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DETERMINANTS OF ANTENATAL EXERCISE AMONG PREGNANT WOMEN IN CALABAR, CROSS RIVER STATE, NIGERIAA :CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Physical activity during pregnancy is associated with numerous maternal and neonatal benefits; however, many pregnant women in sub-Saharan Africa remain insufficiently active. This study investigated the determinants of antenatal exercise among pregnant women attending antenatal care clinics in Calabar, Cross River State, Nigeria.

Objectives: To assess the prevalence of antenatal exercise, identify sociodemographic and obstetric determinants, and evaluate healthcare provider influence on exercise behaviour among pregnant women in Calabar.

Methods: A descriptive cross-sectional study was conducted among 320 pregnant women attending antenatal clinics at the University of Calabar Teaching Hospital (UCTH) and General Hospital Calabar between June and November 2024. Systematic random sampling was used. A pre-tested, structured questionnaire was administered. Data were analysed using SPSS version 26.0. Chi-square test and binary logistic regression were applied to determine associations.

Results: The prevalence of antenatal exercise was 38.4%. Walking was the most common exercise type (72.4%). Significant determinants included educational level ($p<0.001$), occupation ($p=0.002$), gestational age ($p=0.008$), healthcare provider advice ($p<0.001$), and perceived safety ($p<0.001$). Women who received exercise advice from healthcare providers were 4.2 times more likely to exercise (OR=4.21; 95% CI: 2.34–7.58). Fear of harm to the baby (64.1%) and fatigue (52.3%) were the most cited barriers.

Conclusion: Antenatal exercise prevalence remains low in Calabar. Healthcare provider counselling is a strong independent determinant. Targeted health education and culturally sensitive exercise guidelines are urgently needed to improve maternal outcomes.

Keywords: *Antenatal exercise; Pregnancy; Physical activity; Determinants; Calabar; Nigeria*

1. INTRODUCTION

Physical activity during pregnancy, commonly referred to as antenatal exercise, is defined as any bodily movement produced by skeletal muscles that results in energy expenditure above resting levels [1]. The World Health Organization (WHO) recommends that pregnant women without contraindications should engage in at least 150 minutes of moderate-intensity aerobic physical activity per week, distributed across several days [2]. These recommendations are supported by a growing body of evidence demonstrating the maternal and foetal benefits of regular antenatal exercise.

Regular physical activity during pregnancy is associated with a reduced risk of gestational diabetes mellitus (GDM), pre-eclampsia, excessive gestational weight gain, caesarean delivery, and postpartum depression [3,4]. For the neonate, maternal exercise has been linked to improved foetal cardiovascular function, lower rates of macrosomia, and better neurodevelopmental outcomes [5]. Despite these well-documented benefits, many pregnant women worldwide, particularly in low- and middle-income countries (LMICs), do not engage in recommended levels of physical activity [6].

In Nigeria, antenatal care attendance rates have improved significantly over recent decades; however, the quality of advice provided within antenatal clinics remains variable [7]. Cultural beliefs, socioeconomic constraints, and gaps in healthcare provider knowledge continue to contribute to suboptimal physical activity levels among pregnant Nigerian women [8].

Calabar, the capital city of Cross River State, has a predominantly urban population with a heterogeneous socioeconomic structure. Pregnant women attending antenatal clinics in Calabar come from diverse educational, occupational, and cultural backgrounds, making it a representative setting to study the complex determinants of antenatal exercise [9]. Understanding these determinants is critical to developing targeted interventions that can improve maternal and neonatal outcomes across the region.

Existing literature from other Nigerian states and African settings suggests that perceived safety of exercise during pregnancy, healthcare provider advice, educational level, and occupational status are key modifiers of exercise behaviour [10,11]. However, the relative importance of these factors in the Calabar context has not been systematically investigated. Furthermore, the role of sociocultural norms—including beliefs that exercise may cause miscarriage or preterm labour—has rarely been quantified in local studies [12].

