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A STATISTICAL STUDY OF FERTILITY BEHAVIOUR AMONG CIVIL SERVANTS IN ANAMBRA STATE NIGERIA

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Abstract
This study investigates the factors influencing fertility behaviors among civil servants in Anambra State, Nigeria, and evaluates the effectiveness of existing public policies in promoting work-life balance. A cross-sectional survey design was used, incorporating both quantitative and qualitative data collection methods. A sample of 482 civil servants was selected through stratified random sampling. The data were analyzed using descriptive statistics, Generalized Linear Models (GLM) including Poisson and negative binomial regression, chi-square tests, and mixed-effect models to explore relationships between demographic variables and fertility outcomes. The findings reveal that fertility rates significantly differ by age, gender, and marital status, with civil servants aged 40-49 having the highest mean number of children (3.50). Poisson regression analysis identified age and marital status as significant predictors of fertility, with p-values less than 0.05, indicating their strong influence on the number of children ever born. Chi-square tests highlighted significant differences in family planning method preferences across demographic subgroups. Mixed-effect models, accounting for the clustering effect of location, further confirmed that age, gender, level of education, marital status, and location are significant predictors of fertility behavior. Negative binomial regression revealed that the timing of childbearing, its perceived importance in marriage, and societal pressure to have multiple children are key factors influencing fertility. The study concludes that targeted policy interventions are needed to address the specific fertility and family planning needs of civil servants, particularly those in the most fertile age groups. Recommendations include more flexible work arrangements and enhanced parental leave policies to better support the reproductive goals of civil servants, thereby improving work-life balance and job satisfaction.
Keywords: *Fertility behaviour, Civil servants, Poisson distribution, Negative binomial regression, Anambra State, Work-life balance, Family planning policies*

Introduction

Fertility rates and reproductive behaviors play a critical role in shaping demographic and socioeconomic development across regions (Avidime *et al.*, 2010). Nigeria, known for its high total fertility rates – currently averaging 5.3 births per woman – offers a compelling case study in this regard (Kazeem & Jensen, 2022). Recent trends have shown a decline in fertility rates, driven by modernization, urbanization, and increased workforce participation among women (Oyedokun, 2007). However, the relationship between workplace environment, organizational policies, and fertility intentions among working professionals, particularly women, remains insufficiently explored, especially in developing nations (GBrand *et al.*, 2021).

Among career-oriented women, civil servants represent a particularly significant subgroup, given their considerable share of female employment and potential access to work-life balance provisions (Adebowale *et al.*, 2014). Studies suggest that higher educational attainment and active labor force participation correlate with lower fertility rates, particularly in urban areas like Anambra State (Nwosu & Aderinto, 2017). Despite this, limited research directly examines reproductive patterns across subgroups of career-focused women such as civil servants (Okeke, 2013).

Over the years, Nigeria has experienced a steady decline in fertility rates (NDHS, 2018). As of 2024, the fertility rate stands at 5.009 births per woman, reflecting a 1.32% decrease from 2023, which itself marked a similar decline from 2022 (UN-WPP, 2024; macrotrends.net).

Historical data reveals a more pronounced decrease over the decades, from 6.354 births per woman in 1950 to the current level, albeit with some fluctuations (NDHS, 2018; UN-WPP, 2024). This trajectory underscores the broader demographic shifts occurring in Nigeria, as illustrated in Figure 1.1, which presents fertility trends from 1950 to 2024, alongside projections through 2100.

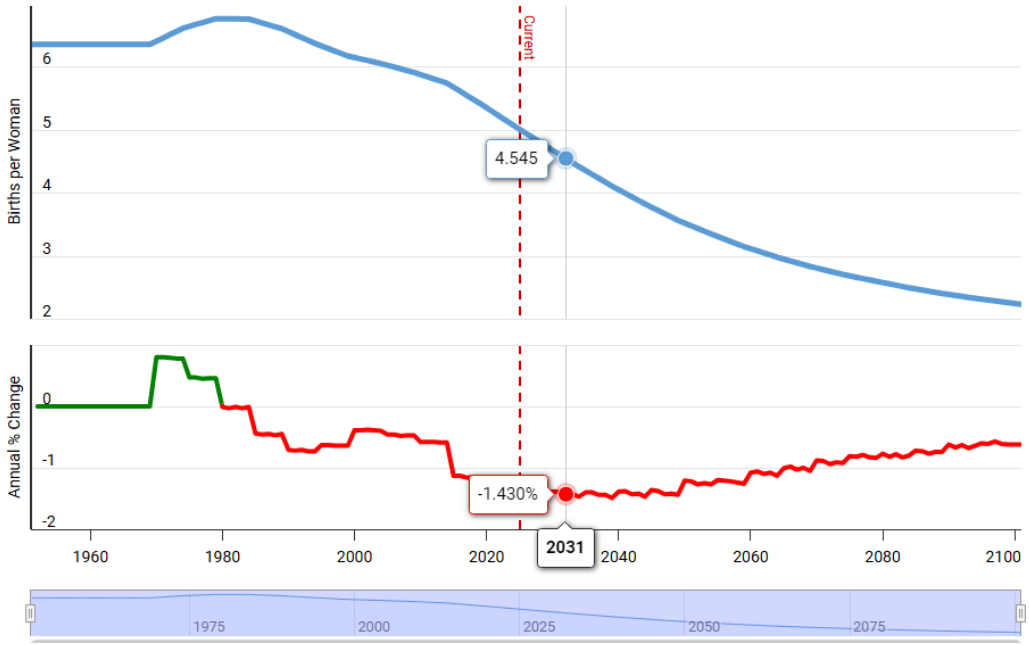


Figure 1. Nigeria Fertility Rate 1950-2024 (Source: United Nations - World Population Prospects)

