Annals of
HEALTH RESEARCH

(The Journal of the Medical and Dental Consultants' Association of Nigeria, OOUTH, Sagamu, Nigeria)

Volume 10 | No. 2 | April – June, 2024

IN THIS ISSUE

- Obstructive Adenotonsillar Enlargement
- Client Satisfaction with NHIS Services
- Post-Dural Puncture Headache Among Obstetric Patients
- Utilization of Children Emergency Services
- Pregnancy-Related Acute Kidney Injury
- Inhibitory potentials of extracts of Vernonia amygdalina on -glucosidase
- Appendiceal Diseases in Children
- Physical Activity Among Nigerian Pregnant Women
- Knowledge of Retinopathy of Prematurity
- Thyroidectomy Anaesthesia in a Jehovah Witness
- Papillary Variant of Intestinal-Type Sinonasal Adenocarcinoma
- Acute Kidney Injury Complicating Ovarian Hyperstimulation Syndrome

ORIGINAL RESEARCH

Awareness and Perception of Physical Activity among Nigerian Pregnant Women Attending Primary and Tertiary Health Facilities: A Comparative Study

Emmanuel GM[1], Adejimi AA[2], Ladi-Akinyemi TW[2], Sodeinde KJ[3], Oyewole OO[1,4]

[1]Department of Physiotherapy, Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria
[2]Department of Community Health and Primary Care, University of Lagos, Lagos, Nigeria
[3]Babcock University, Ilishan-Remo, Nigeria
[4]College of Health Sciences, University of KwaZulu-Natal, Private Bag X54001, Durban, South Africa

*Correspondence: Dr OO Oyewole, Olabisi Onabanjo University Teaching Hospital, PMB 2001, Sagamu, Nigeria. E-mail: oyewoleye@gmail.com, OyewoleO1@ukzn.ac.za ;
ORCID – https://orcid.org/0000-0003-2432-247X.

Abstract

Background: Despite the benefits of physical activity (PA) during pregnancy, expectant women are not meeting the exercise recommendations. This may be connected with their level of awareness, perception, and attitude to physical exercise.

Objective: To assess and compare the awareness and perception of pregnant women about PA at primary and tertiary health care facilities (PHC and THC) in a local government in Nigeria.

Methods: A comparative, cross-sectional study recruited 502 pregnant women from six selected health facilities (250 PHC vs 252 THC). Their perception and awareness of PA were assessed using an interviewer-administered questionnaire.

Results: Pregnant women accessing care in THC have a higher level of awareness than PHC attendees (60.7% vs 34.4%; p = 0.001). Women accessing care at PHC had a better perception of PA (67.2%) than women assessing care at THC 55.2% (p = 0.006). Age and occupation were significantly associated with awareness of PA among participants in PHC, while only occupation was significantly associated with THC. Age, occupation, and number of children alive were significant predictors of awareness of PA; in contrast, age, education, monthly income, and number of pregnancies were the predictors of perception of PA among the PHC participants.

Conclusion: Awareness of PA was good in the tertiary facility but poor in PHC, while perception of PA was good in both facilities. Women, irrespective of parity, should be inspired to exercise as women who habitually exercise are more likely to continue during pregnancy.

Keywords: Awareness, Physical Activity, Pregnancy, Primary Health Care, Tertiary Health Care.

Introduction

Physical Activity (PA) is an essential phenomenon in all stages of life, including pregnancy and the postpartum period.[1] Recommended levels of PA performed during pregnancy have benefits both for the mother and the child.[2] Exercise and other physical

activities involving bodily movement using skeletal muscles result in energy expenditure and are part of playing, working, active transportation, house chores, and recreational activities. [1] The current recommendation is for pregnant women to continue and maintain an active lifestyle during their pregnancies when there are no medical contraindications. [3] The recommended 30 minutes of moderate activity or 8000 steps per day, equivalent to approximately 7.5 MET-h/week, are essential for beneficial results. [4,5] The WHO recommended that adults aged ≥18 should engage in at least 150 minutes of moderate-intensity in a week or at least 75 minutes of vigorous-intensity aerobic activity or an equivalent combination of the two. [1] The guideline also stipulates that pregnant women must take adequate precautions and seek medical consent before trying to achieve the recommendation. [3] The American Congress of Obstetricians and Gynaecologists (ACOG) and the Royal College of Obstetricians and Gynaecologists (RCOG), UK, and the Health Service Executive (HSE) in Ireland recommended 30 minutes daily moderate-intensity physical activity or most days of the week for pregnant women. [6–8] It is submitted, however, that pregnant women are not meeting this exercise recommendation. [9] Few studies have been carried out on PA during pregnancy in Africa, and these few studies concluded that the level of physical activity participation among pregnant women is low and tends to decline as they progress to each trimester.[10–12]

Research has recently established many possible health benefits of aerobic and strength-conditioning exercise in pregnancy and the postpartum period. [13] Initiating or continuing an active lifestyle during pregnancy is now considered safe and even advisable for otherwise healthy pregnant women.[13] It has been noted that PA is a fundamental aspect of people's lives and an essential component of antenatal care. [14] Women with uncomplicated pregnancies and minimal risks can benefit

significantly from PA as recommended in pregnancy guidelines. [3,6,15]