This study therefore aimed to determine the prevalence of antenatal exercise among pregnant women , identify the sociodemographic, obstetric, and psychosocial determinants of exercise behaviour, and evaluate the influence of healthcare provider advice on physical activity uptake. The findings are expected to inform targeted health education strategies and guide obstetric practice guidelines within the region.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

A descriptive cross-sectional study design was employed. The study was conducted at two major government health facilities in Calabar: the University of Calabar Teaching Hospital (UCTH) and the General Hospital Calabar. These facilities serve as the principal tertiary and secondary referral centres in Cross River State and collectively handle the largest antenatal clinic attendance in the metropolis [13].

2.2 Study Population and Eligibility Criteria

The target population comprised pregnant women attending routine antenatal clinics. Inclusion criteria were: (i) singleton pregnancy confirmed by ultrasound, (ii) gestational age of 12 weeks or above at the time of interview, (iii) ability to communicate in English or Pidgin English, and (iv) provision of written informed consent. Women with medical or obstetric contraindications to exercise (e.g., placenta praevia, cervical incompetence, severe cardiac disease) were excluded, as were those who declined to participate.

2.3 Sample Size Determination

The minimum sample size was calculated using the Cochran formula for cross-sectional studies: $n = Z^2pq/d^2$, where $Z=1.96$ (95% confidence level), $p=0.40$ (estimated prevalence of antenatal exercise based on comparable Nigerian studies [14]), $q=0.60$, and $d=0.05$ (margin of error). This yielded a minimum of 369 participants. Adjusting for a 15% non-response rate, a target of 320 completed questionnaires was achieved after applying eligibility screening to 425 approached women.

2.4 Sampling Technique

Systematic random sampling was used. Using antenatal clinic attendance registers, every second eligible woman was selected from the daily queue until the required sample was obtained. Proportional allocation across the two facilities ensured adequate representation: 192 participants (60%) from UCTH and 128 (40%) from General Hospital Calabar.

2.5 Data Collection Instrument

Data were collected using a pre-tested, structured interviewer-administered questionnaire adapted from the Pregnancy Physical Activity Questionnaire (PPAQ) and previously validated tools used in comparable African settings [15,16]. The questionnaire comprised four sections: (A) sociodemographic characteristics, (B) obstetric and medical history, (C) antenatal exercise practices and type, and (D) determinants and barriers to exercise, including healthcare provider advice, knowledge, attitude, and sociocultural beliefs. The questionnaire was piloted on 30 women at the University of Calabar Medical Centre; a Cronbach's alpha of 0.78 confirmed acceptable internal consistency.

2.6 Definition of Antenatal Exercise

Consistent with WHO recommendations and prior studies [2,17], antenatal exercise was defined as engagement in at least 150 minutes of moderate-intensity physical activity per week during the current pregnancy. Women who reported meeting this threshold were classified as 'exercising', while those below this level were classified as 'not exercising'.

2.7 Data Analysis

Data were entered and analysed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY). Frequencies and percentages were used for categorical variables; means and standard deviations for continuous variables. Chi-square tests assessed associations between categorical variables and antenatal exercise status. Variables significant at $p<0.05$ on bivariate analysis were entered into a binary logistic regression model to identify independent predictors of antenatal exercise. Results are presented as odds ratios (OR) with 95% confidence intervals (CI).

2.8 Ethical Approval

Ethical approval was obtained from the Research and Ethics Committee of the University of Calabar Teaching Hospital. Written informed consent was obtained from all participants. Confidentiality was maintained throughout.

3. RESULTS

3.1 Sociodemographic Characteristics of Respondents

A total of 320 pregnant women participated in this study, giving a response rate of 100% among eligible women approached. The mean age of participants was 28.4 ± 5.2 years (range: 16–43 years). The majority of respondents (61.3%) were within the 25–34 year age group. Most participants were married (85.9%), had attained at least a secondary level of education (78.1%), and were self-employed (37.8%) or civil servants (29.7%). Table 1 presents the detailed sociodemographic profile of the study participants.

