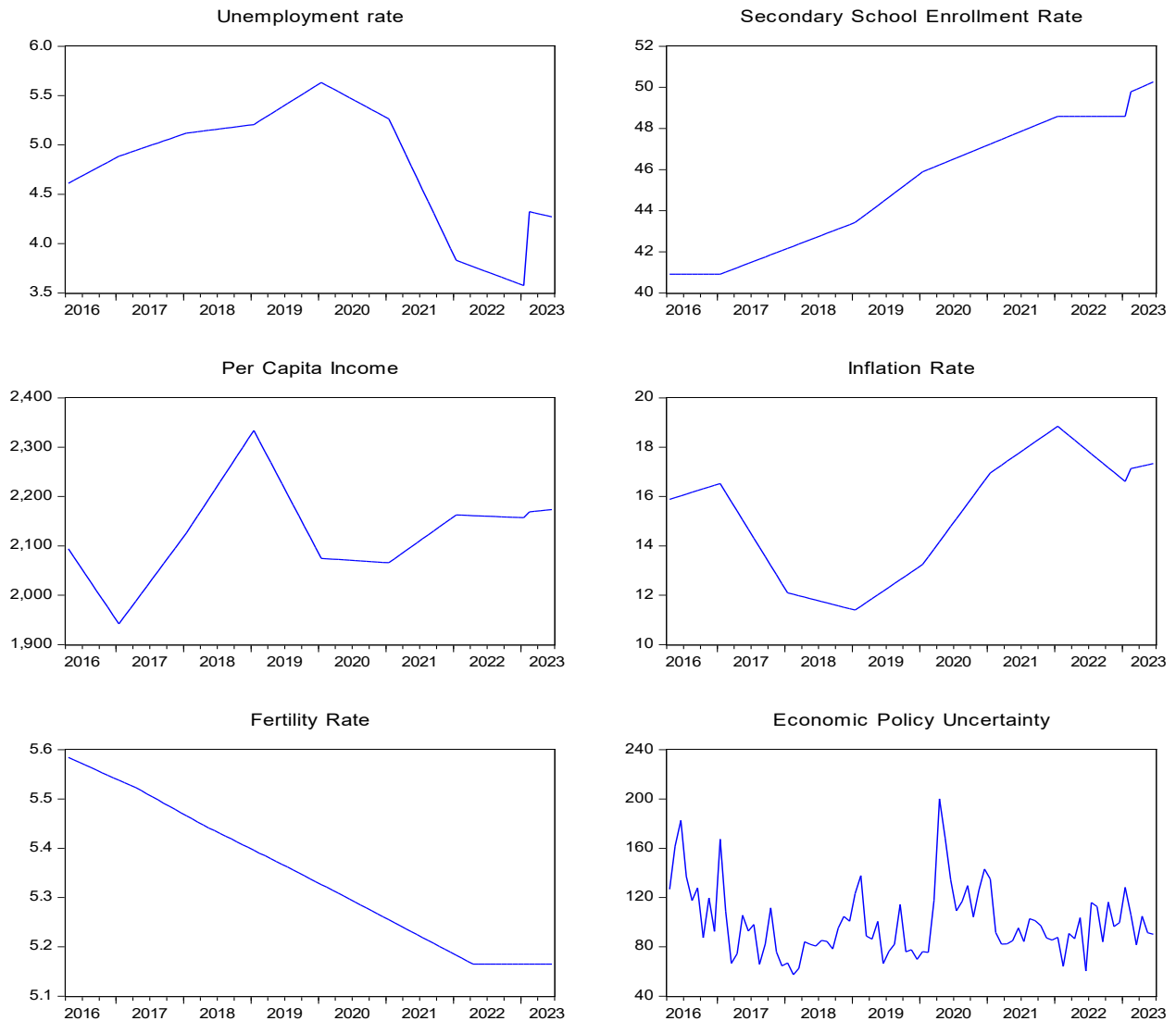


Figure 1: Trends analysis of selected variables

Figure 1 illustrates the trends of the variables employed in the study from April 2016 to June 2023. The unemployment rate rose from 4.61 percent in April 2016 to a peak of 5.63 percent in January 2020, reflecting the economic disruptions triggered by the COVID-19 pandemic and its resultant job

losses. With the onset of recovery efforts, the rate declined steadily to an all-time low of 3.58 percent in January 2023. Similarly, secondary school enrollment showed a consistent upward movement, increasing from 40.91 percent to 50.26 percent of gross enrollment. This rise underscored the impact

of educational reforms and policies designed to expand access for individuals with limited or no prior opportunities to schooling.

