

Original Research Article

## **Determinants and Predictors of Fertility Awareness Among Women Attending Gynaecology and General Outpatient Clinics in Calabar, Nigeria: A Cross-Sectional Study**

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**Abstract:** Background: Understanding reproductive physiology, the fertile window, and factors affecting conception — known as fertility awareness — is fundamental to promoting reproductive health. However, data from sub-Saharan Africa indicate that many women have poor fertility knowledge, which can negatively impact reproductive decisions and outcomes. This study sought to evaluate the extent of fertility awareness and determine its associated factors and predictors among women attending gynaecology and general outpatient clinics at a tertiary hospital in Calabar, Nigeria. Methods: We carried out a cross-sectional descriptive study involving 300 women aged 18–49 years, selected via systematic random sampling. Information was gathered using a pretested, structured, interviewer-administered questionnaire that covered sociodemographic data, reproductive history, and fertility awareness across several domains. Analysis was done with SPSS v26.0 using descriptive statistics, chi-square tests, and binary logistic regression. A p-value <0.05 was considered statistically significant. Results: Respondents had a mean age of  $31.4 \pm 7.8$  years. Overall, 50.7% (152/300) had good fertility awareness. Knowledge was greatest for menstrual cycle regularity (74.7%) and least for basal body temperature charting (32.7%). Multivariate analysis showed that tertiary education (OR = 4.62; 95% CI: 2.78–7.68;  $p < 0.001$ ), prior family planning counselling (OR = 3.44; 95% CI: 2.08–5.70;  $p < 0.001$ ), being a civil servant (OR = 2.98; 95% CI: 1.76–5.04;  $p < 0.001$ ), previous infertility assessment (OR = 2.76; 95% CI: 1.60–4.76;  $p < 0.001$ ), and monthly income  $> \text{N}100,000$  (OR = 2.36; 95% CI: 1.44–3.86;  $p = 0.001$ ) were independent predictors of good fertility awareness. Conclusion: About half of women had adequate fertility awareness, with education, occupation, income, and exposure to reproductive health services as main predictors. There is an urgent need for targeted health education, especially for women with lower education and income, to enhance fertility awareness and improve reproductive health outcomes in Nigeria.

**Keywords:** Fertility awareness, Nigeria, reproductive health, women's health, infertility

## INTRODUCTION

Fertility awareness encompasses an individual's understanding of reproductive biology, including the accurate timing of the fertile period within the menstrual cycle, the process of ovulation, and the various biological, environmental, and lifestyle factors that influence the capacity for conception and maintenance of pregnancy.<sup>1,2</sup> It represents a critical domain of reproductive health literacy and forms the bedrock of informed reproductive decision-making, enabling women to plan pregnancies, avoid unintended conceptions, and seek timely medical care for subfertility.

Globally, Infertility is estimated to affect 48 million couples and 186 million individuals, with sub-Saharan Africa bearing a disproportionately high burden of both primary and secondary infertility.<sup>3</sup> In Nigeria, infertility rates range from 20% to 30% in various studies, representing one of the highest burdens on the continent. Yet, despite this epidemiological reality, fertility awareness remains inadequately studied and poorly understood among Nigerian women.

Studies from high-income nations have repeatedly shown inadequate fertility knowledge, even among women with higher education, especially concerning age-related declines in fertility, identification of the fertile period, and how lifestyle factors like obesity, smoking, and sexually transmitted infections (STIs) affect reproductive capacity.<sup>4,5</sup> The situation in low- and middle-income countries (LMICs), Nigeria included, is probably more critical due to further constraints such as poor access to healthcare, limited schooling, and cultural obstacles to obtaining reproductive health information.

In Nigeria, the intersection of cultural beliefs, patriarchal norms, religious influences, and limited formal health education creates a complex milieu in which women may receive inaccurate or incomplete information about their fertility.<sup>6,7</sup> Misconceptions about the fertile period, the role of menstrual cycle irregularity in infertility, and the treatability of reproductive conditions are widespread. These knowledge gaps lead to delayed care-seeking, inappropriate use of traditional remedies, and psychosocial consequences, including marital discord and social stigmatisation.

The tertiary referral centre receives a diverse patient population spanning various socioeconomic strata, educational backgrounds, and cultural contexts.<sup>8</sup> Its Gynaecology Clinic and General Outpatient Department (GOPD) provide a unique and representative setting in which to assess fertility awareness, as they serve both women with reproductive health concerns and those attending for other medical conditions.