Anambra State, characterized by its average literacy rates and socioeconomic development, provides a distinctive context for examining fertility behaviors (Chukwudozie *et al.*, 2022). Although evidence points to declining family sizes and the influence of female education on lower fertility rates, cultural, ethnic, and religious variations across local government areas remain critical in shaping reproductive behaviors and workplace policy requirements (Izugbara & Ezeh, 2010). This study delves into these complexities, employing a mixed-methods approach to comprehensively explore the factors influencing fertility intentions among civil servants.

By analyzing the interplay between demographic variables, job characteristics, and fertility plans, this research enriches existing literature on fertility predictors in Nigeria (Ochieng, 1991). The findings aim to inform context-specific workplace and policy measures, promoting the balance of professional and parental roles among career-focused women (Mordi *et al.*, 2013). Ultimately, the study seeks to illuminate the intricate dynamics behind modern family size decisions, with broader implications for national policies on family planning, affordable childcare, and flexible work arrangements (Bloom *et al.*, 2009).

The paper is structured into five sections. Section 2 offers an in-depth review of existing literature, synthesizing key insights and conceptual frameworks relevant to the study. Section 3 details the methodological approach, outlining the research design, data collection techniques, and analytical methods employed to address the research questions. Section 4 presents the study's findings, highlighting significant trends and patterns from the data analysis. Finally, Section 5 concludes by summarizing the major findings, discussing their implications, and proposing directions for future research.

Literature Review

Numerous studies across Nigeria and sub-Saharan Africa have investigated socioeconomic predictors of fertility, family planning adoption, and the impacts of education or urbanization on reproductive behaviors. Research has consistently shown that modernization factors like education and urban residence are associated with reduced ideal family sizes and increased contraceptive use (Kritz & Makinwa-Adebusoye, 2006; Burke & Ambasa-Shisanya, 2005). However, sociocultural norms and gender dynamics persistently influence reproductive behaviors, with patriarchal attitudes and low contraception uptake keeping fertility goals higher in rural poorer regions (Okonkwo & Okonkwo, 2010).

Longitudinal analyses have established links between women's advancing careers, delayed marriages, and falling total fertility rates across many African cities (CapeTown & Timaeus, 2003). Nevertheless, few studies have focused specifically on dynamic subgroups like career civil servants or isolated workplace policy impacts on fertility. The proposed study aims to address this gap by investigating childbearing drivers among Anambra government workforce, providing targeted insights to balance female professional aspirations and population management in Nigeria's growing urban economies.

Recent studies in Nigeria have highlighted the complex interplay of sociodemographic factors, gender norms, locality-specific attitudes, and policy awareness gaps that shape couples' reproductive health behaviors (NPC & ICF, 2019; Oyedokun, 2007; Apantaku-Onayemi *et al.*, 2018). For instance, Akanbiemu (2013) examined socio-demographic factors influencing contraceptive use among women in an urban Nigerian community, finding literacy and smaller family size goals correlated with greater contraception uptake. However, side effects concerns reduced uptake, indicating quality issues.

Similarly, Okigbo *et al.* (2019) revealed persistence of patriarchal resistance to birth control and son preference among educated urban Igbo women, highlighting subcultural barriers often overlooked in quantitative surveys. In Ghana, Hindin *et al.* (2014) adopted mixed methods, combining DHS data analysis with focus groups among women, to reveal complex dynamics around fertility decision-making with husbands exerting greater power over reproductive goals.

Methodology

Data Collection

This study adopts a quantitative approach through a cross-sectional survey design. A structured questionnaire was administered to civil servants across all 21 local government areas (LGAs) in Anambra State. The questionnaire was designed to gather comprehensive data on various socio-demographic attributes, fertility indicators such as the current number of children and child spacing, awareness and use of contraceptive methods, motivations and constraints influencing decisions about childbearing, utilization of existing organizational policies and benefits supporting parenthood, as well as perceptions regarding the need for enhancements in public sector family planning support.

The study focused exclusively on permanent employees across different cadres and job levels, ensuring a representative sample of the civil service workforce. A total of 422 civil servants participated in the study, providing insights into the fertility behavior within this population.

Poisson Regression

Poisson regression is a type of generalized linear model (GLM) specifically designed for modeling count data, where the dependent variable represents the number of occurrences of an event within a fixed period, space, or interval. This method is particularly effective when

analyzing data where the outcome is a count of occurrences, such as the number of children or the number of visits.