GDP per capita income started at \$2,094.05 in April 2016 before dropping to \$1,941.88 in January 2017 due to recession-induced downturns. However, policy reforms and stimulus measures enacted in response to the first recession in 25 years boosted GDP per capita, raising it gradually to a peak of \$2,334.02 in January 2019. A subsequent fall to \$2,074.61 in February 2020 coincided with renewed economic pressures, after which the figure remained relatively stable through early 2021. Recovery resumed in the following years, with GDP per capita rising again to \$2,161.25 in April 2022 and \$2,173.48 in June 2023. During the same period, inflation, which stood at 15.89 percent in April 2016, exhibited a fluctuating trend. It declined consistently until January 2019, when it reached 11.40 percent, before reversing into a sustained upward trajectory. Throughout the study period, inflation remained in double digits, largely influenced by monetary policy shifts, supply chain disruptions, and evolving consumer demand patterns.

Other socio-economic indicators also displayed notable trends. Fertility rates recorded a steep decline between 2016 and 2022 before stabilizing, a shift linked to policy uncertainty, demographic transitions, greater adoption of family planning, the economic recession, and pandemic-related disruptions. In contrast, the economic policy uncertainty (EPU) index showed erratic behavior, reflecting shocks from economic and political events. Notable spikes occurred in June 2016 (182.70 points), January 2017 (167.26 points), and April 2020 (200.18 points), corresponding with recessions and the COVID-19 pandemic. Smaller spikes were also evident during the 2019 and 2023 election cycles, while the lowest level of EPU was observed in February 2018 (57.39 points). These dynamics reveal the extent to which economic and political shocks shaped uncertainty and broader economic performance during the period.

Descriptive Statistics

Table 1 provides an overview of the variables analyzed in the study, and offers additional economic intuition on the variables of interest. Throughout the sample period, the fertility rate averaged 5.344 births per

woman, reflecting a range of 5.165 to 5.338 births per woman. Economic Policy Uncertainty exhibited a mean value of 100.000 and fluctuated between 57.395 and 200.179. Meanwhile, the inflation rate averaged 15.144, with values spanning from 11.397 to 18.847. Per capita income averaged \$2125.194 billion, varying between \$1941.879 and \$2334.024 billion. Secondary school enrollment averaged 45.146 percent, with enrollments ranging from 40.910 to 50.259 percent respectively. The unemployment rate exhibited a mean value of

4.824 percent, with a minimum value of 3.576 percent and a maximum value of 5.633 percent respectively. Notably, GDP per capita displayed a normal distribution based on Jacque-Berra's statistics. Conversely, the fertility rate, economic policy uncertainty, inflation rate, secondary school enrollment, and unemployment rate did not demonstrate normal distribution, evidenced by their significant p-values, prompting the acceptance of the null hypothesis of normality.

Table 1: Descriptive Statistics

	FR	EPU	IFR	PKY	SSE	UR
Mean	5.344	100.000	15.144	2125.194	45.146	4.824
Median	5.338	92.893	15.887	2125.834	45.479	5.021
Maximum	5.584	200.179	18.847	2334.024	50.259	5.633
Minimum	5.165	57.395	11.397	1941.879	40.910	3.576
Std. Dev.	0.139	27.813	2.397	86.806	3.033	0.605
Jarque-Bera	6.661**	31.130***	7.852**	0.866	7.720**	9.632***
Probability	0.035	0.000	0.019	0.648	0.021	0.008

Note: *** and ** denote significance at 1% and 5% respectively

Unit Root Test

Time series data often face the risk of spurious regression, a concern that can be mitigated through unit root tests. In this study, such tests were conducted, and the findings are shown in Table 2. From the

Phillips-Perron and Augmented Dickey-Fuller unit root test results it is observed that *Lepu* and *Lpky* both show significant t-statistics indicating stationarity at levels $I(0)$, while other variables were stationarity at first difference $I(1)$. However, this outcome suggests a combination of variables with

different orders of integration, and this necessitated the application of the

Autoregressive Distributed Lag (ARDL) model to effectively analyze the data.