The beneficial effects of PA during pregnancy include maintenance and enhancement of physical fitness and cardiovascular endurance, [16] reduced risk of excessive weight gain, [17] reduced risk of pre-eclampsia and preterm birth, [18–20] reduced low back pain, 21 improved sleep, [22] reduced anxiety and depressive symptoms, improved health perception [23,24] and improved self-reported body image. [10] Pregnant women with comorbidities and complications such as obesity or gestational diabetes mellitus (GDM) can also benefit from PA as it helps with weight control and reduces the risk of GDM (a common pregnancy-related complication occurring in 3.5 to 12% of pregnancies) in obese pregnant women. [3,25] Other benefits of exercise in pregnancy include reduction of back pain, less constipation, loss of the baby weight after delivery, enhancement of mood and posture, and promotion of muscle tone, strength, and endurance. They may help develop the capability to cope with labour. [24] Therefore, physical inactivity or lack of exercise during pregnancy might result in loss of muscular and cardiovascular fitness, excessive maternal weight gain with a raised risk of GDM, varicose veins, dyspnea, lower-back pain, and poor psychological adjustment. [13] Studies have reported that exercise during the second half of pregnancy could decrease the severity of lower back pain. [12, 24] The objective of exercise programs during pregnancy and after childbirth is to reduce impairment and help the woman sustain or regain functions while she is preparing for birth and caring for the infant. [9,15] Despite the benefits of PA, women's physical activity levels often decrease or cease during pregnancy. [3,27] Few studies [10,11,28,29] from Nigeria have assessed PA awareness, attitude, and practice during pregnancy. There is also little or no published literature from Nigeria that examines the influence of health facilities (i.e. primary, secondary, or tertiary) or compares the type of facilities where pregnant women receive

antenatal care concerning PA awareness and perception. Primary health clinic (PHC) attendees in Nigeria are educated by nurses and community extension workers on different health topics, including physical activity. In contrast, nurses and physiotherapists educate the attendees of tertiary health centres (THC) during the antenatal clinic (ANC). These differences in service providers might likely significantly impact PA perception and awareness. Therefore, it is hypothesised that PA awareness and perception of pregnant women attending the services will be substantially different. The outcome of this study may help inform the development of an intervention for varying levels of health care delivery to increase physical activity among pregnant women. It may also inform the need for policies to enhance PA among pregnant women and the implementation of such policies. This study assessed and compared awareness and perception of physical activity among pregnant women accessing antenatal care in Primary and Tertiary Health Care Facilities in Sagamu Local Government Area, Ogun State.

Methods

Design
This was a comparative, cross-sectional study.
Setting
This study was conducted in Sagamu Local Government Area of Ogun state, southwest Nigeria. Ogun State has 20 local governments, and the population of Sagamu LGA was 255,885 according to the 2006 census, with a projected population of 355,900 in 2016.[30]
Population
Pregnant women attending antenatal clinics (ANC) in primary and tertiary health centres in Sagamu Local Government Area of Ogun State, Nigeria, who have had at least a previous antenatal visit, were recruited. Pregnant women who presented and were diagnosed with medical or obstetric complications resulting in ambulatory disabilities and severe

psychological conditions that could have impacted the reliability of information were excluded from the study. [12] Prior to the study, the sample size was determined using the formula used in comparing two proportions based on the prevalence of 35% and 22%; standard normal deviate corresponding to a 5% level of significance set at 1.96 was used at 95% confidence interval, power of 80% and a 10% non-response rate. A minimum sample of 205 per group was obtained to power the study.
Sampling technique
Participants in PHC were selected using a multi-stage sampling method, while participants in THC were selected using systematic random sampling.
Selection of participants at the PHC
In stage 1, simple random sampling (balloting) was used to select five out of the 10 PHCs in the LGA viz - Ogijo, Ajaka, Makun, Sabo GRA, and Agura PHCs were selected.
In stage 2, a proportionate sampling method was used to select 250 participants from the PHCs. A total sum of the estimated number of pregnant women that had been scheduled to visit all the PHCs during the period of research (988) was obtained from the registry of each facility (168 at Ogijo, 161 at Agura, 75 at Sabo GRA, 112 at Ajaka, and 472 at Makun). To get the proportionate sample size for each facility, the estimated sample size for each facility was divided by the total estimated number of women (988) from all the PHCs and multiplied by hundred (100) hence, 17.0% (43) of the participant were selected from Ogijo PHC, 16.3% (41) from Agura PHC, 7.59% (19) from Sabo GRA PHC, 11.34% (28) from Ajaka PHC, and 47.77% (119) from Makun PHC.
In stage 3, systematic random sampling was used to select participants in each selected PHC. According to the information from the registry of each PHC ANC, a total estimated number of pregnant women visiting each PHC ANC during the study period was obtained. The Kth (sampling interval) was determined by dividing the total number of pregnant women estimated to attend by the required sample size (168, 112, 472, 75, and 161 being the estimated number of pregnant women visiting Ogijo,

Ajaka, Makun, Sabo GRA and Agura PHC respectively). The division was by the expected sample size for each facility as obtained from stage 2 (41, 28, 119, 28, and 19 for Ogijo, Ajaka, Makun, Sabo GRA and Agura PHC, respectively). The first sample was between one and K^{th}. It was chosen by simple random sampling (balloting), then taking every K^{th} participant after that, where K^{th} (fourth for all the PHC) was a sampling interval based on the attendance list on the register for the day. The process was repeated until the projected sample size was accomplished. The immediate next participant was approached if a woman was unwilling to participate.

Selection of participants at the Tertiary Healthcare Facility

Olabisi Onabanjo University Teaching Hospital (OOUTH), the only teaching hospital in the local government area, was selected as the tertiary health facility. A systematic random sampling technique was used to select the participants. On average, about 40 to 80 pregnant women visit the ANC clinic of OOUTH every day. According to the information from the registry of the ANC clinic, the total estimated number of pregnant women visiting the ANC clinic during the study period would be 780 and the Kth (K = 3) was determined by dividing the total number of pregnant women estimated to attend by the required sample size. The first sample was between one and K^{th}. It was chosen by simple random sampling (balloting), then taking every K^{th} participant after that, where K^{th} was a sampling interval based on the register list made for the day. The process was repeated until the projected sample size was accomplished. The immediate next participant was approached if a participant was unwilling to participate.

Data collection tool

A semi-structured interviewer-administered, validated questionnaire was used to elicit data from the participants. The questionnaire was adapted from a similar study. [31] The questionnaire assessed participants' socio-demographic data, pregnancy-related characteristics, awareness of pregnant women on physical activity, and perception of pregnant women on physical activity. The parts were as follows:

Section A: Participants' socio-demographic data and pregnancy-related characteristics. Socio-demographic data included age (last birthday), marital status, educational status, religion, family setting (monogamy or polygamy), and monthly income. Pregnancy-related factors included the number of pregnancies (parity) and the number of children alive.

