



# Physical Activity and Health-Related Quality of Life in Pregnant Women

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## Abstract

**Background:** Physical activity (PA) and health-related quality of life (HRQoL) are significantly affected in pregnancy.

**Objectives:** The aim of this study was to assess these constructs among Nigerian pregnant women and also examine the relationship between them.

**Methods:** A total of 140 pregnant women were recruited from four selected antenatal clinics in Ile-Ife, Osun State, Nigeria, who participated in this cross-sectional study. The pregnancy physical activity questionnaire (PPAQ); consisting of 33 questions aimed at evaluating different day to day activities and SF-12 health survey; an eight scale grouped questionnaire were used to assess PA and HRQoL, respectively. Descriptive statistics (mean, standard deviation, frequency, and percentage) and inferential statistics (Pearson product moment correlation and one-way ANOVA) were used for data analysis. Alpha level was set at  $P < 0.05$ .

**Results:** The mean age of the participants was  $30.4 \pm 4.33$  years. Household ( $347.0 \pm 452.1$ ) and vigorous intensity ( $14.3 \pm 30.8$ ) PA constituted the highest and least forms of PA. On the other hand, role limitation-physical ( $82.0 \pm 18.3$ ) and health perception ( $82.0 \pm 18.0$ ), and role limitation-mental ( $54.2 \pm 50$ ), respectively were the highest and least rated scales on SF-12. The HRQoL scores were not significantly different ( $P > 0.05$ ) across the three trimesters of pregnancy except for physical functioning ( $P = 0.023$ ). However, there were significant differences in PA across the three trimester of pregnancy ( $P < 0.05$ ), except for vigorous intensity ( $P = 0.072$ ), sport ( $P = 0.057$ ), and occupational activity ( $P = 0.057$ ). There were significant correlations among HRQoL sub-scales and each of household, occupational, and moderate intensity PA only ( $P < 0.05$ ).

**Conclusions:** Light to moderate intensity and household PA are predominant among Nigerian pregnant women than vigorous intensity, occupational, and sports-related PA. Higher health perception and physical role limitation in HRQoL were mostly demonstrated by the pregnant women. There was a significant inverse relationship between HRQoL and each of moderate intensity, occupational, and household PA.

**Keywords:** Physical Activity, Health, Quality of Life, Pregnancy

## 1. Background

Pregnancy is one of the most important stages in a woman's life (1) and it is associated with significant physiological and psychological changes (2). These changes are risk factors for sedentary lifestyle and/or low levels of physical activity (PA) during pregnancy (3). While the benefits of active engagement in PA during pregnancy for the mother and growth of the foetus is well documented in the

literature (1, 4-6), a considerable number of women reduce or discontinue PA, and only a few engage in exercises or sport activities during pregnancy (7). In a bid to promote the health benefits of PA, American College of Obstetrician and Gynaecologists (8) recommended that pregnant women should engage in at least 30 minutes of moderate-intensity exercise for most days of the week, if not all.

On the other hand, quality of life, which is a term often used interchangeably with a person's well-being or gen-

eral health status, is reported to be significantly affected in pregnancy (9, 10). Ramírez-Vélez (11) submits that women experience subtle changes even in normal pregnancies, which may alter their ability to carry out their activity of daily living and may distract them from their overall health-related quality of life (HRQoL). It is however generally accepted that the self-perceived health is a major contribution to the overall quality of life (12). During pregnancy, reduced quality of life has also been associated with lower levels of PA (13).

Literature is replete on a number of intrinsic and extrinsic factors that influence HRQoL yet there is wide variations on the direction of association that exist among these variables and HRQoL (9, 10, 12). However, lower levels of PA that is commonly induced in pregnancy is considered to have a significant influence of on overall quality of life (13). Physiological changes occurring during pregnancy are likely to contribute to reduced physical health status (11). Furthermore, Hueston and Kasik-Miller (14) reported a negative correlation between gestational age and multiple physical HRQoL dimensions. While the overarching goal of antenatal care increases the likelihood of a favourable maternal and neonatal outcome (15, 16), less consideration has been given to the altered psychosocial state of women arising during pregnancy (11).

In consonance with the foregoing, exploring the relationship between PA and HRQoL in pregnancy needs deserved attention. Considering that both PA and HRQoL are significantly affected during pregnancy, however, the nexus between both constructs seems less explored in the literature. Furthermore, both PA and quality of life are context dependent, and as such, their outcomes may vary from one study to another.