Table 2: Unit Root Test

	Phillip Perron		ADF	
	Levels	First differences	Levels	First differences
Lepu	-5.065*** (0.000)	-	-5.065*** (0.000)	-
Lfr	-2.201 (0.208)	-2.814** (0.035)	-1.932 (0.316)	-2.936** (0.021)
Lifr	-0.821 (0.808)	-2.211** (0.027)	-1.889 0.336	-2.884** (0.025)
Lpky	-2.588** (0.042)	-	-3.182** (0.025)	-
Lsse	0.402 (0.982)	-5.255*** (0.000)	0.608 (0.989)	-7.741*** (0.000)

Note:*** and ** denotes significant at 1% and 5% respectively.

Long-Run Relationship Results

To examine the existence of a long-run relationship among the variables, the ARDL Bounds testing approach was employed. As presented in Table 3, the computed F-statistic of 25.069 exceeded the upper bound critical value of 4.68 at the chosen significance level.

This outcome provides strong statistical evidence of a long-run equilibrium relationship. Consequently, the null hypothesis of no long-run relationship between economic policy uncertainty and fertility in Nigeria is rejected, confirming the presence of a stable long-run association among the variables under consideration.

Table 3: Bounds Test Results

Significance	Lower Bound	Upper Bound	F-Statistics
	I(0)	I(1)	
10%	2.26	3.25	$F_{SS} = 25.069^{***}$
5%	2.62	3.79	
2.5%	2.96	4.18	
1%	3.41	4.68	

Note: *** denotes significance at 1 %.

Short-run and long-run asymmetry effects of economic policy uncertainty on fertility

Table 4 shows the short-run and long-run asymmetric effects of economic policy uncertainty (EPU) on fertility decisions in Nigeria. The short-run results revealed that both positive and negative changes in EPU generally exerted negative effects on fertility, though with mixed dynamics across time lags. For instance, a one percent increase in EPU immediately reduced fertility by 0.024 percent, though this was statistically insignificant, while a two-period lagged positive shock had a positive and significant effect. This suggested that households tended to postpone childbirth when faced with sudden uncertainty but, after some time, might increase fertility as a form of long-term security against unpredictable economic

conditions. Conversely, a one percent decrease in EPU had a significant negative effect on fertility, lowering it by 0.599 percent, implying that reduced uncertainty did not necessarily translate into higher childbearing. Instead, households appeared cautious, possibly due to the lingering effects of prior instability or broader socio-economic constraints that continued to shape reproductive decisions.

The short-run dynamics of the control variables also revealed important insights. A one-period lagged negative shock in EPU increased fertility significantly, suggesting that households could adjust positively once uncertainty began to decline. Inflation (IFR) had no significant short-run effect, indicating that price instability alone was insufficient to shape fertility behavior. GDP per capita

(PKY) had a positive and significant one-month lagged effect, increasing fertility by 0.016 percent, which implied that improved income levels gave families confidence to have children. Secondary school enrollment (SSE) produced mixed results, as a two-period lagged increase significantly raised fertility by 0.144 percent, while a three-period lagged increase reduced it by 0.160 percent. This reflected the dual role of education: initially fostering optimism but eventually encouraging delayed childbearing and smaller family sizes as women gained more opportunities and awareness of family planning. Similarly, the unemployment rate (UR) showed asymmetric effects: a two-month lag negatively influenced fertility, while a three-month lag had a positive effect, consistent with Bellido et al. (2016), who argued that labor market shocks can both deter and stimulate fertility depending on timing and household coping strategies. The significant and negative error correction term (-0.4832) further indicated that about 48.32 percent of deviations from long-run equilibrium were corrected each month, suggesting a fairly rapid adjustment toward long-term stability.

In the long run, the results were more consistent, showing that both positive and

negative changes in EPU were associated with significant declines in fertility, with positive shocks having a stronger effect. Specifically, a one percent positive shock in EPU reduced fertility by 0.286 points, while a negative shock reduced it by 0.130 points, highlighting an overall inverse relationship between policy uncertainty and fertility. These findings suggested that, over time, heightened uncertainty discouraged families from expanding, as they viewed childbearing as a long-term commitment requiring economic stability. The results aligned with the works of Wang and Zhong (2022) and Olayiwola et al. (2024), which also found that uncertainty exerted persistent downward pressure on fertility. The control variables reinforced these findings: GDP per capita had a strong positive effect, as higher income improved the ability of households to sustain children, while secondary school enrollment had a significant negative effect, consistent with evidence from Bharati et al. (2023), Zhang and Zhao (2023), and Ayadi et al. (2023), showing that education empowered women to delay childbirth and adopt family planning. In contrast, both unemployment (UR) and inflation (IFR) had no significant long-run effects, indicating that while they influenced short-term decisions, they did not

persistently shape fertility patterns. Overall, the results highlighted that economic policy uncertainty served as a key determinant of

fertility decline in Nigeria, while income and education played complementary roles in shaping long-term reproductive behavior.