Section B: Awareness of pregnant women on physical activity. The section contained five questions on awareness of PA.

Section C: Perception of pregnant women on physical activity. The section had two categories and the first category had 13 questions on the perception of the benefits of physical activity and the second on the perception of contraindications of physical activity respectively. The questionnaire was pre-tested on 20 pregnant women registered at the Primary Health Centre in Ikenne local government area of Ogun State for content validity and to correct for ambiguity in the questionnaires.

The questionnaires were administered to the participants with the help of trained research assistants, and confidentiality and anonymity were maintained. The eleven questions on the awareness of types of physical activity had the option of yes or no. At the same time, the correct answer got one mark and zero for the wrong answer, making the maximum obtainable score eleven (0-5 as poor and 6-11 as good awareness). For perception, the questions were ranked on the five-item Likert ordinal scale ranging from strongly agreed to strongly disagreed. The five-item Likert ordinal scales were collapsed into two for analyses after reversing negatively worded questions. Strongly agreed and agreed as one and indifferent to strongly disagreed as zero, giving rise to maximum obtainable scores of 26 (0-13

as poor perception and 14-26 as good perception).

Ethics
Ethical Approval for this study was obtained from the Health Research and Ethics Committees of the Lagos University Teaching Hospital (ADM/DCST/HREC/APP/4291) and Olabisi Onabanjo University Teaching Hospital, Sagamu (OOURH/HREC/417/2021AP). The Chairman and the Medical Officer of Health of the local government gave permission to conduct this research; verbal approval was also obtained from the head of each facility. Written informed consent was obtained from the participants after the purpose and nature of the study had been explained to them. The women understood that refusal to participate would not negatively interfere with their care.

Data analysis
Data analysis was done using SPSS version 25. Data were summarised as mean, standard deviation, and proportions. The Chi-Square test was used to test associations between the categorical variables. Binary logistics regression (Wald forward conditional) was used to determine predictors of physical activity awareness and perception. The p-value of ≤ 0.05 was taken as statistically significant.

Results

A total of 502 pregnant women participated in this study; they comprised 250 participants from PHC and 252 participants from THC. The overall mean age of the participants was 30.04±6.51years whereas it was 29.65±7.15 years and 30.04± 5.79 years in PHC and THC, respectively. Table I shows that the majority had at least secondary education (90.4% and 93.6% for PHC and THC, respectively; p<0.001). Most of the participants were multigravida (86.4% and 69.8% for PHC and THC, respectively; p<0.001). Most of the participants were also multiparous in PHC

(66.8%) compared to (35.7%) in THC (p<0.001) and had at least two children alive (PHC and THC were 66.0% and 33.7% respectively; p<0.001). Age, religion, educational status, number of pregnancies, parity, and number of children alive were also significantly associated with the type of health facility (p<0.05) in each case.

Table II shows the distribution according to awareness of types of physical activity that can be practised in pregnancy among PHC and THC attendees. Overall, the participants at THC (60.7%) had significantly greater awareness of physical activity types compared with PHC attendees (34.4%), especially concerning pelvic floor exercise, muscle strengthening, abdominal muscle exercise, leisure gardening, and running activities (p<0.05). Tables IIIa and IIIb show the participants' perceptions of the benefits and contraindications of antenatal exercises. Most of the PHC attendees had a significantly greater perception of the contraindications of PA compared with THC attendees, especially in variables such as vaginal bleeding during pregnancy, uterine contraction, chest pain, migraine, difficulty in breathing, abdominal pain, dizziness, and premature labour (p<0.05) in each case.

Tables IVa and IVb present the association of awareness and awareness of PA in PHC and THC. Age (χ^2 = 6.525, p = 0.011) and occupation (χ^2 = 5.357, p = 0.021) were significantly associated with PA awareness among PHC participants, while only occupation (χ^2 = 5.738, p = 0.017) was associated with PA awareness at THC. When variables such as religion, occupation, education, income, family setting, number of pregnancies, parity, number of children alive, and age were entered into logistic regression using the forward conditional Wald method, age, occupation, and number of children alive predicted PA awareness among PHC participants (Table V). PHC attendees with age >35 years were 69% less likely to have good PA awareness

compared to participants with age ≤35 years (OR = 0.310, CI = 0.128 – 0.174, p = 0.01). Civil servants attending PHC were twice more likely to have good PA awareness compared to others (OR = 2.062, CI = 1.147-3.706, p = 0.016), while

participants with >2 children alive were twice as likely to have good PA awareness compared with those who have <2 children alive (OR = 1.929, CI = 1.047-3.552, p = 0.035).

Table I: Socio-demographic characteristics of the participants

Variable	PHC (n=250) n (%)	Tertiary (n=252) n (%)	χ2	P- value
Age Group(years)				
15-24	81(32.4)	53(21.0)		
25-34	128(51.2)	143(56.8)		
≥35	41(16.4)	56(22.2)	8.993	0.011
Religion				
Christianity	144(57.6)	187(74.2)		
Islam	99(39.6)	63(25)		
Traditional	7(2.8)	2(0.8)	16.356	<0.001
Occupation				
Business	169(67.6)	148(58.7)		
Civil Servant	19(7.6)	33(13.1)		
Others	62(24.8)	71(28.2)	5.762	0.056
Educational Status				
None	7(2.8)	4(1.59)		
Primary	17(6.8)	12(4.8)		
Secondary	141(56.4)	82(32.5)		
Tertiary	85(34.0)	154(61.1)	37.203	<0.001
Monthly Income (Naira)				
< 10,000	55(22.0)	45(17.9)		
10,000-20,000	67(26.8)	94(37.3)		
21,000-50,000	77(30.8)	67(26.6)		
51,000-100,000	37(14.8)	28(11.1)		
>100,000	14(5.6)	18(7.1)	7.961	0.093
Family type				
Monogamy	155(62.0)	176(69.8)		
Polygamy	76(30.4)	60(23.8)		
Single Parenting	19(7.6)	16(6.4)	3.464	0.177
Number of Pregnancy				
Multigravida	216(86.4)	176(69.8)		
Primigravida	34(13.6)	76(30.2)	20.110	<0.001
Parity				
Nullipara	34(13.6)	85(33.7)		
Primipara	49(19.6)	77(30.56)		
Multipara	167(66.8)	90(35.7)	51.142	<0.001
No of Children Alive				
0	35(14.0)	93(36.9)		
1	50(20.0)	74(29.4)		
2	91(36.4)	55(21.8)		
≥ 3	74(29.6)	30(11.9)	54.412	<0.001