The Poisson distribution underpins this model, characterizing the probability of a certain number of events occurring within the defined interval. A key assumption of the Poisson distribution is that the mean and variance of the count data are equal. In Poisson regression, the relationship between the mean of the dependent variable and the independent variables is modeled using a log link function, which allows for the prediction of count data while maintaining the non-negative nature of the counts. The Poisson regression model can be written as:

$$\log(\mu_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n \tag{1}$$

where μ_i is the mean of the outcome variable modelled as $exp(X_i\beta)$, β_0 is the intercept term, $\beta_i: i = 1,2,\cdots,n$ are the coefficients associated with the predictor variables, and $X_i: i = 1,2,\cdots,n$ are the predictor variables. The Poisson distribution is defined as:

$$p(Y = y) = \frac{\mu^y e^{-\mu}}{y!} \tag{2}$$

where the log-likelihood function for Poisson distribution is given by:

$$L(\beta|y) = \prod_{i=1}^{n} \frac{\mu^y e^{-\mu}}{y!} = \sum_{i=1}^{n} y_i \log(\mu_i) - \mu_i - \log(y!) \tag{3}$$

where $\mu_i = exp(X_i\beta)$,

$$L(\beta|y) = \sum_{i=1}^{n} y_i exp(X_i\beta) - exp(X_i\beta) - \log(y!) \tag{4}$$

$$\frac{\partial L(\beta|y)}{\partial \beta} = \sum_{i=1}^{n} y_i X_i - exp(X_i\beta)X_i = 0 \tag{5}$$

However, applying GLM to the questionnaire responses, the model is formulated using number of children every born as dependent variable Y and age, gender, location, and marital status as independent variable X.

Negative Binomial Distribution

Negative binomial regression (NBR) is a type of generalized linear model designed to handle count data, especially when the data exhibit over dispersion. Over dispersion occurs when the variance of the dependent variable exceeds the mean, which violates the assumptions of the Poisson regression model. NBR introduces an extra parameter to account for this over dispersion, providing more accurate estimates and standard errors. The negative binomial distribution is given as:

$$P(Y_i = y_i) = \frac{\Gamma\left(y + \frac{1}{k}\right)}{\Gamma(y+1)\Gamma\left(\frac{k}{k}\right)} \left(\frac{k\mu}{1+k\mu}\right)^y \left(\frac{1}{1+k\mu}\right)^{\frac{1}{k}}; i = 0,1,2,3,\ldots \tag{6}$$

$$Y_i \sim NegBin(\mu, k) \text{ and } log(\mu_i) = X_i^T\beta \tag{7}$$

where Y_i is the count outcome for the ith observation, μ_i is the mean of the outcome variable, modeled as $exp(X_i\beta)$, X_i is a vector of predictor variables for the ith observation, β is a vector of coefficients, and k is the dispersion parameter.

The log-likelihood function for negative binomial distribution is written as follows:

$$\log L(\beta, k) = \sum_{i=1}^{n} \left[\log \Gamma\left(y_i + \frac{1}{k}\right) - \log \Gamma(y_i + 1) - \log \Gamma\left(\frac{1}{k}\right) + y_i \log(k\mu_i) - y_i \log(1 + k\mu_i) - \frac{1}{k} \log(1 + k\mu_i) \right] \quad (8)$$

where the mean μ_i is linked to the predictors X_i through a log link function $\mu_i = X_i^T \beta$.

Chi-Square Test of Association

To identify the gaps between births and understand preferences for family planning methods among civil servants across demographic groups in the state, we first calculate mean birth intervals from survey data across subgroups, then chi-square test of association would be used to compare family planning method preferences by age, gender, location etc. The Chi-Square test statistic is defined as:

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(o_{ij} - e_{ij})^2}{e_{ij}} \quad (9)$$

where o_{ij} is the observed frequency while e_{ij} is the expected frequencies. The null hypothesis H_0 is: there is no significant difference in awareness of existing government benefits related to parental leave, childcare assistance, and flexible work arrangements among civil servants across demographic subgroups in Anambra state.

Mixed Effect Model

A mixed effects model is a statistical model that contains both fixed effects and random effects. It is commonly used for the analysis of questionnaire or survey data that comes from multiple subjects over time. In a mixed effects model, the fixed effects are parameters that are associated with an entire population or with certain repeatable levels of experimental factors. The random effects are associated with individual experimental units drawn randomly from a population. The general formula for a mixed effects model is written as:

$$y = X\beta + Z\gamma + \varepsilon \quad (10)$$

where y is vector of responses, X is design matrix for the fixed effects, β is vector of fixed effect coefficients, Z is the design matrix for the random effects, γ is vector of random effect coefficients, and ε is vector of error terms. The random effects γ are assumed follow a multivariate normal distribution with mean zero and covariance matrix $\sigma_\gamma^2 \times D$ where D is the variance-covariance matrix of the random effects. The likelihood function for the mixed-effects model can be expressed as follows:

$$L(\beta, \sigma_\gamma^2) = \frac{1}{(2\pi)^{n/2} |\Sigma|^{1/2}} exp\left(-\frac{1}{2} (Y - X\beta - Z\gamma)^T \Sigma^{-1} (Y - X\beta - Z\gamma) \right) \quad (11)$$

where Σ is the covariance matrix of the residuals, which is assumed to be $\sigma^2 I$, where I is the identity matrix.