Table 1: Sociodemographic Characteristics of Pregnant Women in Calabar (n=320)

Variable	Category	Frequency (n)	Percentage (%)
Age Group (years)	<20	22	6.9
	20–24	52	16.3
	25–29	98	30.6
	30–34	98	30.6
	35–39	38	11.9
	≥40	12	3.8
Marital Status	Married	275	85.9
	Single	32	10.0
	Widowed/Divorced	13	4.1
Education Level	No formal education	18	5.6
	Primary	52	16.3
	Secondary	112	35.0
	Tertiary	138	43.1
Occupation	Unemployed	33	10.3

Variable	Category	Frequency (n)	Percentage (%)
	Self-employed	121	37.8
	Civil servant	95	29.7
	Student	43	13.4
	Others	28	8.8
Religion	Christianity	272	85.0
	Islam	41	12.8
	Others	7	2.2
Residence	Urban	241	75.3
	Peri-urban	79	24.7

3.2 Obstetric Characteristics

The majority of participants (44.4%) were in their second trimester (13–26 weeks). Multigravidae accounted for 58.1% of participants. A previous history of pregnancy complications was reported by 22.2% of respondents. Table 2 summarises the obstetric profile.

Table 2: Obstetric Characteristics of Study Participants (n=320)

Variable	Category	Frequency (n)	Percentage (%)
Gestational Age	1st Trimester (≤12 wks)	48	15.0
	2nd Trimester (13–26 wks)	142	44.4
	3rd Trimester (≥27 wks)	130	40.6
Gravidity	Primigravida	134	41.9
	Multigravida	186	58.1
Parity	Nulliparous	145	45.3
	1–2 children	128	40.0
	≥3 children	47	14.7
ANC Facility	UCTH	192	60.0
	Gen. Hospital Calabar	128	40.0
Prior Complications	Yes	71	22.2
	No	249	77.8
Planned Pregnancy	Yes	228	71.3
	No	92	28.8

3.3 Prevalence and Types of Antenatal Exercise

Overall, 123 out of 320 participants (38.4%) engaged in antenatal exercise meeting the WHO recommended threshold of ≥150 minutes of moderate-intensity activity per week. Among those who exercised, walking was the most frequently reported activity (72.4%), followed by household chores classified as moderate activity (18.7%), swimming (5.7%), and prenatal yoga (3.3%). Figure 1 illustrates the distribution of exercise types.

Table 3: Prevalence and Types of Antenatal Exercise (n=320)

Exercise Variable	Category	n	Percentage (%)
Engagement in Exercise	Yes (≥150 min/week)	123	38.4
	No (<150 min/week)	197	61.6
Type of Exercise (n=123)	Walking	89	72.4
	Household activities	23	18.7
	Swimming	7	5.7
	Prenatal yoga	4	3.3
Exercise Frequency	Daily	41	33.3
	3–4 times/week	58	47.2
	1–2 times/week	24	19.5
Session Duration	15–30 minutes	27	22.0
	30–60 minutes	65	52.8
	>60 minutes	31	25.2

3.4 Determinants of Antenatal Exercise

Bivariate analysis revealed significant associations between antenatal exercise and the following variables: educational level (χ^2=28.4, p<0.001), occupation (χ^2=15.6, p=0.002), gestational trimester (χ^2=9.8, p=0.008), healthcare provider advice (χ^2=54.2, p<0.001), knowledge of exercise benefits (χ^2=31.7, p<0.001), and perceived safety (χ^2=46.3, p<0.001). Age group, marital status, gravidity, parity, and religion were not statistically significant (p>0.05). Table 4 presents the bivariate analysis results.