In THC, occupation (OR = 0.485, CI = 0.285-0.823, p = 0.007) and family setting (OR = 1.842, CI = 1.047-3.240) predicted PA awareness. Civil servants in THC were 52% less likely to be aware of PA than others. At the same time, participants in monogamous family settings were twice as likely to have good awareness of PA as those in polygamous settings. Age (χ² = 11.815, p = 0.001), education (χ² = 13.815, p = 0.0001), income (χ² = 29.006, p = 0.0001), number of pregnancies (χ² = 14.978, p = 0.0001), parity (χ² = 6.302, p = 0.012) and number of children alive (χ² = 6.726, p = 0.009) were significantly associated with PA perception among PHC participants.

Table II: Awareness of types of physical activity

Variable	PHC (n = 250)		Tertiary (n = 252)		χ2	p-value
	Not Aware	Aware	Not Aware	Aware		
	n (%)	n (%)	n (%)	n (%)		
Walking	3(1.2)	247(98.8%)	4(1.6)	248(98.4%)	0.137	0.711
Dancing	30(12.0)	220(88.0)	20(7.9)	232(92.1)		0.128
Pelvic Floor Exercise	178(71.2)	72(28.8%)	121(48.0)	131(52.0%)	28.007	p<0.001
Swimming	206(82.4)	44(17.6%)	187(74.2)	65(25.8%)	24.957	0.026
Stretching Exercise	156(62.4)	94(37.6%)	61(24.2)	191(75.8%)	74.597	p<0.001
Muscle Strengthening	152(60.8)	98(39.2%)	86(34.1)	166(65.9%)	35.810	p<0.001
Abdominal Exercise	189(75.6)	61(24.4%)	147(58.3)	105(41.7%)	16.905	p<0.001
Cycling	170(68.0)	80(32.0%)	197(78.2)	55(21.8%)	6.608	0.010
Back Care Exercise	92(36.8)	158(63.2%)	74(29.4)	178(70.6%)	3.134	0.077
Leisure Gardening	168(67.2)	82(32.8%)	144(57.1)	108(42.9%)	5.396	0.020
Running	193(77.2)	57(22.8%)	158(62.7)	94(37.3%)	12.549	P<0.001
Overall awareness Score	164(65.6)	86(34.4)	99(39.3)	153(60.7)	38.840	<0.001*

Table IIIa: Perception of the benefits of physical activity

Variable	PHC		Tertiary Care		χ2	p-value
	Poor	Good	Poor	Good		
	n (%)	n (%)	n (%)	n (%)		
Reduces risk of back pain during pregnancy	28 (11.2)	222 (88.8)	17 (6.75)	235 (93.25)	3.051	0.081
Prevents excessive weight gain during pregnancy	20 (8.00)	230 (92.00)	17 (6.75)	235 (93.25)	0.289	0.591
Increases risk of urinary incontinence during pregnancy	148 (59.20)	102 (40.80)	107 (42.46)	145 (57.54)	14.070	<0.001*
Increases risk of diabetes during pregnancy	80 (32.00)	170 (68.00)	99 (39.29)	153 (60.71)	2.904	0.0884
Strengthens pelvic floor muscles during pregnancy	43 (17.20)	207 (82.80)	39 (15.48)	213 (84.52)	0.273	0.6014
Increases formation of varicose veins during pregnancy	138 (55.20)	112 (44.80)	135 (53.57)	117 (46.43)	0.134	0.714
Increases risk of swelling of extremities during pregnancy	68 (27.20)	182 (72.80)	104 (41.27)	148 (58.73)	11.030	<0.001*
Causes high blood pressure during pregnancy	64 (25.60)	186 (74.40)	72 (28.57)	180 (71.43)	0.561	0.4538
Increases muscle tone, strength, and endurance during pregnancy	47 (18.80)	203 (81.20)	32 (12.70)	220 (87.30)	3.523	0.0605
Increased energy and stamina during pregnancy	33 (13.20)	217 (86.30)	28 (11.11)	224 (88.89)	0.513	0.474
Improvement of body awareness, posture, coordination, and balance during pregnancy	27 (10.80)	223 (89.20)	24 (9.52)	228 (90.48)	0.224	0.6360
Better ability to cope with labour and delivery	22 (8.80)	228 (91.20)	19 (7.54)	233 (92.46)	0.266	0.606
More rapid postnatal recovery	32 (12.80)	218 (87.20)	40 (15.87)	212 (84.13)	0.965	0.326

At the same time, there was no factor associated with perception in THC (Tables IV). When variables such as religion, occupation, education, income, family setting, number of pregnancies, parity, number of children alive, and age were entered into logistic regression

using the forward conditional Wald method, age (OR = 3.746, CI = 1.225-11.457, p = 0.021), education (OR = 2.838, CI = 1.082-7.441, p = 0.034), income (OR = 3.128, CI = 1.677-5.833, p = 0.000) and number of pregnancies (OR = 2.308, CI = 1.027-5.187, p = 0.043) predicted PA perception among PHC participants while no factor predicted perception in THC (Table V). PHC attendees who were >35 years old were four times more likely to have a good

perception of PA compared to those who were <35 years old. Pregnant women who had at least secondary education were three times more likely to have a good perception of PA compared to those who had primary or no education. Pregnant women who earned above 20,000 Naira were three times more likely to have a good perception of PA compared to those who earned less.