Results

Demographic characteristics of the civil servants in Anambra state

Table 1. Demographic characteristic of the participants

Age	Frequency	Percentage (%)
20-29yrs	81	16.8
30-39yrs	81	16.8
40-49yrs	272	56.4
50yrs	48	10.0
Gender		
Female	272	56.4
Male	210	43.6
Level of education		
FSLC	32	6.6
WASCE/GCE	64	13.3
OND	104	21.6
HND/BSC	210	43.6
Higher degree	72	14.9
Marital status		
Single	24	5.0
Divorced	48	10.0
Widow	57	11.8
Married	353	73.2
Location		
Rural	186	38.6
Urban	296	61.4
Salary		
< N300,000	314	65.1
N300000-N500000	136	28.2
N500000-N700000	16	3.3
N700000-N900000	16	3.3

In **Table 1**, the age distribution shows that a majority, 56.4%, are between 40-49 years old, with equal proportions (16.8%) in the 20-29 and 30-39 age brackets, and 10% aged 50 and above. Gender-wise, females constitute a larger portion at 56.4%, compared to 43.6% males. Educational attainment varies, with 43.6% holding HND/BSC degrees, followed by 21.6% with OND, 14.9% with higher degrees, 13.3% having WASCE/GCE, and 6.6% possessing FSLC. Marital status indicates that 73.2% are married, 11.8% are widowed, 10% are divorced, and 5% are single.

Geographically, the participants predominantly reside in urban areas (61.4%), while 38.6% are from rural locations. Income levels reveal that a significant majority, 65.1%, earn less than N300,000, with 28.2% earning between N300,000 and N500,000, and smaller groups (3.3% each) earning N500,000 - N700,000 and N700,000 - N900,000. This demographic overview highlights the diverse backgrounds of the respondents, which is crucial for analyzing fertility behavior patterns among civil servants in the region. Table 4.1above shows the demographic characteristics of the participants.

4.2 Fertility Rates Comparison among Civil Servants

Table 2. Descriptive statistics for the number of children by characteristics

Characteristics		Mean	Confidence Interval Low	Confidence Interval Upper	Min.	Max	Median	Range	I. R
Age	20-29	3.21	2.95	3.47	1	4	4	3	1
	30-39	2.91	2.62	3.2	1	6	3	5	1
	40-49	3.5	3.32	3.68	1	6	3	5	3
	50+	3.33	3.11	3.55	3	5	3	2	0
Gender	Male	3.54	3.4	3.68	1	6	4	5	1
	Female	3.81	2.99	3.36	1	6	3	5	2
Marital Status	Single	3	2.39	3.61	1	4	4	3	3
	Divorce	3.5	3.35	3.65	3	4	3.5	1	1
	Widowed	4.98	4.78	5.19	4	6	5	2	2
	Married	3.07	2.93	3.21	1	6	3	5	2
Location	Urban	2.86	2.78	2.95	1	4	3	3	1
	Rural	4.09	3.83	4.34	1	6	5	5	3

To investigates the fertility rates among civil servants, represented by the number of children ever born, and how these rates vary across different demographic factors: age, gender, location, and marital status as shown in **Table 2**, descriptive statistics was used. The analysis reveals varying fertility rates across different age groups among civil servants. Between ages 20-29 years, the mean number of children is 3.21, with a minimum of 1 and a maximum of 4 children. The median is 4, suggesting a skew towards higher fertility in this group. Ages 30-39 years, have the mean number of children drops to 2.91, with a range of 1 to 6 children and a median of 3. The interquartile range is 1, indicating moderate variability. 40-49 years, fertility increases with a mean of 3.50, ranging from 1 to 6 children. The median is 3, with an interquartile range of 3, indicating high variability in this age group. From 50 years and above, the mean is slightly lower at 3.33, with children ranging from 3 to 5. The median remains at 3, and the standard deviation is the lowest at 0.753, showing less variability. In all, younger and older civil servants tend to have fewer children compared to those in their 40s, who exhibit the highest mean fertility rate.

By Gender, fertility rates also differ by gender. For females the mean number of children is 3.18, with a minimum of 1 and a maximum of 6. The median is 3, and the interquartile range is 2, indicating moderate variability. Considering males, the mean number of children they desire to have is higher at 3.54, with a range of 1 to 5 children. The median is 4, and the interquartile range is 1, suggesting less variability compared to females. Males tend to have slightly more children on average than females, and the distribution is less varied among males.

By Marital Status, there are significant differences in fertility rates. For Singles, the mean number of children is 3.00, with a range from 1 to 4. The median is 4, showing a skew towards higher fertility. The divorced has mean, 3.50, with children ranging from 3 to 4. The median is 3.5, with minimal variability. For widowed, the group has the highest mean number of children at 4.98, with a range of 4 to 6 children. The median is 5, showing very high fertility. Married people have mean is number of children 3.07, with a range of 1 to 6 children. The

median is 3, and the interquartile range is 2, indicating moderate variability. Widowed individuals have significantly higher fertility rates, while single and married individuals have fewer children on average.