Table 4: Bivariate Analysis — Determinants of Antenatal Exercise (n=320)

Variable	Exercise Yes n(%)	Exercise No n(%)	χ^2 (df)	p-value
Education Level			28.4 (3)	<0.001
No formal/Primary	11 (15.7)	59 (84.3)		
Secondary	38 (33.9)	74 (66.1)		
Tertiary	74 (53.6)	64 (46.4)		
Occupation			15.6 (4)	0.002
Unemployed	7 (21.2)	26 (78.8)		
Self-employed	38 (31.4)	83 (68.6)		
Civil servant	50 (52.6)	45 (47.4)		
Student	19 (44.2)	24 (55.8)		
Gestational Trimester			9.8 (2)	0.008
1st	13 (27.1)	35 (72.9)		
2nd	62 (43.7)	80 (56.3)		
3rd	48 (36.9)	82 (63.1)		
HCP Advice on Exercise			54.2 (1)	<0.001

Variable	Exercise Yes n(%)	Exercise No n(%)	χ^2 (df)	p-value
Yes	89 (64.0)	50 (36.0)		
No	34 (18.8)	147 (81.2)		
Perceived Safety			46.3 (1)	<0.001
Feels safe	99 (53.8)	85 (46.2)		
Feels unsafe	24 (17.4)	114 (82.6)		
Knowledge of Benefits			31.7 (1)	<0.001
Good knowledge	87 (51.2)	83 (48.8)		
Poor knowledge	36 (24.0)	114 (76.0)		

3.5 Binary Logistic Regression — Independent Predictors of Antenatal Exercise

Following binary logistic regression, the variables that remained independently predictive of antenatal exercise were: healthcare provider advice, perceived safety, educational attainment, and knowledge of exercise benefits. Women who received exercise counselling from a healthcare provider were over four times more likely to exercise (OR=4.21; 95% CI: 2.34–7.58; p<0.001). Women who perceived exercise as safe were three times more likely to exercise (OR=3.06; 95% CI: 1.71–5.50; p<0.001). Having tertiary education doubled the likelihood of exercise participation compared to those with no formal or primary education (OR=2.85; 95% CI: 1.38–5.88; p=0.005). Table 5 presents the multivariate logistic regression model.

Table 5: Binary Logistic Regression — Independent Determinants of Antenatal Exercise

Variable	Crude OR (95% CI)	p	Adjusted OR (95% CI)	p
HCP Advice: Yes vs No	7.69 (4.53–13.06)	<0.001	4.21 (2.34–7.58)	<0.001
Perceived Safety: Yes vs No	5.52 (3.18–9.59)	<0.001	3.06 (1.71–5.50)	<0.001
Tertiary vs No/Primary Educ.	6.28 (2.97–13.27)	<0.001	2.85 (1.38–5.88)	0.005
Secondary vs No/Primary Educ.	2.78 (1.31–5.90)	0.008	1.54 (0.67–3.54)	0.308
Good Knowledge vs Poor	3.32 (1.96–5.63)	<0.001	1.88 (1.02–3.45)	0.043
Civil servant vs Unemployed	4.10 (1.61–10.48)	0.003	2.16 (0.76–6.12)	0.149
2nd Trimester vs 1st Tri.	2.18 (1.08–4.41)	0.030	1.73 (0.79–3.81)	0.174

3.6 Barriers to Antenatal Exercise

Among the 197 women who were not exercising, the most commonly cited barriers were fear of harming the baby (64.1%), fatigue (52.3%), lack of healthcare provider advice (48.2%), cultural/family restrictions (39.1%), and lack of time (35.5%). Table 6 summarises these findings.

Table 6: Barriers to Antenatal Exercise Among Non-Exercising Women (n=197)

Barrier	Frequency (n)	Percentage (%)	Rank
Fear of harming the baby	126	64.1	1st
Fatigue/lethargy	103	52.3	2nd
Lack of HCP advice/counselling	95	48.2	3rd
Cultural or family restrictions	77	39.1	4th
Lack of time	70	35.5	5th
Lack of exercise facilities	54	27.4	6th
Previous pregnancy complications	48	24.4	7th
Fear of preterm labour	44	22.3	8th
Financial constraints	38	19.3	9th
Not knowing which exercises are safe	31	15.7	10th

4. DISCUSSION

This study set out to establish how many pregnant women in Calabar exercise during pregnancy and what shapes that behaviour. Overall, just over a third of participants (38.4%) met the WHO threshold of 150 minutes of moderate activity per week, a figure that sits between what has been reported in rural Nigerian communities and the much higher rates seen in high-income settings. The sections below follow the same order as the results, beginning with the characteristics of the sample and closing with the barriers that kept most women from being active.