Table 4: Short-run and long-run asymmetry effect

Short-Run Result				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FR(-1))	0.1317	0.0826	1.5949	0.1165
D(EPU_POS)	-0.0240*	0.0085	-2.8130	0.0671
D(EPU_POS(-1))	-0.0002*	0.0001	-1.7360	0.0882
D(EPU_POS(-2))	0.0002**	0.0001	2.2127	0.0311
D(EPU_POS(-3))	0.0001	0.0001	1.2239	0.2262
D(EPU_NEG)	-0.5996**	0.2710	-2.2122	0.0271
D(EPU_NEG(-1))	0.0004***	0.0001	3.7361	0.0004
D(PKY)	0.0071	0.0049	1.4471	0.1535
D(PKY(-1))	0.0159***	0.0053	3.0150	0.0039
D(SSE)	0.0014	0.0194	0.0719	0.9430
D(SSE(-1))	0.0478	0.0382	1.2530	0.2155
D(SSE(-2))	0.1437***	0.0359	4.0036	0.0002
D(SSE(-3))	-0.1604***	0.0209	-7.6821	0.0000
D(UR)	-0.0001	0.0022	-0.0379	0.9699
D(UR(-1))	-0.0041	0.0044	-0.9360	0.3534
D(UR(-2))	-0.0179***	0.0042	-4.2307	0.0001
D(UR(-3))	0.0192***	0.0024	8.1168	0.0000
CointEq(-1)	-0.4832**	0.2112	-2.2878	0.0260
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EPU_POS	-0.2856**	0.0707	-4.0347	0.0274
EPU_NEG	-0.1302**	0.0305	-4.2571	0.0238
IFR	-0.0008	0.0169	-0.0453	0.9640
PKY	0.0917**	0.0433	2.1172	0.0388

SSE	-0.4389***	0.1306	-3.3611	0.0014
UR	-0.0271	0.0173	-1.5644	0.1235
C	1.7550***	0.2512	6.9873	0.0000

Note: ***, **, * denotes significance at 1%, 5%, and 10 %, respectively.

Predicted effects of counterfactual shock to economic policy uncertainty on fertility rate

Figure 2a illustrates that a positive one standard deviation shock to economic policy uncertainty (EPU) results in a sharp short-run decline in fertility rates (FR), which eventually stabilizes at a sustained long-run level of about 7.080. This finding implies that when uncertainty in economic policies rises, households tend to adopt cautious reproductive behavior, often postponing or limiting childbirth due to concerns about income stability, rising living costs, and the unpredictability of government interventions. Such behavior reflects the rational response of families who view childbearing as a long-term investment that requires a stable economic environment. The result suggests that during periods of heightened EPU, such as recessions, political transitions, or policy reforms, fertility choices are highly sensitive, with households prioritizing economic survival over family expansion. This outcome aligns with broader economic theories that link uncertainty to risk-averse

decision-making, thereby reinforcing the argument that volatility in economic policies exerts a dampening effect on fertility in both the short and long run.

Conversely, Figure 2b shows that a negative one standard deviation shock to EPU also induces a significant long-run decline in fertility, stabilizing around 7.000. This finding is particularly noteworthy, as one might expect reduced uncertainty to encourage higher fertility; however, the decline suggests that families may not immediately adjust reproductive decisions even when the economic environment becomes more predictable. Instead, the inertia created by prior exposure to high uncertainty, coupled with structural factors such as changing cultural norms, women's increasing participation in education and the labor force, and broader demographic transitions, may continue to exert downward pressure on fertility rates. The implication of this result is that lowering economic uncertainty alone may not be sufficient to reverse declining fertility trends. Instead, complementary policies, such as investments

in social safety nets, affordable childcare, and education—are needed to build household confidence in long-term economic stability. Thus, both positive and negative shocks to EPU point toward an underlying structural

decline in fertility, highlighting the importance of stable policy environments and supportive socio-economic frameworks in shaping reproductive behavior.