## 2. Objectives

The objective of this study was to assess PA and HRQoL in pregnancy, while exploring the relationship that exist between them.

## 3. Methods

This cross-sectional study involved purposively recruited pregnant women, who were literate in English language without any positive report of an underlying pathology, such as diabetes or hypertension. Excluded from this study were pregnant women, who were involved in PA intervention prior or during the course of this study. The respondents were recruited from four selected facilities with antenatal care services in Ile-Ife, namely Urban Comprehensive Health Centre, Eleyele; Primary Health Centre, Aderemi; Obafemi Awolowo University, Health Centre;

and Obafemi Awolowo Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria.

Based on a sample size formula of  $n = (Z_{1-\alpha/2})^2 p(1-p)/d^2$ , where  $n$  is the desired sample size,  $Z_{1-\alpha/2}$  (i.e. 1.96) is the standard normal variate at 95% confidence level,  $p$  is the expected proportion in the population (15% is adopted in this study, as epidemiological data indicates that only 15% of pregnant women meet the minimum recommendations of 150 minutes of moderate-intensity PA per week (17, 18)) and  $d$  is the absolute error or precision, a total of 196 was calculated ( $(1.96)^2 \times 0.15(1 - 0.15)/0.05^2 = 196$ ). However, a total of 140 pregnant women participated in this study, yielding a response rate of 71.4% (i.e.  $140/196 \times 100$ ). Ethical approval for the study was obtained from the Health Research and Ethics Review Committee of the Institute of public health, Obafemi Awolowo University Ile-Ife, Nigeria. The purpose of the research was explained to each respondent and informed consent for participation was obtained.

### 3.1. Instrument

1- The pregnancy physical activity questionnaire (PPAQ) by Chasan-Taber (19) was used to assess PA. The PPAQ consists of 33 questions, which aims at assessing different day to day activities, including household/caregiving, occupational, sports/exercise, transportation, and inactivity. The validity of PPAQ was reported as 0.78. The reliability of its dimensions included: Sedentary activities (0.79), low-intensity activities (0.78), moderate-intensity activities (0.82), vigorous-intensity activity (0.81), household activity (0.86), occupational activities (0.93), and sport activities (0.83) (19).

2- SF-12 health survey by Ware et al. (20) was used to assess HRQoL. The SF-12 survey was derived from the short form health survey-36 (SF-36). The SF-12 survey are grouped to eight scales, which are physical functioning, role-physical, bodily pain, general health, energy/fatigue, social functioning, role-emotional, and mental health. These scales are summarized to two domains, which are physical health and mental health component. The reliability for physical and mental health component were observed as 0.89 and 0.76, respectively. Relative validity of physical and mental health component summary ranges from 0.43 to 0.93 (median = 0.67) and 0.60 to 1.07 (median = 0.97), respectively (20).

### 3.2. Data Analysis

Descriptive statistics of mean, standard deviation, frequency, and percentage were used to summarize the social demographic variables of respondents. Inferential statistics of Pearson product moment correlation, and one-way analysis of variance (ANOVA) were used. Alpha level was set

to  $P < 0.05$ . The data analyses were carried out using statistical package for social sciences (SPSS) version 20.0 software (SPSS Inc., Chicago, Illinois, USA).

### 3.3. Computations

#### 3.3.1. Scoring and Computation of PPAQ

The computation of the PPAQ was based on the method described by Chasan-Taber et al. (19) to calculate energy expenditure. Accordingly, self-reported time spent on each activity was multiplied by activity intensity (in METs) in order to obtain the average daily energy expenditure (METs  $\times$  hours/day). Calculation of activity intensity was based on field-based measurements of pregnant women as reported by Roberts et al. (21) and the compendium-based MET values (version 2000) (22). Energy expenditures of all activities, in turn, were summed up to obtain the mean MET hours per day for total activity. Also, using pre-set cut-points (sedentary,  $< 1.5$  METs; light,  $< 3.0$  METs; moderate,  $3.0 < \text{to } 6.0$  METs; or vigorous,  $\geq 6.0$  METs), each activity was classified by its intensity and according to type (household/caregiving, occupational, sports/exercise, transportation, and inactivity). Thus, the average number of MET hours per day spent on each activity type was calculated (23).