Table IIIb: Perception of the contraindications of physical activity

Variable	PHC		Tertiary		χ2	p-value
	Poor n (%)	Good n (%)	Poor n (%)	Good n (%)		
Vaginal bleeding during pregnancy	42 (16.80)	208 (83.20)	80 (31.75)	172 (68.25)	15.239	<0.001*
Uterine contractions during pregnancy	87 (34.8)	163 (65.2)	134 (53.17)	118 (46.83)	17.194	<0.001*
Chest pain during pregnancy	56 (22.40)	194 (77.60)	102 (40.48)	150 (59.52)	19.013	<0.001*
Migraine during pregnancy	55 (22.00)	195 (78.00)	99 (39.68)	153 (60.71)	17.598	<0.001*
Difficulty in breathing during pregnancy	46 (18.40)	204 (81.60)	102 (40.48)	150 (59.52)	29.419	<0.001*
Swelling of the extremities during pregnancy	169 (67.60)	81 (32.40)	77 (30.56)	175 (69.44)	68.915	<0.001*
Back pain during pregnancy	169 (67.6)	81 (32.40)	81 (32.14)	171 (67.86)	63.112	<0.001*
Obesity can exercise	157 (62.80)	93 (37.20)	69 (27.38)	183 (72.62)	63.606	<0.001*
Abdominal pain during pregnancy	67 (26.8)	183 (73.2)	153 (60.71)	99 (39.29)	58.632	<0.001*
Muscle weakness during pregnancy	191 (76.4)	59 (23.6)	125 (49.6)	127 (50.40)	38.638	<0.001*
Dizziness during pregnancy	49 (19.6)	201 (80.4)	84 (33.33)	168 (66.67)	12.154	<0.001*
Diabetes during pregnancy	220 (88.00)	30 (12.0)	172 (68.25)	80 (31.75)	28.597	<0.001*
Premature labour during pregnancy	52 (20.8)	198 (79.2)	102 (40.48)	150 (59.52)	22.801	<0.001*
Overall perception score	82 (32.8)	168 (67.2)	113 (44.84)	139 (55.16)	7.660	0.006*

Discussion

The mean age of the participants (30.04± 6.51 years) agrees with the average age of women in reproductive years in the country (15-49 years).

[32,31] A higher proportion of the participants who utilised the THC had tertiary education compared to those who utilised the PHC. This result is inconsistent with the report of Okonofua, where 61% of those attending PHC

had primary or no education. [33] Also, a higher proportion of the THC participants were civil servants compared to PHC counterparts who mainly were into business. This study observed that the commonest religion among both PHC and THC was Christianity. This was similar to the findings of Mbada, who also conducted a survey of physical exercise among pregnant women in southwest Nigeria.[31]

This present study showed that most (66.3%) pregnant women with less than one living child attended THC. This may likely be because women with fewer living children felt they needed more expert intervention compared to those with more living children, hence the increased registration of such women in the THC. According to studies on factors that determine the choice of delivery in Nigeria, the number of children was a significant predictor of the choice of delivery. [34] This was also in accordance with the findings in Eritrea.[35]

Table IVa: Association of awareness and perception of physical activity (Primary Care Level)

Variable	Primary Health Care							
	Awareness				Perception			
	Good n (%)	Poor n (%)	Chi-square	p-value	Good n (%)	Poor n (%)	Chi-square	p-value
Age group (years) (ref ≤35)	79 (91.9)	130 (79.3)			131 (78.0)	78 (95.1)		
>35	7 (8.1)	34 (20.7)	6.525	0.011	37 (22.0)	4 (4.89)	11.815	0.001
Religion (ref: Islam /others)	32 (37.2)	74 (45.1)			75 (44.6)	31 (37.8)		
Christianity	54 (62.8)	90 (54.9)	1.446	0.229	93 (55.4)	51 (62.2)	1.055	0.304
Occupation (ref: Business /trader)	50 (58.1)	119 (72.6)			118 (70.2)	51 (62.2)		
Civil servants/others	36 (41.9)	45 (27.4)	5.357	0.021	50 (29.8)	31 (37.8)	1.628	0.202
Education (ref: Primary /none)	9 (10.5)	15 (9.1)			8 (4.8)	16 (19.5)		
Secondary/Tertiary	77 (89.5)	149 (90.9)	0.113	0.737	160 (95.2)	66 (80.5)	13.815	0.0001
Monthly income (Naira) (ref: ≤20000)	48 (55.8)	74 (45.1)			62 (36.9)	60 (73.2)		
>20000	38 (44.2)	90 (54.9)	2.581	0.108	106 (63.1)	22 (26.8)	29.006	0.0001
Family setting (ref: polygamy /single)	31 (36.0)	64 (39.0)			110 (65.5)	37 (45.1)		
monogamy	55 (64.0)	61 (61.0)	0.212	0.645	58 (34.5)	45 (54.9)	2.627	0.105
Number of pregnancies (ref: Primigravida)	12 (14.0)	22 (13.4)			13 (7.7)	21 (25.6)		
Multigravida	74 (86.1)	142 (86.6)	0.013	0.906	155 (92.3)	61 (74.4)	14.978	0.0001
Parity (ref: Primipara /nulligravida)	25 (29.1)	58 (35.4)			47 (28.0)			
Multipara	61 (70.9)	106 (64.6)	1.008	0.315	121 (72.0)	36 (43.9)	6.302	0.012
Number of children alive (ref: 0-1Alive)	26 (30.2)	59 (36.0)			48 (28.6)	37 (45.1)		
≥2 Alive	60 (69.8)	105 (64.0)	0.829	0.363	120 (71.4)	45 (54.9)	6.726	0.009

Most participants had a good awareness of walking, dancing, and back care exercises as exercises that can be practised in pregnancy; this result was positive for both PHC and THC.

Similar studies in southwest Nigeria [31] and Ethiopia[12] had similar results. However, the THC participants had a better awareness score for pelvic floor exercises, muscle strengthening, and stretching exercises, with a score of almost twice that of their counterparts at PHC, who had below-average scores. This may be explained by the fact that the women attending tertiary facilities had better education and the presence of exercise professionals engaging the women in antenatal activities.