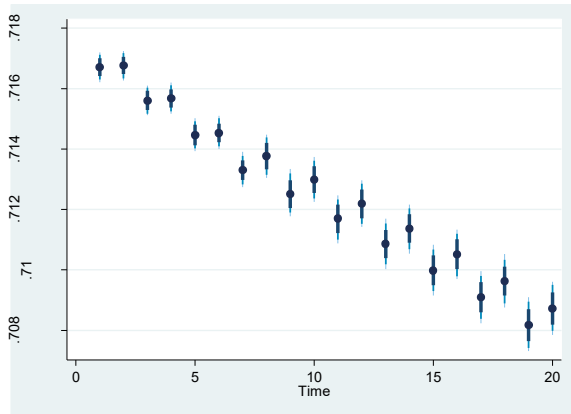


Figure 2a: Positive shock to EPU

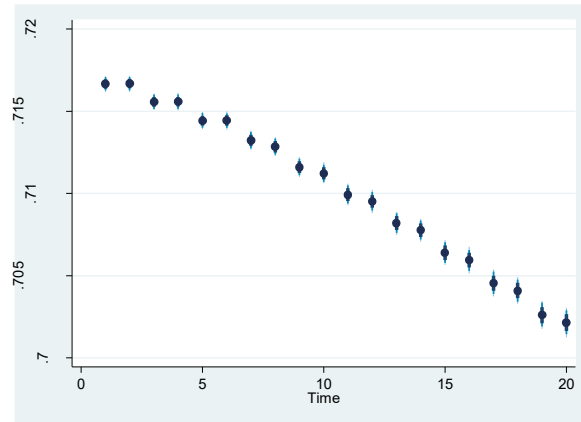


Figure 2b: Negative shock to EPU

Wavelet Coherence Results

To determine the relationship between fertility and economic policy uncertainty, wavelet coherence was used, and the result is presented in Figure 3. Figure 3 presented the wavelet coherence analysis of the relationship between fertility rates (FR) and economic policy uncertainty (EPU). The cone of influence, shaded in grey, marked the area where edge effects could distort results, making it a critical boundary for interpretation. The bold black contour line represented regions of statistical significance, established through Monte Carlo simulations, while the color gradient indicated the

strength of correlation between the variables—blue denoted weak correlation and red denoted strong correlation. The direction of the arrows added another layer of interpretation: arrows pointing right indicated a positive relationship, arrows pointing left indicated a negative relationship, while diagonal arrows revealed causality—upward-right or downward-left implied that EPU influenced FR, and upward-left or downward-right showed that FR influenced EPU. This methodological approach allowed for a dynamic and time-varying analysis of the co-movement

between the two variables across different frequencies and time horizons.

The results revealed a clear negative (anti-phase) correlation between FR and EPU from June 2018 to June 2020, represented by bright red regions within the significance contour. During this period, increases in policy uncertainty coincided with declines in fertility rates, with the downward-left arrows confirming that EPU significantly influenced FR rather than the other way around. This relationship coincided with Nigeria's experience of heightened uncertainty due to global oil price volatility, the political and economic aftershocks of the 2019 elections, and the onset of the COVID-19 pandemic, which collectively disrupted household economic stability. The implication of this finding was that during times of heightened uncertainty, families tended to delay or reduce childbearing as a rational response to

resource constraints and unpredictability in the economic environment. In contrast, outside this window, specifically between April 2016 and May 2018, and again between July 2020 and June 2023, the dominance of cold blue colors and absence of significant contours indicated no meaningful relationship between EPU and FR. This suggested that the influence of policy uncertainty on fertility was episodic rather than continuous, emerging strongly only during periods of pronounced economic or political shocks. From a policy perspective, the findings implied that stabilizing economic policies, reducing political tensions, and providing strong social safety nets during crises could help mitigate the adverse effects of uncertainty on fertility decisions. Such measures would not only promote household confidence in the future but also support demographic stability in the long term