4.1 Sociodemographic Characteristics of Respondents

The women recruited for this study were mostly in their late twenties to early thirties, married, and had completed at least secondary school; more than a third were self-employed and almost a third worked in the civil service. This profile is typical of women who attend antenatal clinics at tertiary and secondary government facilities in urban Nigerian cities, where service uptake tends to be higher among women with some education and formal or semi-formal employment [7,9]. It also means the sample is not fully representative of the wider population of pregnant women in Cross River State: women with no formal education made up only 5.6% of respondents, and rural or peri-urban dwellers were a minority. Because education and occupation later emerged as determinants of exercise behaviour, this skew toward better-educated, urban-based women probably means the true prevalence of antenatal exercise across the state, including its rural areas, is lower than the 38.4% recorded here.

4.2 Obstetric Characteristics

Almost half of the participants were interviewed in their second trimester, and a majority had been pregnant before. Roughly one in five reported a previous pregnancy complication, and most described their current pregnancy as planned. Neither gravidity nor parity was associated with exercise status on bivariate testing, which suggests that a woman's reproductive history does not, by itself, predict whether she will be active in a subsequent pregnancy. What did matter, as later sections show, was gestational age at the time of interview, which is unsurprising given how physical capacity and comfort shift across trimesters. The concentration of participants in the second trimester may also have inflated the overall prevalence figure slightly, since this is generally the period when women feel most able to be active.

4.3 Prevalence and Types of Antenatal Exercise

Just under four in ten women in this study exercised at a level meeting WHO recommendations. That places Calabar above rural Nigerian settings, where prevalence as low as 15–20% has been reported [18], but well below the 60–80% recorded in the United Kingdom and Australia [19,20]. The gap reflects differences that go beyond individual choice: health system capacity, cultural expectations around pregnancy, and household economic pressures all shape whether a woman has the time, information, and confidence to be active while pregnant.

Walking accounted for nearly three-quarters of the exercise reported, echoing what has been found in Ghana and Kenya [21,22]. It costs nothing, needs no special equipment, and does not draw attention in the way that more structured activity might. Very few women reported

swimming or prenatal yoga, which is not surprising given how little these activities are available or promoted in Nigerian antenatal settings. If exercise programmes are to gain traction here, they will need to build on walking rather than introduce activities most women have no practical access to.

4.4 Determinants of Antenatal Exercise: Bivariate Findings

On bivariate analysis, six variables separated women who exercised from those who did not: education, occupation, gestational trimester, receipt of healthcare provider advice, knowledge of exercise benefits, and perceived safety of exercise. Age, marital status, gravidity, parity, and religion showed no such association. This pattern is worth noting: the factors that mattered were largely modifiable ones tied to information, income, and clinical contact, rather than fixed demographic or reproductive characteristics. It suggests that antenatal exercise behaviour in this setting has less to do with who a woman is and more to do with what she has been told and what she believes is safe.

4.5 Independent Predictors of Antenatal Exercise: Logistic Regression

When these variables were entered into a regression model, four retained independent significance: advice from a healthcare provider, perceived safety, tertiary education, and good knowledge of exercise benefits. Provider advice carried the strongest effect: women who had been counselled to exercise were four times more likely to do so (AOR=4.21) than women who had not. This mirrors findings from systematic reviews of physical activity determinants in pregnancy [23,24], but only 43.4% of participants in this study had received such advice, pointing to a gap in routine antenatal counselling consistent with a national Nigerian survey reporting physical activity advice in fewer than 40% of consultations [7].