Table IVb: Association of awareness and perception of physical activity (Tertiary Care Level)

Variable	Tertiary Health Care							
	Awareness				*Perception*			
	Good n (%)	Poor n (%)	Chi-Square	p-value	Good n (%)	Poor n (%)	Chi-Square	p-value
Age group (years) (ref ≤35)	122 (79.7)	74 (74.7)			112 (80.6)	84 (74.3)		
>35	31 (20.3)	25 (25.3)	0.866	0.352	27 (19.4)	29 (25.7)	1.404	0.236
Religion (ref: Islam /others)	44 (28.8)	21 (21.2)			39 (28.1)	26 (23)		
Christianity	109 (71.2)	78 (78.8)	1.788	0.181	100 (71.9)	87 (77)	0.850	0.362
Occupation (ref: Business /trader)	99 (64.7)	49 (49.5)			82 (59.0)	66 (58.4)		
Civil servants/others	54 (35.3)	50 (50.5)	5.738	0.017	57 (41.0)	47 (41.6)	0.009	0.925
Education (ref: Primary /none)	12 (7.8)	4 (4.0)			12 (8.6)	4 (3.5)		
Secondary/Tertiary	141 (92.2)	95 (96.0)	1.462	0.227	127 (91.4)	109 (96.5)	2.719	0.099
Monthly income (Naira) (ref: ≤20000)	82 (53.6)	57 (57.6)			73 (52.5)	66 (58.4)		
>20000	71 (46.4)	42 (42.4)	0.385	0.535	66 (47.5)	47 (41.6)	0.874	0.350
Family setting (ref: polygamy /single)	40 (26.1)	36 (36.4)			97 (69.8)	34 (30.1)		
monogamy	113 (73.9)	63 (63.6)	2.981	0.084	42 (30.2)	79 (69.9)	0.00	0.983
Number of pregnancies (ref: Primigravida)	46 (30.1)	30 (30.3)			44 (31.7)	32 (28.3)		
Multigravida	107 (69.9)	69 (67.7)	0.002	0.968	95 (68.3)	81 (71.7)	0.329	0.566
Parity (ref: Primipara /nulligravida)	95 (62.1)	67 (67.7)			92 (66.2)	70 (61.9)		
Multipara	58 (37.9)	32 (32.3)	0.817	0.366	47 (33.8)	43 (38.1)	0.488	0.485
Number of children alive (ref: 0-1Alive)	97 (63.4)	70 (70.7)			95 (68.3)	72 (63.7)		
≥2 Alive	56 (36.6)	29 (29.3)	1.436	0.213	44 (31.7)	41 (36.3)	0.597	0.440

Cycling and swimming exercises were the least known exercise that could be performed by pregnant women in both facilities. Conversely, the ACOG [36] ranked exercises in pregnancy in

order as Kegel, swimming, walking, bicycling, aerobics, and dance. A low level of awareness of swimming as an essential antenatal exercise may be due to a lack of swimming skills and the limited availability of swimming pools around the area of study. Furthermore, cycling or riding a stationary bike is not a well-known antenatal exercise in the study setting. It could be linked to the nonavailability of dedicated bikeways on Nigerian roads.

The overall awareness score showed that the THC participants had above-average awareness scores (60.7%), while PHC attendees (32.8%) had poor awareness scores. This was further confirmed by logistic regression. THC attendees were four times more likely to be aware of physical activity than their counterparts in the PHC. This can be explained by the fact that most of the participants in the tertiary facility group had tertiary education. This result affirms previous studies carried out among pregnant women in similar facilities.[10,12]

Table V: Predictors of awareness and perception of physical activity

Variable	B	SE.	Wald	OR	95% CI of OR Lower	Upper	P-value
Awareness (Primary Health Care)							
Age group (ref ≤35 years)	-1.170	0.453	6.682	0.310	0.128	0.754	0.010
Occupation (ref: Business /trader)	0.724	0.299	5.849	2.062	1.147	3.706	0.016
Number of living children (ref: 0-1 Alive)	0.657	0.312	4.447	1.929	1.047	3.552	0.035
Constant	-1.173	0.294	15.957	0.309			0.000
Awareness (Tertiary Health Care)							
occupation (ref: Business /trader)	-0.724	0.270	7.175	0.485	0.285	0.823	0.007
Family setting (ref: polygamy /single)	0.611	0.288	4.499	1.842	1.047	3.240	0.034
Constant	0.325	0.247	1.735	1.384			0.188
Perception (Primary Health Care)							
Age group (ref ≤35 years)	1.321	0.570	5.361	3.746	1.225	11.457	0.021
Education (ref: Primary /none)	1.043	0.492	4.496	2.838	1.082	7.441	0.034
Income (ref: ≤20000 Naira)	1.140	0.318	12.857	3.128	1.677	5.833	0.000
Gravida (ref: Primigravida)	0.836	0.413	4.098	2.308	1.027	5.187	0.043
Constant	-1.583	0.564	7.869	0.205			0.005

B – Beta; S.E - Standard error; OR - Odds ratio

In the current study, most women perceived that antenatal exercises/PA reduce back pain, increase the ability to cope with labour and delivery, enhance post-natal recovery, improve stamina, strengthen muscles of childbirth, and prevent weight gain. These findings are consistent with previous reports from India,[37,38] Ethiopia[39] and Nigeria.[31] Some participants in both THC and PHC erroneously perceived that physical activity could increase the formation of varicose veins, increase leakage of urine, and cause increased swelling of the extremities. In contrast, evidence shows that these conditions can be alleviated by practising physical activity.[18] This indicates the need for intervention to improve the perception of pregnant women and, by extension, the public at large on the benefits of exercise.