#### 3.3.2. Scoring and Computation of SF-12

The SF-12 is a multipurpose short form survey with 12 items. To score the SF-12, the researchers followed the method proposed by the developers (20). The items were combined, scored, and weighted to form eight subscales (bodily pain (BP), general health (GH), vitality (VT), and social functioning (SF); and physical functioning (PF), mental health (MH), role physical (RP), and role emotional (RE)), and the subscales in turn were computed to form two domains (mental component summary (MCS) and physical component summary (PCS)). Response categories for the 12 items vary from two- to six-point scales, and raw scores for items range from one to six. Raw scores for items were transformed by recoding (each ranging from 0 (the worst) to 100 (the best)) them in order to obtain the eight scale scores (20). The summary scores of the PCS and MCS scores, were calculated from z-scores of the eight subscales, using weights from principal component analysis on the SF-36 scales (24).

## 4. Results

The socio-demographic and clinical characteristics of the respondents are presented in Table 1. The mean age of the respondents in this study was  $30.4 \pm 4.33$  years. Most of the respondents (53.6%) were in their third trimester and

were still engaged in active work during their pregnancy (85.7%). Table 2 shows the mean and percentile data on PA of the respondents. The PA participation was highest in the second trimester ( $1040 \pm 1563.8$ ), while the respondents in the third trimester had the lowest mean of  $10.4 \pm 24.5$  in vigorous intensity PA. Cumulatively in all trimesters, household PA ( $347.0 \pm 452.1$ ) and vigorous intensity PA ( $14.3 \pm 30.8$ ) had the highest and the lowest mean scores, respectively.

Table 3 shows the mean and percentile data of respondents' HRQoL. In all the three trimesters, role limitation-physical ( $83.6 \pm 13.6$ ;  $80.1 \pm 19.0$ ;  $82.5 \pm 19.3$ ) and health perception ( $83.6 \pm 13.6$ ;  $80.1 \pm 19.0$ ;  $82.5 \pm 19.3$ ) had the highest mean scores. The lowest mean scores across the three trimesters was observed in role limitation-mental scale ( $60.0 \pm 50.0$ ;  $57.5 \pm 50.1$ ;  $50.7 \pm 50.3$ ). The HRQoL scale with the highest overall mean scores were health perception ( $82.0 \pm 18.3$ ) and role limitation-physical ( $82.0 \pm 18.0$ ) respectively, while role limitation-mental had the least scale score ( $54.2 \pm 50.0$ ). The domain scores for physical health and mental health was  $71.3 \pm 14.5$  and  $61.4 \pm 23.4$ , respectively.

Comparison of HRQoL and PA scores across the different trimesters of pregnancy is shown in Table 4. There were no significant differences in the HRQoL across the three trimesters of pregnancy, except for physical functioning ( $P = 0.023$ ). However, there were significant differences in PA across the three trimesters of pregnancy except for vigorous intensity ( $P = 0.072$ ), sport ( $P = 0.057$ ), and occupational activity ( $P = 0.057$ ).

Correlation between HRQoL and PA is shown in Table 5. There was a significant correlation between HRQoL subscales and each of the household, occupational, and moderate intensity PA ( $P < 0.05$ ). However, there was no significant correlation ( $P > 0.05$ ) between the HRQoL sub-scales and the other PA types (sedentary, light intensity, vigorous intensity, sport, and total PA).

## 5. Discussion

This study assessed PA and HRQoL among pregnant females. The PA scores obtained in this study varied by trimester. Pregnant women in the second trimester had the highest ( $1040 \pm 1563.8$ ) PA score. This finding is congruent with the reports of Borodulin et al. (25) who also found high levels of PA during the second trimester of pregnancy. Therefore, the findings of this study supports earlier assertion that PA is usually highest during the second trimester (26). The reason being that pregnant women tend to be more stable during the second trimester (27). Based on PA types, this study found that pregnant women in the second trimester had the highest overall mean of

**Table 1.** Social-Demographic and Clinical Characteristics of the Respondents (N = 140)<sup>a</sup>

Variables	Values
<b>Age, mean <math>\pm</math> SD</b>	30.4 $\pm$ 4.33
<b>Marital status</b>	
Married	139 (99.3)
Widowed	1 (0.7)
<b>Occupation</b>	
Civil/public service	52 (37.1)
Trading/business	46 (32.9)
Student	12 (8.6)
Artisan	18 (12.9)
Unemployed	12 (8.6)
<b>Religion</b>	
Christianity	108 (77.1)
Islam	30 (21.4)
Others	2 (1.4)
<b>Ethnic</b>	
Yoruba	118 (84.3)
Igbo	12 (8.6)
Hausa	1 (0.7)
Others	9 (6.4)
<b>Trimester</b>	
1st trimester	25 (17.9)
2nd trimester	40 (28.6)
3rd trimester	75 (53.6)
<b>Number of children</b>	
0	63 (45.0)
1	43 (30.7)
2	24 (17.1)
3	9 (6.4)
4	1 (0.7)
<b>Work during pregnancy</b>	
Yes	120 (85.7)
No	20 (14.3)
<b>Hypertensive</b>	
Yes	0 (0)
No	140 (100)
<b>Diabetic</b>	
Yes	0 (0)
No	140 (100)
<b>Total</b>	140 (100)

<sup>a</sup>Values are expressed as frequency (%) unless otherwise indicated.