Despite the clinical and public health relevance of fertility awareness, there is a paucity of robust, institutionally grounded research on this subject from the South-South geopolitical zone of Nigeria. The few available studies have been conducted in the southwest and north of the country, and their findings may not be generalisable to the distinct sociocultural and demographic context of Cross River State.

Consequently, this study sought to: (i) evaluate the extent of fertility awareness among women attending gynaecological and general outpatient clinics; (ii) examine the sociodemographic and clinical factors linked to fertility awareness; and (iii) establish the independent predictors of adequate fertility awareness in this group. It is anticipated that the results will guide the development of targeted, evidence-based health education programs and reproductive health policies in Nigeria.

## **2. MATERIALS AND METHODS**

### **2.1 Study Design and Setting**

This was a cross-sectional descriptive study carried out from January to September 2023 at the Gynaecology Clinic and General Outpatient Department (GOPD) of the University of Calabar Teaching Hospital (UCTH), Calabar, Cross River State, Nigeria. The Gynaecology Clinic sees about 50 patients each week, while the GOPD records roughly 400 consultations weekly.

### **2.2 Study Population and Eligibility Criteria**

The study included women of reproductive age (18–49 years) attending the Gynaecology Clinic or GOPD during the study period.<sup>9</sup> Eligibility required participants to be 18–49 years old, not previously enrolled in the study, not acutely ill, and to provide informed consent. Exclusions applied to women who could not converse in English or Nigerian Pidgin and those with significant cognitive impairment.

### **2.3 Sample Size Determination**

The minimum sample size was computed using Cochran's formula for cross-sectional surveys:  $n = Z^2pq/d^2$ , where  $Z = 1.96$  (95% confidence level),  $p = 0.50$  (assumed proportion with good fertility awareness, to maximise sample size),  $q = 1 - p = 0.50$ , and  $d = 0.06$  (acceptable margin of error).<sup>10</sup> This gave a minimum of 267 participants. With a 10% allowance for non-response, the final target was 300 participants.

### **2.4 Sampling Technique**

Systematic random sampling was used. The weekly average attendance was applied to estimate total attendees during the study period. A sampling interval ( $k$ ) was obtained by dividing the estimated total attendance by the required sample size. The first respondent was chosen randomly among the first  $k$  attendees, and subsequently every  $k$ th attendee was recruited until the sample size was reached, with proportional allocation across both clinics.

### **2.5 Data Collection Instrument**

Information was obtained using a pretested, structured, interviewer-administered questionnaire adapted from validated instruments used in earlier fertility awareness studies in Nigeria and other African contexts.<sup>11,12</sup> The questionnaire had four parts: (A) sociodemographic details (age, education, marital status, occupation, monthly household income, parity, and religion); (B) reproductive history and healthcare use (prior infertility assessment, family planning counselling, STI history, and exposure to health information via media); (C) a 20-item fertility awareness scale covering knowledge of the fertile period,

ovulation, basal body temperature (BBT), cervical mucus changes, menstrual cycle physiology, age-related fertility decline, lifestyle influences on fertility, STI-related fertility impairment, and available fertility treatment options; and (D) sources of fertility-related information.

## 2.6 Scoring and Outcome Variable

Each correct response in Section C was awarded one mark, with a maximum total score of 20. A composite fertility awareness score was computed for each participant. Consistent with similar studies, a score of  $\geq 10/20$  (50%) was classified as 'good fertility awareness', while a score  $< 10/20$  was classified as 'poor fertility awareness'. Domain-specific analyses were also conducted.

## 2.7 Pretesting and Quality Assurance

The questionnaire was pretested among 30 women at the University of Calabar Teaching Hospital antenatal clinic (not included in the main study), and necessary modifications were made based on clarity and comprehension.<sup>13</sup> Four trained research assistants (nurses) conducted the interviews in private consultation rooms. Daily checks of completed questionnaires were performed by the principal investigator to ensure completeness and consistency.

## 2.8 Ethical Considerations

Ethical clearance was secured from the Health Research Ethics Committee (UCTH/HREC/2022/117) before data collection began.<sup>14</sup> Written informed consent was secured from every participant. Confidentiality was protected by using coded identifiers rather than names. Participation was fully voluntary, and respondents could withdraw at any stage without any negative impact on the care they received.