Vaginal bleeding, dizziness, uterine contraction, and difficulty in breathing were the significant contraindications to PA as perceived by PHC participants in this study; this is also consistent with previous studies. [31,39] However, most participants from the THC are of the opinion that women with back pain, obesity, and muscle weakness can exercise during pregnancy. Also, most participants from both facilities perceived that a woman who had diabetes mellitus could not exercise.

These contraindications (back pain, muscle weakness, swelling, and diabetes mellitus) are considered relative and should not rule out physical activity in pregnancy.[6] Overall, perception was good in both PHC and THC. However, this current study observed that perception among the participants in PHC was marginally better than that of their counterparts in the THC. This improved perception among PHC participants might be because they have had more pregnancies and births and are, therefore, more experienced in childbirth-related matters.

Conclusion

The prevalence of awareness of PA among women accessing care in the THC (60.7%) was higher compared to PHC participants (34.4%). The perception of the benefits and contraindications of PA was good among the attendees in both settings; however, the PHC participants were much better in terms of their perception of the benefits and contraindications of PA. There should be implementation of interventions to increase awareness of types of PA among pregnant women and the benefits associated with it. The inclusion of exercise specialists in PHC will be a helpful approach.

Ethics
All participants gave informed consent to participate in the study, which was performed in accordance with the Declaration of Helsinki. Ethical approvals were obtained from the Health Research and Ethics Committee of the Lagos University Teaching Hospital (ADM/DCST/HREC/APP/4291) and Olabisi Onabanjo University Teaching Hospital, Sagamu (OOURH/HREC/417/2021AP).

Availability of data and materials
The datasets used and analysed for this publication are available from the corresponding author upon reasonable request.

References

1. WHO | Physical Activity. WHO. Accessed 19 March 2020. http://www.who.int/dietphysicalactivity/pa/en/

2. Ferraro Z, Rutherford J, Keely EJ, Dubois L, Adamo KB. An assessment of patient information channels and knowledge of physical activity and nutrition during pregnancy. Obstet Med 2011;4:59-65. https://doi.org/10.1258/om.2011.110006

3. ACOG Committee Opinion No. 650: Physical Activity and Exercise During Pregnancy and the Postpartum Period. Obstet Gynecol 2015;126:e135-142. https://doi.org/10.1097/AOG.0000000000001214

4. McParlin C, Robson SC, Tennant PW, Besson H, Rankin J, Adamson AJ, *et al.* Objectively measured physical activity during pregnancy: a study in obese and overweight women. BMC Pregnancy and Childbirth. 2010;10(1):76. doi:10.1186/1471-2393-10-76

5. Moore SC, Patel AV, Matthews CE, Berrington de Gonzalez A, Park Y, Katki HA*, et al.* Leisure Time Physical Activity of Moderate to Vigorous Intensity and Mortality: A Large Pooled Cohort Analysis. PLOS Medicine. 2012;9:e1001335. https://doi.org/10.1371/journal.pmed.1001335

6. Evenson KR, Barakat R, Brown WJ, Molina PD, Haruna M, Mikkelsen EM, *et al.* Guidelines for Physical Activity during Pregnancy: Comparisons From Around the World. Am J Lifestyle Med 2014;8:102-121. https://doi.org/10.1177/1559827613498204

7. Kominiarek MA, Chauhan SP. Obesity Before, During, and After Pregnancy: A Review and Comparison of Five National Guidelines. Am J Perinatol 2016;33:433-441. https://doi.org/10.1055/s-0035-1567856

8. Flannery C, McHugh S, Anaba AE, Clifford E, O'Riordan M, Kenny L.C *et al.* Enablers and barriers to physical activity in overweight and obese pregnant women: an analysis informed by the theoretical domains framework and COM-B model. BMC Pregnancy Childbirth 2018;18:178. https://doi.org/10.1186/s12884-018-1816-z

9. de Barros MC, Lopes MAB, Francisco RPV, Sapienza AD, Zugaib M. Resistance exercise and glycemic control in women with gestational diabetes mellitus. Am J Obstet Gynecol 2010;203:556.e1-6. https://doi.org/10.1016/j.ajog.2010.07.015

10. Adeoye IA. Pattern and correlates of physical activity and sedentary behaviours of pregnant women in Ibadan, Nigeria: Findings from Ibadan Pregnancy Cohort Study. PLOS Glob Public Health 2022;2:e0001153. https://doi.org/10.1371/journal.pgph.0001153

11. Adeniyi A, Ogwumike O. Physical Activity and Energy Expenditure: Findings from the Ibadan Pregnant Women's Survey. Afr J Reprod Health 2014;18:117-126.

12. Janakiraman B, Gebreyesus T, Yihunie M, Genet MG. Knowledge, attitude, and practice of antenatal exercises among pregnant women in Ethiopia: A cross-sectional study. PLoS ONE 2021;16:e0247533. https://doi.org/10.1371/journal.pone.0247533

13. Mukona D, Stephen P, Mathilda Z, Stray-Pedersen B. Physical activity in pregnant women in Africa: A systematic review. Int J Nurs Midwifery 2016;8:28-34. https://doi.org/10.5897/IJNM2015.0196

14. Nkhata LA, Nkandu EM, Shula H, Mweshi MM. Attitude to Exercise in Pregnant Women Attending Antenatal Care at the University Teaching Hospital in Lusaka, Zambia. J Prev Reh Med 2016;1:19-24. https://doi.org/:10.21617/jprm.2016.0101.4

15. Nascimento SL do, Godoy AC, Surita FG, Pinto e Silva JL. Recommendations for physical exercise practice during pregnancy: A critical review. Revista Brasileira de Ginecologiae Obstetrícia 2014;36:423-431. https://doi.org/10.1590/SO100-720320140005030

16. Ramírez-Vélez R, Aguilar de Plata AC, Escudero MM, Echeverry I, Ortega JG, Salazar B, *et al.* Influence of regular aerobic exercise on endothelium-dependent vasodilation and cardiorespiratory fitness in pregnant women. J Obstet Gynaecol Res 2011;37:1601-1608. https://doi.org/10.1111/j.1447-0756.2011.01582.x