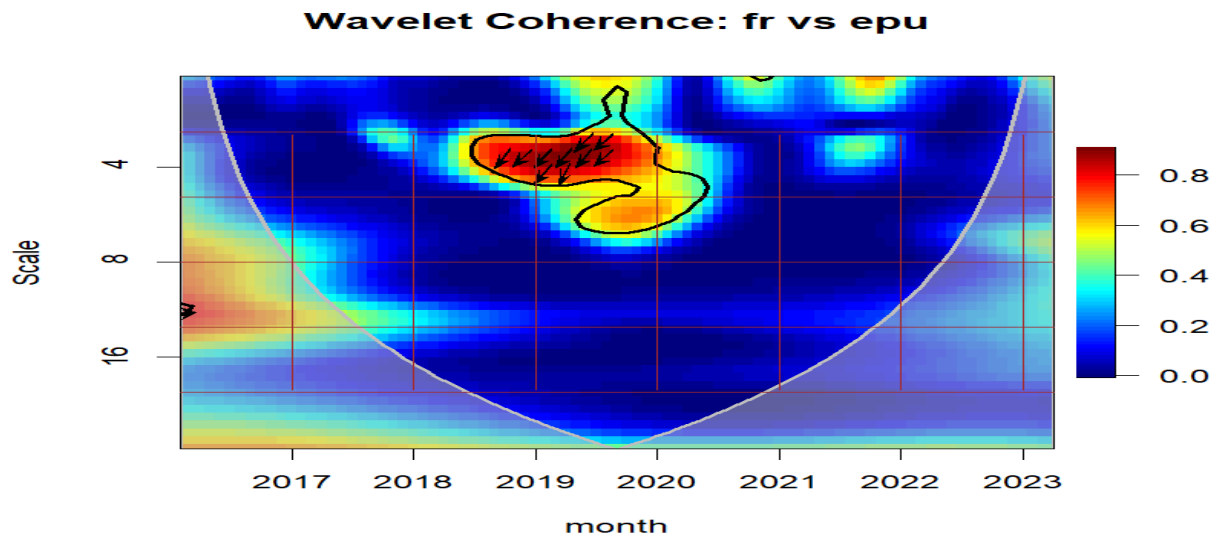


Figure 3: Wavelet Coherence showing relationship between EPU and Fertility

Conclusion and Recommendations

This study examined the correlation, as well as the short- and long-run asymmetric relationships, between economic policy uncertainty (EPU) and fertility in Nigeria. The findings from the wavelet coherence analysis revealed two distinct phases: between June 2018 and June 2020, EPU exerted a significant negative influence on fertility rates, while outside this period, no meaningful correlation was observed, suggesting that households gradually adjusted their reproductive behavior in response to earlier shocks. The ARDL

bounds test confirmed the existence of a long-run relationship between EPU and fertility, with both positive and negative shocks leading to declines in fertility rates, although the effects of negative shocks were more pronounced. In the short run, the results were mixed but largely showed negative outcomes, indicating that households responded to uncertainty with caution by postponing or reducing childbirth. These results, validated by counterfactual analysis, led to the conclusion that economic policy uncertainty consistently exerted downward pressure on fertility decisions in both the short and long run.

In light of these findings, several policy recommendations are advanced. First, the

government should strengthen and expand social safety net programmes, including unemployment benefits, conditional cash transfers, and subsidized healthcare, to cushion households against the adverse effects of policy uncertainty. Such interventions would help reduce the financial strain on families, enabling them to make fertility decisions without being overly constrained by unstable economic conditions. Second, expanding access to quality education and family planning services, particularly for women, is crucial, as higher education levels empower women with knowledge and resources to make informed reproductive choices aligned with economic realities. Finally, policymakers should prioritize the design and consistent implementation of transparent fiscal and monetary policies, coupled with clear communication of policy objectives. Stable and predictable policy environments foster confidence among households and minimize the disruptive influence of uncertainty on fertility trends, thereby contributing to both demographic stability and broader socio-economic development.