For fertility rate by Location, in the rural areas, the mean number of children is 4.09, ranging from 1 to 6. The median is 5, indicating high fertility in rural areas. The interquartile range is 3, showing substantial variability. Also, in urban areas, the mean is lower at 2.86, with a range from 1 to 4 children. The median is 3, with an interquartile range of 1, indicating less variability. Civil servants in rural areas have higher fertility rates compared to those in urban areas, with a wider range of children born.

Table 3. Poisson regression model effects test for fertility rates among civil servants in Anambra State

	Type III		
Source	**Wald Chi-Square**	Df	**p-value**
(Intercept)	182.825	1	0.000
Gender	.834	1	0.361
marital status	14.243	3	0.003
Location	17.315	1	0.000
Age	.693	1	0.405

In **Table 3**, among the independent variables, marital status and location emerged as significant predictors. Widowed individuals have a significantly higher number of children compared to other marital statuses, while those living in rural areas also tend to have more children than their urban counterparts. In contrast, gender and age were not significant predictors in the model.

The parameter estimates reveal that being widowed and living in a rural area are associated with a higher expected number of children. Specifically, widowed individuals have a multiplicative increase in the number of children by a factor of approximately 1.339, and those in rural areas by a factor of 1.275, compared to their respective reference groups (**Table 13**)

4.3 Examining Gaps between Births and Family Planning Preferences among the Civil Servants

Table 4. Distribution of responses on Family Planning Methods among civil servants in Anambra State

		Observations	**Percentage (%)**
Oral contraceptive	No	392	81.3%
	Yes	90	18.7%
Injectable	No	48	10.0%
	Yes	434	90.0%
Implants	No	232	48.1%
	Yes	250	51.9%
Condom	No	96	19.9%
	Yes	386	80.1%
Intrauterine devices	No	370	76.8%
	Yes	112	23.2%
Periodic abstinence	No	328	68.0%
	Yes	154	32.0%
Withdraw method	No	330	68.5%
	Yes	152	31.5%

The **Table 4** indicates that 81.3% of civil servants do not use oral contraceptives, while 18.7% do. Injectable contraceptives are used by 90% of respondents, leaving 10% not using this method. Implants show a near balance, with 51.9% of respondents using them and 48.1% not. Condoms are widely used, with 80.1% of civil servants opting for this method, while 19.9% do not. Intrauterine devices (IUDs) are less favored, with 76.8% not using them compared to 23.2% who do. Periodic abstinence is practiced by 32% of respondents, whereas 68% do not follow this method. Similarly, the withdrawal method is used by 31.5% of civil servants, with 68.5% not employing this technique.

Table 5. Measure of association between the demographic characteristics

Characteristic	Pearson Chi-square	df	p-value
Contraceptive and Age	19.423	3	0.001
Oral contraceptive and Gender	0.432	1	0.511
Oral contraceptive and Level of education	21.538	4	0.001
Oral contraceptive and marital status	3.852	3	0.278
Oral contraceptive and Location	31.217	1	0.001
Oral contraceptive and salary	8.58	3	0.035
Injectable and age	20.424	3	0.001
Injectable and gender	15.692	1	0.001
Injectable and Level of education	32.922	4	0.001
Injectable and Marital status	19.481	3	0.001
Injectable and Location	17.734	1	0.001
Injectable and salary	28.522	3	0.001
Implants and age	67.607	3	0.001
Implants and gender	24.497	1	0.001
Implants and Level of education	46.974	4	0.001
Implants and marital status	46.045	3	0.001
Implants and Location	51.906	1	0.001
Implants and salary	41.238	3	0.001
Condom and age	62.027	3	0.001
Condom and gender	0.176	1	0.675
Condom and Level of education	113.073	4	0.001
Condom and marital status	43.807	3	0.001
Condom and Location	75.327	1	0.001
Condom and salary	64.137	3	0.001
Intrauterine devices and age	21.447	3	0.001
Intrauterine devices and gender	0.03	1	0.862
Intrauterine device and Levelof education	31.996	4	0.001
Intrauterine devices and marital status	33.739	3	0.001
Intrauterine devices and Location	1.121	1	0.29
Intrauterine devices and salary	25.34	3	0.001
Periodic Abstinence and Age	39.203	3	0.001
Periodic Abstinence and Gender	0.047	1	0.829
Periodic Abstinence and Level of education	18.127	4	0.001
Periodic Abstinence and Marital status	6.176	3	0.103
Periodic Abstinence and Location	0.082	1	0.775
Periodic Abstinence and Salary	17.085	3	0.001
Withdrawal Method and Age	27.741	3	0.001
Withdrawal Method and Gender	26.878	1	0.001

Withdrawal method and Level of education	29.503	4	0.001
Withdrawal method and marital status	34.859	3	0.001
Withdrawal method and Location	104.048	1	0.001
Withdrawal method and salary	17.508	3	0.001

In **Table 5**, Age is a significant factor influencing all family planning methods, with Chi-square values and p-values indicating strong associations. For instance, the usage of oral contraceptives ($\chi^2 = 19.423$, $p = 0.000$), injectable ($\chi^2 = 20.424$, $p = 0.000$), implants ($\chi^2 = 67.607$, $p = 0.001$), condoms ($\chi^2 = 62.027$, $p = 0.000$), IUDs ($\chi^2 = 21.447$, $p = 0.000$), periodic abstinence ($\chi^2 = 39.203$, $p = 0.000$), and withdrawal method ($\chi^2 = 27.741$, $p = 0.000$) all show significant age-related variations.