17. Muktabhant B, Lawrie TA, Lumbiganon P, Laopaiboon M. Diet or exercise, or both, for preventing excessive weight gain in pregnancy. Cochrane Database Syst Rev. 2015;6:CD007145. https://doi.org/10.1002/14651858.CD007145.pub3

18. Ferraro ZM, Gaudet L, Adamo KB. The potential impact of physical activity during pregnancy on maternal and neonatal outcomes. Obstet Gynecol Surv 2012;67:99-110. https://doi.org/10.1097/OGX.0b013e318242030e

19. Barakat R, Pelaez M, Montejo R, Refoyo I, Coteron J. Exercise throughout pregnancy does not cause preterm delivery: a randomised, controlled trial. J Phys Act Health. 2014;11:1012-1017. https://doi.org/10.1123/jpah.2012-0344

20. Aune D, Saugstad OD, Henriksen T, Tonstad S. Physical activity and the risk of preeclampsia: a systematic review and meta-analysis. Epidemiology 2014;25:331-343. https://doi.org/10.1097/EDE.0000000000000036

21. Liddle SD, Pennick V. Interventions for preventing and treating low-back and pelvic pain during pregnancy. Cochrane Database Syst Rev 2015;9:CD001139. https://doi.org/10.1002/14651858.CD001139.pub4

22. Ruben J. Using Exercise to Combat Depression. Soc Work Today. 2012;12:22.

23. Robledo-Colonia AF, Sandoval-Restrepo N, Mosquera-Valderrama YF, Escobar-Hurtado C, Ramírez-Vélez R. Aerobic exercise training during pregnancy reduces depressive symptoms in nulliparous women: a randomised trial. J Physiother 2012;58:9-15. https://doi.org/10.1016/S1836-9553(12)70067-X

24. Barakat R, Pelaez M, Montejo R, Luaces M, Zakynthinaki M. Exercise during pregnancy improves maternal health perception: a randomised controlled trial. Am J Obstet Gynecol 2011;204:402.e1-7. https://doi.org/10.1016/j.ajog.2011.01.043

25. Harrison AL, Shields N, Taylor NF, Frawley HC. Exercise improves glycaemic control in women diagnosed with gestational diabetes mellitus: A systematic review. J Physiother 2016;62(4):188-196. https://doi.org/10.1016/j.jphys.2016.08.003

26. Davenport MH, Marchand AA, Mottola MF, Poitras VJ, Gray CE, Garcia AJ, *et al.* Exercise for the prevention and treatment of low back, pelvic girdle and lumbopelvic pain during pregnancy: a systematic review and meta-analysis. Br J Sports Med 2019;53:90-98. https://doi.org/10.1136/bjsports-2018-099400

27. Currie S, Sinclair M, Murphy MH, Madden E, Dunwoody L, Liddle D. Reducing the decline in physical activity during pregnancy: a systematic review of behaviour change interventions. PLoS ONE. 2013;8:e66385. https://doi.org/10.1371/journal.pone.0066385

28. Abugu L, Samuel P. Attitude to Antenatal Exercise among Pregnant Women in Enugu state, Nigeria.Int J Human Kinetics Health Educ 2023;3.

29. Makinde O, Adeyemo F, Ogundele B. Perception of pregnant mothers attending the antenatal clinic on the usefulness of prenatal exercise in Osogbo, Osun state, Nigeria. Health Sci J 2014;8.

30. Sagamu (Local Government Area, Nigeria) - Population Statistics, Charts, Map and Location. Accessed 19 April 2021. https://www.citypopulation.de/php/nigeria-admin.php?adm2id=NGA028020

31. Mbada CE, Adebayo OE, Adeyemi AB, *et al.* Knowledge and Attitude of Nigerian Pregnant Women towards Antenatal Exercise: A Cross-Sectional Survey. ISRN Obstet Gynecol 2014;2014:260539. https://doi.org/10.1155/2014/260539

32. National Population Commission-, ICF. Nigeria Demographic and Health Survey 2018 - Final Report. Published online 01 October 2019. Accessed 13 August 2021. https://dhsprogram.com/publications/publication-fr359-dhs-final-reports.cfm

33. Okonofua F, Ntoimo L, Ogungbangbe J, Anjorin S, Imongan W, Yaya S. Predictors of women's utilisation of primary health care for skilled pregnancy care in rural Nigeria. BMC Pregnancy Childbirth 2018;18. https://doi.org/10.1186/s12884-018-1730-4

34. Egharevba J, Pharr J, van Wyk B, Ezeanolue E. Factors Influencing the Choice of Child Delivery Location among Women Attending Antenatal Care Services and Immunization Clinic in Southeastern Nigeria. Int J MCH AIDS. 2017;6:82-92. https://doi.org/10.21106/ijma.213

35. Gebregziabher NK, Zeray AY, Abtew YT, Kinfe TD, Abrha DT. Factors determining the choice of place of delivery: an analytical cross-sectional study of mothers in Akordet town, Eritrea. BMC Public Health. 2019;19:924. https://doi.org/10.1186/s12889-019-7253-8

36. Exercise During Pregnancy | ACOG. Accessed 06 August 2021. https://www.acog.org/womens-health/faqs/exercise-during-pregnancy

37. Sheth R, Gala S, Sheth M. Knowledge, attitude, and perception about antenatal physiotherapy among pregnant women in Ahmedabad. Int J Med Sci Public Health. 2019;8:718-722. https://doi.org/10.5455/ijmsph.2019.0511619062019

38. Sujindra E, Bupathy A, Suganya A, Praveena R. Knowledge, attitude, and practice of exercise during pregnancy among antenatal mothers. Int J Educ Psychol Res 2015;1:234. https://doi.org/10.4103/2395-2296.158347

39. Adinma J.I.B, Adinma E.D, Umeononihu O.S, Oguaka V, Oyedum S.O. Perception and Practice of Exercise during Pregnancy by Antenatal Women in Southeastern Nigeria. J Gynecol Reprod Health 2018; 2:1-6. https://doi.org/10.33425/2639-9342.1057