## 2.9 Statistical Analysis

Data were entered and analysed with IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA).<sup>15</sup> Continuous data were presented as mean  $\pm$  standard deviation, while categorical data were reported as frequencies and percentages. Bivariate relationships between sociodemographic factors and fertility awareness were tested using Chi-square ( $\chi^2$ ) analysis. Variables that had  $p < 0.25$  in the bivariate tests were included in a binary logistic regression model using the backward stepwise approach to determine independent predictors of good fertility awareness. Both crude and adjusted odds ratios (OR) with 95% confidence intervals (CI) were presented. The level of statistical significance was set at  $p < 0.05$ .

## 3. RESULTS

### 3.1 Sociodemographic Profile of Respondents

Three hundred women were enrolled, and all completed the questionnaire, yielding a 100% response rate. Respondents had a mean age of  $31.4 \pm 7.8$  years, with ages ranging from 18 to 49 years, and nearly half (46.0%) fell within the 25–34 year bracket. More than half (50.7%) had university-level education, and 64.0% were married. The largest

occupational category was civil servants at 38.7%, while 34.7% reported monthly household earnings of between ₦50,000 and ₦100,000. Christians made up most of the sample (72.0%), and 44.7% had given birth to one or two children. Table 1 shows the full sociodemographic profile

**Table 1:** Sociodemographic Profiles of Study Respondents (n = 300)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–24	52	17.3
	25–34	138	46.0
	35–44	82	27.3
	≥45	28	9.3
Educational Level	No formal education	18	6.0
	Primary	34	11.3
	Secondary	96	32.0
	Tertiary	152	50.7
Marital Status	Single	74	24.7
	Married	192	64.0
	Divorced/Widowed	34	11.3
Occupation	Unemployed	42	14.0
	Trader/Self-employed	88	29.3
	Civil servant	116	38.7
	Student	54	18.0
Monthly Income (₦)	<50,000	68	22.7
	50,000–100,000	104	34.7
	100,001–200,000	82	27.3
	>200,000	46	15.3
Parity	Nulliparous	78	26.0
	1–2	134	44.7
	3–4	66	22.0
	≥5	22	7.3
Religion	Christianity	216	72.0
	Islam	72	24.0
	Traditional/Other	12	4.0

### 3.2 Level of Fertility Awareness

Overall, 152 respondents (50.7%) achieved a score of  $\geq 10/20$  and were classified as having good fertility awareness, while 148 (49.3%) had poor fertility awareness.<sup>16</sup> Domain-specific analysis revealed that knowledge of menstrual cycle regularity was the highest (74.7%), followed by awareness of the fertile window/ovulation (62.0%) and the impact of STIs on fertility (56.0%). The lowest scores were recorded for knowledge of basal body temperature charting (32.7%) and fertility treatment options (35.3%). The detailed domain scores are presented in Table 2.

**Table 2:** Domain-Specific Fertility Awareness Scores Among Respondents (n = 300)

Domain of Fertility Awareness	Good Knowledge n (%)	Poor Knowledge n (%)
Awareness of the fertile window/ovulation	186 (62.0)	114 (38.0)
Knowledge of basal body temperature (BBT)	98 (32.7)	202 (67.3)
Cervical mucus changes	112 (37.3)	188 (62.7)
Menstrual cycle regularity	224 (74.7)	76 (25.3)
Age-related fertility decline	144 (48.0)	156 (52.0)
Effect of lifestyle on fertility	128 (42.7)	172 (57.3)
Impact of STIs on fertility	168 (56.0)	132 (44.0)
Fertility treatment options	106 (35.3)	194 (64.7)
Overall Fertility Awareness Score	152 (50.7)	148 (49.3)

### 3.3 Sociodemographic Determinants of Fertility Awareness

Bivariate analysis revealed several statistically significant associations with good fertility awareness. Women with tertiary education were significantly more likely to demonstrate good fertility awareness compared to those with no formal education or only primary education ( $\chi^2 = 48.62$ ,  $p < 0.001$ ).<sup>17</sup> Similarly, civil servants had higher fertility awareness than unemployed women ( $\chi^2 = 22.14$ ,  $p < 0.001$ ). Women earning above ₦100,000 per month had significantly better fertility awareness than lower-income groups ( $\chi^2 = 18.76$ ,  $p < 0.001$ ). Women who had previously received family planning counselling ( $\chi^2 = 36.88$ ,  $p < 0.001$ ) and those who had undergone infertility evaluation ( $\chi^2 = 28.44$ ,  $p < 0.001$ ) also demonstrated significantly higher fertility awareness. Age, marital status, parity, and religion were also associated with fertility awareness on bivariate analysis ( $p < 0.05$ ).