References

- Adebola, O. G., Ewemooje, O. S., & Adebola, F. B. (2023). Predictors and differences in fertility level among Nigerian women of reproductive age: a function of subgroup social norms fertility behaviour. *Human Fertility*, 26(5), 1114-1128.
- Adsera, A and Menendez, A (2011), Fertility changes in Latin America in the context of economic uncertainty, *Population Studies*, 65(1), 37-56.
- Ahmed, T., Rahman, A. E., Amole, T. G., Galadanci, H., Matjila, M., Soma-Pillay, P., ... & Anumba, D. O. (2021). The effect of COVID-19 on maternal newborn and child health (MNCH) services in Bangladesh, Nigeria and South Africa: call for a contextualised pandemic response in LMICs. *International Journal for Equity in Health*, 20(1), 77.
- Ali, M. A., & Kamraju, M. (2023). The economic consequences of population aging challenges and policy implications. *ASEAN Journal of Economic and Economic Education*, 2(2), 145 150.
- Ariyo, O. O. (2024). The naira redesign policy in nigeria: issues and challenges. *GVU Journal of*

- Management and Social Sciences*, 9(2), 93-101.
- Ayadi, M. F., Onodipe, G., & Adepoju, O. E. (2023). Adolescent fertility and its impact on educational attainment in Nigeria: A propensity score matching approach. *International Journal of Healthcare Management*, 1-9.
- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593-1636.
- Bellido, H, and Marcen, M (2016), Fertility and the Business Cycle: The European Case.
- Bharati, T., Chang, S., & Li, Q. (2023). Does tertiary education expansion affect the fertility of women past the college-entry age?. *Journal of Economic Behavior & Organization*, 212, 1029-1055.
- Buckles, K, Hungerman, D and Lugauer, S (2021), Is Fertility a Leading Economic Indicator? *NBER Working Paper*, 24355.
- Campisi, N., Kulu, H., Mikolai, J., Klüsener, S., & Myrskylä, M. (2020). *A spatial perspective on the Nordic fertility decline: the role of economic and social uncertainty in fertility trends.*
- Chester, G. V. (1963). The theory of irreversible processes. *Reports on Progress in Physics*, 26(1), 411.
- Comolli, C, Neyer, G, Andersson, G, Dommermuth, L, Fallesen, P, Jalovaara, M, Jonsson, A, Kolk, M, and Lappegard, T. (2021), Beyond the economic gaze: childbearing during and after recessions in the Nordic countries, *European Journal of Population*, 37, 473-520.
- Coskun S and Dalgic, H, (2024), The emergence of procyclical fertility: The role of breadwinner women, *Journal of Monetary Economics*, 142,
- Davalos, E and Morales, L (2017). Economic Crisis promotes fertility decline in poor areas: Evidence from Colombia, *Demographic Research*, 37(27), 867-888.
- Effiong, U., Udonwa, U. E., Ekpe, J. P., Effiong, U. E., Udonwa, U. E., & Polycarp Ekpe, J. (2022). Fertility and population explosion in Nigeria: Does income actually count. *GPH-*

- International Journal of Business Management*, 5(7), 42-59.
- Ehrlich, I., & Lui, F. T. (1991). Intergenerational Trade, Longevity, and Economic Growth. *Journal of Political Economy*, 99(5), 1029–1059.
- Enemuwe, C. A. (2024). Determinants of fertility in Nigeria: An analysis of recent data. *Population Review*, 63(2), 94-117.
- Ezirim, E. O., Omole, O. R., Akwuruoha, E. M., Ejikem, P. I., & Airaodion, A. I. (2023). Factors Influencing Family Planning Services among Rural Women in Nigeria. *International Journal of Research and Reports in Gynaecology*, 6(1), 54-66.
- Fahlén, S., & Oláh, L. (2015). The impact of economic uncertainty on childbearing intentions in Europe. *Families and Societies: Workin Paper Series*, 36, 209-243.
- Federal Ministry of Health (2014), Nigeria National Family Planning Blueprint, Abuja, Nigeria.
- Federal Ministry of Health (2020), Nigeria National Family Planning Blueprint, Abuja, Nigeria.
- Furceri, D., Pizzuto, P., & Yarveisi, K. (2024). The effect of pandemic crises on fertility. *Journal of Population Economics*, 37(1), 1-30.
- Gilányi, Z., & Martinás, K. (2000). An irreversible economic approach to the theory of production. *Open Systems & Information Dynamics*, 7(4), 365-374.
- Gozgor, G., Bilgin, M. H., & Rangazas, P. (2021). Economic uncertainty and fertility. *Journal of Human Capital*, 15(3), 373-399.
- Khattak, S. W. (2019). Fertility Determinants and Economic Uncertainty. *FWU Journal of Social Sciences*, 13(3).
- Matysiak, A, Sobotka, T and Vignoli, D. (2021). The great recession and fertility in Europe: A sub-national analysis, *European Journal of Population*, 37, 29-64.
- Nazir, N, Asif, M, & Khattak, S. (2023). Socio-Economic Determinants of Fertility Behavior: A Co-Integration Analysis for Pakistan. *International*