Gender influences the use of injectable contraceptives ($\chi^2 = 15.692$, $p = 0.001$), withdrawal method ($\chi^2 = 26.878$, $p = 0.000$) and implants ($\chi^2 = 24.497$, $p = 0.000$), though its impact on other methods is less significant. Marital status affects the use of injectable ($\chi^2 = 19.481$, $p = 0.002$), withdrawal method ($\chi^2 = 34.859$, $p = 0.000$), and IUDs ($\chi^2 = 33.739$, $p = 0.003$), with less impact on other methods.

Education level significantly correlates with the usage of oral contraceptives ($\chi^2 = 21.538$, $p = 0.000$), injectable ($\chi^2 = 32.922$, $p = 0.000$), implants ($\chi^2 = 46.974$, $p = 0.000$), condoms ($\chi^2 = 113.073$, $p = 0.000$), IUDs ($\chi^2 = 31.996$, $p = 0.000$), periodic abstinence ($\chi^2 = 18.127$, $p = 0.001$), and withdrawal method ($\chi^2 = 29.503$, $p = 0.001$). Higher education levels generally correlate with increased usage of these methods.

Salary impacts the use of oral contraceptives ($\chi^2 = 8.580$, $p = 0.035$), injectable ($\chi^2 = 28.522$, $p = 0.000$), implants ($\chi^2 = 41.238$, $p = 0.001$), condoms ($\chi^2 = 64.137$, $p = 0.001$), IUDs ($\chi^2 = 25.340$, $p = 0.000$), periodic abstinence ($\chi^2 = 17.085$, $p = 0.002$), and withdrawal method ($\chi^2 = 17.508$, $p = 0.001$), suggesting economic factors influence family planning choices.
Location also affects the use of oral contraceptives ($\chi^2 = 31.217$, $p = 0.001$), injectable ($\chi^2 = 17.734$, $p = 0.000$), implants ($\chi^2 = 51.906$, $p = 0.001$), condoms ($\chi^2 = 75.327$, $p = 0.001$), and indicating geographical accessibility and cultural differences play roles in family planning preferences. Location has no influence on intrauterine (IUDs) ($\chi^2 = 1.121$, $p = 0.290$), indicating that most people the location studied do not use intrauterine contraceptive.

However, the table data shows a complex interplay of demographic factors shaping family planning method preferences among civil servants in Anambra State. High usage of injectable and condoms, balanced usage of implants, and lower usage of oral contraceptives, IUDs, periodic abstinence, and withdrawal methods characterize the overall pattern. Age, education, and salary are prominent factors influencing these preferences, with gender, marital status, and location also playing significant roles.

4.4 Examining motivations, societal expectations, and policy provisions driving fertility choices among civil servants at various life and career stages

Table 6. Distribution of responses to various motivations for childbearing among civil servants in Anambra State

			Observations	Percentage (%)
Factor	Personal desire to have children	Not important at all	43	8.9%
		Slightly important	13	2.7%
		Moderately important	113	23.4%
		Very important	142	29.5%
		Extremely important	171	35.5%
		Total	482	100.0%
	Family pressure or expectations	Not important at all	6	1.2%
		Slightly important	6	1.2%
		Moderately important	10	2.1%
		Very important	33	6.8%
		Extremely important	427	88.6%
		Total	482	100.0%
	Financial stability	Not important at all	40	8.3%
		Slightly important	32	6.6%
		Moderately important	371	77.0%
		Very important	32	6.6%
		Extremely important	7	1.5%
		Total	482	100.0%
	Career stage or stability	Not important at all	290	60.2%
		Slightly important	39	8.1%
		Moderately important	59	12.2%
		Very important	56	11.6%
		Extremely important	38	7.9%
		Total	482	100.0%
	Cultural or religious beliefs	Not important at all	78	16.2%
		Slightly important	37	7.7%
		Moderately important	53	11.0%
		Very important	97	20.1%
		Extremely important	217	45.0%
		Total	482	100.0%

Table 6 provides the distribution of responses to various motivations for childbearing. The data show that a significant proportion of respondents consider personal desire, family pressure, and cultural or religious beliefs as very or extremely important in their decision to have children. Specifically, 35.5% of respondents indicated that the personal desire to have children is extremely important, while 29.5% rated it as very important. Family pressure or expectations were rated as extremely important by 88.6% of respondents. For cultural or religious beliefs, 45.0% considered it extremely important, and 20.1% rated it as very important. In contrast, financial stability and career stage or stability were less frequently deemed important, with only 8.3% and 7.9% of respondents, respectively, considering them extremely important.