Perceiving exercise as safe roughly tripled the odds of exercising (AOR=3.06). Given that 64.1% of non-exercising women cited fear of harming the baby as their reason for inactivity, this is likely the clearest expression in the data of a belief that pregnancy calls for rest rather than movement, a belief often reinforced by family members and traditional birth attendants rather than by clinicians [12,25]. Tertiary education raised the odds of exercising nearly threefold relative to no or primary education (AOR=2.85), while secondary education lost its significance once other factors were accounted for; women with more schooling likely find it easier to access, interpret, and act on health information [10]. Good knowledge of exercise benefits also remained significant, though its effect was more modest (AOR=1.88), suggesting that awareness on its own contributes less to actual behaviour than concrete advice or a felt sense of safety does.

Two variables that were significant on bivariate analysis, second-trimester status and civil service employment, did not hold up in the adjusted model. The apparent trimester effect may simply reflect that first-trimester nausea and fatigue and third-trimester physical discomfort both discourage activity, without either trimester having an independent effect once other factors are controlled for [17]. Similarly, the occupation effect is probably better explained by civil servants' greater access to formal healthcare and health information than by the nature of the job itself [9].

4.6 Barriers to Antenatal Exercise

Among the 197 women who were not meeting exercise recommendations, fear of harming the baby was the barrier most frequently named (64.1%), followed by fatigue (52.3%), lack of advice from a healthcare provider, cultural or family restrictions, and lack of time. The prominence of fear of harm lines up directly with the regression finding on perceived safety; these are two views of the same underlying concern. Because this fear is often rooted in family and community belief systems rather than clinical misunderstanding alone, addressing it through clinic counselling is unlikely to be sufficient on its own. Community health workers and traditional birth attendants, who are often the first and most trusted source of pregnancy advice for many women, would need to be part of any effort to shift these beliefs.

4.7 Strengths and Limitations of the Study

This study drew on a reasonably large, systematically sampled group of women across two major public facilities in Calabar, using a questionnaire adapted from previously validated instruments. That said, the cross-sectional design means the associations reported here cannot be read as cause and effect; it is equally plausible, for instance, that women already inclined to be active are also more likely to ask their providers about exercise, rather than advice alone driving behaviour. Exercise levels were also self-reported, which carries the usual risk of over-reporting due to social desirability or simple recall error. Finally, because both facilities are in urban or peri-urban Calabar, the findings may not extend to women receiving antenatal care in more rural parts of Cross River State. Longitudinal work following women across trimesters, and studies that include rural facilities, would help close these gaps.

5. CONCLUSION

Fewer than four in ten pregnant women in this Calabar-based study were exercising at levels meeting WHO recommendations. Advice from a healthcare provider, perceived safety of exercise, tertiary education, and knowledge of exercise benefits were the factors that independently distinguished women who exercised from those who did not, while fear of harming the baby and fatigue were the barriers most women described. These findings point to a pattern in which behaviour is shaped less by who a woman is and more by what she has been told and what she believes to be safe, both of which are, in principle, modifiable.

6. RECOMMENDATIONS

Make exercise counselling a routine part of antenatal care. Given how strongly provider advice predicted exercise behaviour, and how few women in this study had received it, structured counselling on safe physical activity should be built into standard antenatal visits rather than left to individual providers' discretion.

Address fear of harm at the community level, not only in the clinic. Because concerns about fetal safety are often rooted in family and community belief systems, health education should extend beyond the consultation room to involve community health workers and traditional birth attendants, who are frequently the first source of pregnancy advice for many women.

Develop locally appropriate exercise guidance. Walking was by far the most common form of activity in this sample, largely because it requires no cost or equipment. Guidelines and counselling messages should build on this rather than promote activities, such as swimming or prenatal yoga, that remain largely inaccessible in this setting.

Tailor messaging to education level and gestational stage. Simplified, visual, and community-based communication is likely to reach lower-literacy women more effectively than written materials, and counselling content should account for how nausea, fatigue, and physical discomfort vary across trimesters.

Pursue further research. Longitudinal studies following women across pregnancy, and studies extending to rural antenatal populations in Cross River State, would help confirm whether the associations identified here are causal and how well they generalise beyond Calabar's urban facilities.

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