- Journal of Academic Research for Humanities*, 3(4), 270–281
- Nickayin, S, Chelli, F, Turco, R, Nosova, R, Vavoura, C and Salvati, L. (2022), Economic downturns, urban growth and suburban fertility in a Mediterranean context, *Economies*, 10 (252), 1-26.
- Olayiwola, S. O., Osakede, U. A., & Adeyemi, F. O. (2024). Fiscal Sustainability and Demographic Transition in Nigeria. *African Journal of Economic Review*, 12(1), 140-154.
- Olowolafe, T. A., Adebowale, A. S., Fagbamigbe, A. F., Bolarinwa, O. A., & Akinyemi, J. O. (2023). Shifts in age pattern, timing of childbearing and trend in fertility level across six regions of Nigeria: Nigeria Demographic and Health Surveys from 2003–2018. *PloS one*, 18(1), e0279365.
- Ornegi, T., Koyuncu, J.Y. & Oksak, Y (2022). Does higher inflation mean lower fertility rate: The case of Turkey. *Balkan Journal of Social Sciences*. 11(21), 7-14.
- Palombella, G. (2023). Irreversible Choices and Future Generations’ Rights. *Kutafin Law Review*, 10(1), 110-136.
- Pan, J.-N., & Yang, Y. (2019). The impact of economic uncertainty on the decision of fertility: Evidence from Taiwan. *The North American journal of economics and finance*. 54, 101090.
- Puig-Barrachina, V, Rodriguez-Sanz, M, Dominguez-Berjon, M, Martin, U, Luque, M, Ruiz, M and Perez, G (2020), Deline in fertility induced by economic recession in Spain, *Gac Sanit*, 34(3), 238-244.
- Rai, K., & Garg, B. (2024). Demographic transition and inflation. *Economic Systems*, 101214.
- Safdari-Dehcheshmeh, F., Noroozi, M., Taleghani, F., & Memar, S. (2023). Factors influencing the delay in childbearing: A narrative review. *Iranian journal of nursing and midwifery research*, 28(1), 10-19.
- Schmitt, C. (2012). A cross-national perspective on unemployment and first births. *European Journal of Population* 28, 303–335.

- Tettehfiio, P. S. A., Okumagba, M. T., Oyibo, P. G., Ntaji, M., & Awunor, N. S. (2022). Socioeconomic and sociocultural predictors of family planning uptake amongst females (15–49 years) in Delta State central senatorial district. *Journal of the Medical Women's Association of Nigeria*, 7(2), 48-54.
- Tregaki, A and Bagavos, C (2019), Fertility variations in the recession context: the case of Greece, *Genus*, 75(18). 1-15.
- Tumala, M. M., Omotosho, B. S., Mohammed, M. G., Musa, M., & Eguasa, B. E. O. (2023). Economic policy uncertainty index for Nigeria. Available at SSRN 4570762.
- United Nations (2024), World Population Prospects, 2024 revision.
- Van Wijk, D., & Billari, F. C. (2024). Fertility postponement, economic uncertainty, and the increasing income prerequisites of parenthood. *Population and Development Review*, 50(2), 287-322.
- Vignoli, D, Sven D, and Gustavo D. (2012). Whose job instability affects the likelihood of becoming a parent in Italy? A tale of two partners. *Demographic Research* 26, 41–62.
- Vignoli, D., Guetto, R., Bazzani, G. *et al.* A reflection on economic uncertainty and fertility in Europe: The Narrative Framework. *Genus* 76, 28 (2020).
- Wang Y, Gozgor G and Lau CKM (2022b) Effects of pandemics uncertainty on fertility. *Front. Public Health*, 10: 854771.
- Wang, S., & Zhong, S. (2022b). Economic Uncertainty, Cultural and Ideational Transition, and Low Fertility. *Sustainability*, 14(14), 8344.
- Westoff C. F. (1978). Marriage and fertility in the developed countries. *Scientific American*, 239(6), 51–57.
- Willis, R. J. (1973). *A New Approach to the Economic Theory of Fertility Behavior. Journal of Political Economy*, 81(2, Part 2), S14–S64.
- Zhang, Z., & Zhao, Z. (2023). Women's education and fertility in China. *China Economic Review*, 78, 101936.