Table 7. Negative Binomial regression model effects test of motivations for childbearing among civil servants in Anambra State

	Type III		
Source	**Wald Chi-Square**	**df**	**p-value**
(Intercept)	27.088	1	.285
Personal desire to have children	1.305	4	.031
Family pressure or expectations	1.533	4	.0215
Financial stability	2.370	4	.668
Career stage or stability	5.696	4	.223
Cultural or religious beliefs	1.710	4	.029

Table 7 presents the Type III Wald Chi-Square tests, revealing that personal desire to have children ($p = 0.031$), family pressure or expectations ($p = 0.0215$), and cultural or religious beliefs ($p = 0.029$) significantly predict the number of children. These findings underscore the substantial role of intrinsic motivations, social influences, and cultural factors in childbearing decisions. In contrast, financial stability ($p = 0.668$) and career stage or stability ($p = 0.223$) do not have a significant impact.

In general, the analysis highlights that intrinsic and social motivations, along with cultural beliefs, are crucial determinants of fertility behavior among civil servants in Anambra State, Nigeria. Economic factors and career considerations, however, appear to play a lesser role. This understanding can guide the development of targeted policies and programs to support family planning and reproductive health in the region.

Table 8. Distribution of responses on societal expectations and pressures related to childbearing among civil servants

			Observations	**Percentage (%)**
Factor	Society expects individuals to have children by a certain age	Strongly disagree	23	4.8%
		Disagree	104	21.6%
		Neutral	38	7.9%
		Agree	123	25.5%
		Strongly Agree	194	40.2%
		Total	482	100.0%
	Having children is essential for social acceptance	Strongly disagree	49	10.2%
		Disagree	85	17.6%
		Neutral	86	17.8%
		Agree	181	37.6%
		Strongly Agree	81	16.8%
		Total	482	100.0%
	Childbearing is considered a crucial part of marital life	Strongly disagree	49	10.2%
		Disagree	76	15.8%
		Neutral	74	15.4%
		Agree	283	58.7%
		Total	482	100.0%
	There is societal pressure to have more than one child	Strongly disagree	88	18.3%
		Disagree	26	5.4%
		Neutral	77	16.0%
		Agree	146	30.3%
		Strongly Agree	145	30.1%
		Total	**482**	**100.0%**

The analysis of **Table 8** reveals notable insights into societal expectations. When considering whether society expects individuals to have children by a certain age, 4.8% of respondents strongly disagreed, 21.6% disagreed, 7.9% were neutral, 25.5% agreed, and 40.2% strongly agreed. Similarly, regarding the necessity of having children for social acceptance, 10.2% strongly disagreed, 17.6% disagreed, 17.8% were neutral, 37.6% agreed, and 16.8% strongly agreed. In terms of childbearing being considered a crucial part of marital life, 10.2% strongly disagreed, 15.8% disagreed, 15.4% were neutral, and a significant 58.7% agreed. Lastly, the perception of societal pressure to have more than one child showed 18.3% strongly disagreed, 5.4% disagreed, 16.0% were neutral, 30.3% agreed, and 30.1% strongly agreed.

Table 9. Negative binomial regression model effects test for societal expectations and pressures related to childbearing in Anambra State

	Type III		
Source	Wald Chi-Square	df	p-value
(Intercept)	23.280	1	0.000
Society expects individuals to have children by a certain age	2.640	4	0.020
Having children is essential for social acceptance	2.723	4	0.503
Childbearing is considered a crucial part of marital life	3.419	3	0.031
There is societal pressure to have more than one child	2.204	5	0.040

In **Table 9**, the intercept showed a highly significant effect (Wald Chi-Square = 23.280, df = 1, $p < .001$), suggesting substantial underlying influences on the number of children beyond the included variables. Societal expectations about the timing of childbearing were found to be significant (Wald Chi-Square = 2.640, df = 4, $p = .020$), indicating that these expectations significantly influence fertility behavior. However, the belief that having children is essential for social acceptance was not significant (Wald Chi-Square = 2.723, df = 4, $p = .503$), implying this perception does not notably impact the number of children. In contrast, the view of childbearing as a crucial part of marital life was significant (Wald Chi-Square = 3.419, df = 3, $p = .031$), highlighting its importance in fertility decisions. Additionally, societal pressure to have more than one child was also significant (Wald Chi-Square = 2.204, df = 5, $p = .040$), further emphasizing the influence of societal norms on fertility behavior.

The findings underscore the significant role of societal expectations and pressures in shaping fertility behavior among civil servants in Anambra State, Nigeria. The timing of childbearing, its perceived importance in marriage, and societal pressure to have multiple children are key factors influencing the number of children. Conversely, the notion that children are essential for social acceptance does not significantly impact fertility behavior. These insights provide a nuanced understanding of how societal norms and expectations shape reproductive decisions in this context.