### 3.4 Predictors of Good Fertility Awareness: Multivariate Analysis

Variables that reached  $p < 0.25$  in bivariate testing were entered into a binary logistic regression model. The model was statistically significant overall (Omnibus  $\chi^2 = 148.36$ ,  $df = 12$ ,  $p < 0.001$ ) and accounted for 46.2% of the variation in fertility awareness (Nagelkerke  $R^2$ ). The Hosmer-Lemeshow test showed acceptable model fit ( $\chi^2 = 8.14$ ,  $df = 8$ ,  $p = 0.42$ ). In the multivariate model, university-level education was the strongest independent predictor of good fertility awareness (OR = 4.62; 95% CI: 2.78–7.68;  $p < 0.001$ ). Other significant predictors were prior family planning counselling (OR = 3.44; 95% CI: 2.08–5.70;  $p < 0.001$ ), being a civil servant (OR = 2.98; 95% CI: 1.76–5.04;  $p < 0.001$ ), prior infertility assessment (OR = 2.76; 95% CI: 1.60–4.76;  $p < 0.001$ ), monthly income above ₦100,000 (OR = 2.36; 95% CI: 1.44–3.86;  $p = 0.001$ ), and exposure to health-related media (OR = 2.12; 95% CI: 1.30–3.46;  $p = 0.002$ ). High school education (OR = 2.14; 95% CI: 1.24–3.70;  $p = 0.007$ ), parity of three or more (OR = 1.68; 95% CI: 1.02–2.76;  $p = 0.041$ ), and age 35 years or older (OR = 1.84; 95% CI: 1.12–3.02;  $p = 0.016$ ) were also independently associated. Table 3 contains the full results.

**Table 3:** Binary Logistic Regression — Independent Predictors of Good Fertility Awareness (n = 300)

Variable	OR	95% CI	p-value
Age ( $\geq 35$ vs $< 35$ years)	1.84	1.12–3.02	0.016
Tertiary education (vs none/primary)	4.62	2.78–7.68	$< 0.001$
Secondary education (vs none/primary)	2.14	1.24–3.70	0.007
Married (vs single)	1.52	0.94–2.46	0.086
Civil servant occupation (vs unemployed)	2.98	1.76–5.04	$< 0.001$
Monthly income $> 100,000$ ₦ (vs $< 50,000$ )	2.36	1.44–3.86	0.001
Parity $\geq 3$ (vs nulliparous)	1.68	1.02–2.76	0.041
Prior family planning counselling	3.44	2.08–5.70	$< 0.001$
Previous infertility evaluation	2.76	1.60–4.76	$< 0.001$
Exposure to health education media	2.12	1.30–3.46	0.002

OR = Odds Ratio; CI = Confidence Interval; ₦ = Nigerian Naira. Reference categories in parentheses.

## 4. DISCUSSION

This cross-sectional study assessed fertility awareness among 300 women attending gynaecology and general outpatient clinics at a tertiary hospital in Calabar, Nigeria. The

overall prevalence of good fertility awareness was 50.7%, indicating that approximately half of the women had a satisfactory understanding of fertility-related concepts. This finding reflects a significant gap in reproductive health knowledge that warrants targeted public health intervention.<sup>1</sup>

Fertility awareness levels reported in this study align with results from comparable research conducted in Nigeria. A study among women attending a fertility clinic in Enugu reported 54.2% good fertility knowledge, while a study in Lagos found 48.6% adequate awareness.<sup>6,7</sup> However, these figures are considerably lower than those reported from high-income country settings, where up to 70–80% of women demonstrate adequate fertility knowledge, albeit with well-documented gaps in specific domains such as age-related decline and natural fertility cycle methods.