Table 10. Distribution of responses on impact of policy provisions among civil servants in Anambra State

			Observations	Percentage (%)
Factor	Maternity/paternity leave policies	No influence at all	59	12.2%
		Slight influence	74	15.4%
		Moderate influence	142	29.5%
		High influence	207	42.9%
		Total	482	100.0%
	Childcare support and services provided by the government	No influence at all	28	5.8%
		Slight influence	50	10.4%
		Moderate influence	193	40.0%
		High influence	211	43.8%
		Total	482	100.0%
	Financial incentives for having children	No influence at all	192	39.8%
		Slight influence	185	38.4%
		Moderate influence	16	3.3%
		High influence	67	13.9%
		Extreme influence	22	4.5%
		Total	482	100.0%
	Workplace flexibility and family-friendly policies	No influence at all	190	39.4%
		Slight influence	117	24.3%
		Moderate influence	69	14.3%
		High influence	53	11.0%
		Extreme influence	53	11.0%
		Total	482	100.0%

In **Table 10**, Maternity/paternity leave policies had varying levels of influence on fertility behavior. While 12.2% indicated no influence at all, 15.4% slight influence, 29.5% moderate influence, and 42.9% high influence. Childcare support and services provided by the government also showed a significant impact, with 5.8% no influence at all, 10.4% slight influence, 40.0% moderate influence, and 43.8% high influence. Financial incentives for having children had diverse responses: 4.1% indicated no influence, 39.8% no influence at all, 38.4% slight influence, 3.3% moderate influence, 13.9% high influence, and 4.5% extreme influence. Workplace flexibility and family-friendly policies were reported to have no influence at all by 39.4% of respondents, slight influence by 24.3%, moderate influence by 14.3%, high influence by 11.0%, and extreme influence by 11.0%.

Table 11. Negative binomial regression model effects test for policy provisions among civil servants in Anambra State

	Type III		
Source	Wald Chi-Square	df	p-value
(Intercept)	39.085	1	0.000
Maternity/paternity leave policies	2.933	4	0.013
Childcare support and services provided by the government	2.058	4	0.045
Financial incentives for having children	2.298	5	0.807
Workplace flexibility and family-friendly policies	7.957	4	0.093

Table 11 reveals that the intercept was highly significant with a Wald chi-square value of 39.085 (df = 1, p < .001). Maternity/paternity leave policies had a Wald chi-square value of 2.933 (df = 4, p = .013), indicating a significant effect on the number of children. Childcare support and services provided by the government had a Wald chi-square value of 2.058 (df = 4, p = .045), also indicating a significant effect. Financial incentives for having children had a Wald chi-square value of 2.298 (df = 5, p = .807), which was not significant. Workplace flexibility and family-friendly policies had a Wald chi-square value of 7.957 (df = 4, p = .093), approaching significance.

The study found that maternity/paternity leave policies and childcare support services provided by the government significantly influence fertility behavior among civil servants in Anambra State. Financial incentives for having children did not show a significant effect, whereas workplace flexibility and family-friendly policies showed a near-significant impact. These findings highlight the importance of supportive policies in influencing childbearing decisions.

4.5 Relationship between individual-level factors and fertility behaviour among civil servants in Anambra State, accounting for the clustering effect of location

Table 12. Result of fixed effects estimates of the relationship between fertility behaviour among civil servants in Anambra State

Source	Numerator df	Denominator df	F	p-value
Intercept	1	469	703.219	0.000
Age	3	469.000	23.200	0.000
Gender	1	469.000	35.596	0.000
Level of education	4	469.000	77.903	0.000
Marital status	3	469.000	28.350	0.000
Location	1	469	85.205	0.000

Table 12 provides detailed insights into the relationship between the predictor variables and the dependent variable (number of children). The significant predictors include age, gender, level of education, marital status, and location. Younger age groups (20-29, 30-39, and 40-49) years have significantly fewer children compared to the reference age group (50 years and above). Males prefer to have fewer children compared to females. Education levels show mixed results, with some people with the qualifications (WAEC/GCE and BSc/HND) having fewer children and others having more children compared to the reference group. Marital status also impacts fertility, with different statuses having varying effects. The location

significantly affects the number of children, with the negative estimate indicating fewer children in the urban location than in the rural location.

Table 13. Poisson regression model estimates for fertility rates among civil servants in Anambra State

				95% C.I for Exp(B)	
Parameter	**B**	**p-value**	**Exp(B)**	**Lower**	**Upper**
(Intercept)	1.017	.000	2.764	2.330	3.279
[gender=1]	-.051	.361	.950	.852	1.060
[gender=2]	0[a]	.	1	.	.
[marital status=1]	-.051	.689	.950	.738	1.222
[marital status=2]	.052	.546	1.054	.890	1.248
[marital status=3]	.292	.000	1.339	1.142	1.569
[marital status=4]	0[a]	.	1	.	.
[Location=1]	.243	.000	1.275	1.137	1.430
[Location=2]	0[a]	.	1	.	.
Age	.025	.405	1.026	.966	1.089
(Scale)	1[b]				

5. Conclusion

The study concludes that fertility behavior among civil servants in Anambra State is influenced by a complex interplay of demographic factors, personal motivations, societal expectations, and policy provisions. Middle-aged, rural, and widowed individuals exhibit higher fertility rates, while educational attainment and income levels also play significant roles. Personal desire and family pressure are major motivators for childbearing, whereas financial and career considerations are less influential. Societal norms and expectations significantly shape fertility behavior, with policy provisions such as maternity/paternity leave and childcare support having a notable impact.

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