Domain-specific analysis revealed that awareness of menstrual cycle regularity was the highest (74.7%), which may reflect the frequency with which menstrual irregularity is a presenting complaint in gynaecology clinics, prompting patient education by healthcare providers.<sup>19</sup> In contrast, knowledge of BBT charting (32.7%) and fertility treatment options (35.3%) was particularly poor. This mirrors findings from other African studies, where more technical aspects of fertility physiology and assisted reproductive technologies are poorly understood, likely due to limited health literacy, low media coverage, and high cost of fertility investigations and treatments, which places them beyond the consideration of many women.

In this study, education was identified as the strongest independent predictor of adequate fertility awareness, with university-educated women being almost five times as likely to have good awareness than those with no formal schooling or only elementary education. (OR = 4.62,  $p < 0.001$ ).<sup>4,5</sup> This is consistent with a substantial body of literature from sub-Saharan Africa and globally, which confirms education as the single most important determinant of health literacy, including reproductive health knowledge. Education not only directly imparts knowledge but also enhances critical thinking, health information-seeking behaviour, and the ability to engage meaningfully with healthcare providers.

Access to reproductive health services — specifically prior family planning counselling (OR = 3.44) and previous infertility evaluation (OR = 2.76) — were significant predictors of good fertility awareness in this study.<sup>11,12</sup> This underscores the vital role of point-of-care health education in tertiary health facilities. Women who have previously engaged with the healthcare system for reproductive health concerns appear to accumulate fertility knowledge through these interactions, highlighting the opportunity to routinely integrate structured fertility counselling into all reproductive health consultations in Nigerian hospitals.

Occupation and income were also significant predictors of fertility awareness, with civil servants and higher-income women showing greater awareness.<sup>17</sup> These findings likely reflect the interplay of education, socioeconomic access to information resources (internet, newspapers, health magazines), and healthcare utilisation patterns. Lower-income women

who are unemployed or self-employed in the informal sector may face multiple barriers to accessing reproductive health information, including cost of care, transportation challenges, and limited time for health-seeking activities.

The finding that age  $\geq 35$  years (OR = 1.84) was associated with good fertility awareness is of particular interest, given that this cohort is also at greatest risk for age-related fertility decline.<sup>3,8</sup> While older women may accumulate more reproductive experience and healthcare exposure over time, the fact that a significant proportion still demonstrated poor awareness of fertility decline and treatment options is concerning. This suggests that even experiential knowledge gained through personal reproductive health challenges does not necessarily translate to adequate clinical fertility awareness without targeted health education.

Exposure to health education media was an independent predictor of good fertility awareness (OR = 2.12,  $p = 0.002$ ), highlighting the role of mass media campaigns, social media, and community health education programmes in bridging the fertility knowledge gap.<sup>18,20</sup> Given the high penetration of mobile phones and social media platforms in Nigeria, digital health interventions targeting fertility awareness represent a promising and scalable strategy to improve reproductive health literacy among Nigerian women.

#### **4.1 Strengths and Limitations**

This study has multiple strengths. It used an institution-based approach at a key tertiary referral hospital, achieved an adequate sample size, employed a validated and pretested questionnaire, and recorded a 100% response rate. The detailed multivariate analysis made it possible to identify independent predictors while adjusting for confounding variables. However, some limitations must be noted. Because of its cross-sectional design, the study cannot establish cause-and-effect relationships. The hospital-based sample may reduce generalisability to the wider community, since patients who attend clinics often differ from non-attendees in health-seeking practices and socioeconomic status.<sup>9,10</sup> There is also a possibility of social desirability bias inflating knowledge scores, even with steps taken to make participants comfortable. In addition, being limited to one tertiary facility may limit how well the findings apply to primary and secondary health facilities.

#### **5. CONCLUSION**

This study found that only half of women attending gynaecology and general outpatient clinics at the health facility had good fertility awareness, with significant deficits in knowledge of basal body temperature charting, fertility treatment options, and age-related fertility decline. Education, occupation, income, access to family planning counselling, prior infertility evaluation, and media exposure were identified as significant independent predictors of good fertility awareness.

These results carry significant implications for both clinical care and public health policy. Routine integration of structured, evidence-based fertility education into all reproductive health consultations at the hospital and other Nigerian health facilities is

strongly recommended. Targeted programmes should prioritise women with low educational attainment and limited income. Community-based digital health interventions leveraging mobile platforms should also be explored. Future studies should adopt longitudinal designs, include community-based samples, and evaluate the impact of fertility education programmes on reproductive health outcomes in Nigeria.

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