527  $\pm$  636.0 in household related PA. This finding supports the study of Florindo et al., who found that household PA is the most prevalent PA in comparison to occupational and transportation PA. The authors documented further that the highest of all reviewed PA types among the pregnant participants was household intensity PA (28). The first trimester characteristics, such as nausea and fatigue begin to fade for most women as they move into their second trimester (29). This may account for the increase in household PA among the pregnant women in this study.

From the result of this study, pregnant women in the third trimester had the least mean score (10.4  $\pm$  3.4) for vigorous intensity PA. The results are generally consistent with previous studies (13, 30) indicating a significant decline in time spent in total and vigorous leisure PA and stable levels of moderate leisure PA from pre-pregnancy to pregnancy. Mudd et al. (31) submits that first-time mothers and women, who do not participate in moderate or vigorous PA activity before pregnancy seem to feel unsafe/unsure about vigorous PA during pregnancy.

Furthermore, from this study, there were significant differences in PA across the three trimesters of pregnancy, except for vigorous intensity and occupational activity. Specifically, this study found that PA participation score was highest in the second trimester (1040  $\pm$  1563.8) and lowest in the third trimester, especially in vigorous intensity PA (10.4  $\pm$  3.4). The third trimester is a period where the pregnant women, usually embark on a maternity leave, which may make them spend more time at home than at work (32). Another possible reason is that most of the pregnant women may feel more comfortable and safer doing household activities than engaging in occupational or sport activities (32).

The HRQoL scores obtained in this study varied by trimester. The HRQoL scale with the highest mean score (82.0  $\pm$  18.3) was role limitation-physical perception and health perception respectively, while role limitation and mental health had the least scale score (54.2  $\pm$  50.0), respectively. In a study by Ramírez-Vélez (11), the participants reported higher scores in the vitality (energy/fatigue), followed by mental health and HP. This study shows that there were significant differences in the HRQoL across the three trimesters of pregnancy except for physical functioning. Moyer et al. (33) found that physical functioning was significantly different during pregnancy across the country samples. Vinturache et al. (34) showed no significant differences for the changes in physical and mental health scores from pregnancy to postpartum.

In this present study, there was significant correlations between HRQoL scales and each of household, occupational, and moderate intensity PA. However, there was no significant correlation between the HRQoL scales and the

**Table 2.** Mean Values and Percentile Data of the Respondents' Physical Activity (All the Trimesters) N = 140

Variables	25th	Median	Mean $\pm$ SD	75th	95th
<b>First trimester (N = 25)</b>					
Sedentary	25.5	80.5	117.3 $\pm$ 122.9	192.5	402.9
Light intensity	48.0	159.5	216.7 $\pm$ 98.3	333.1	742.1
Moderate intensity	14.3	65.4	179.6 $\pm$ 289.7	190.4	1099.1
Vigorous intensity	0.00	3.4	11.0 $\pm$ 16.6	16.9	56.7
Household	54.5	223.5	314.0 $\pm$ 392.5	378.7	1503.4
Occupational	0.00	0.00	3.33 $\pm$ 15.1	0.00	55.23
Sports	13.8	27.0	45.1 $\pm$ 51.9	50.0	183.3
Total PA	179.9	306.4	507.7 $\pm$ 526.5	688.7	2018.3
<b>Second trimester (N = 40)</b>					
Sedentary	21.4	94.5	197.3 $\pm$ 267.1	234.1	893.6
Light intensity	146.3	247.5	370.5 $\pm$ 331.22	471.7	1184.4
Moderate intensity	22.4	84.0	521.4 $\pm$ 1212.0	314.7	4207.9
Vigorous intensity	0.00	4.2	23.71 $\pm$ 44.1	25.1	147.5
Household	154.1	269.2	527.6 $\pm$ 636.0	365.3	2361.2
Occupational	0.00	0.00	238.6 $\pm$ 790.3	0.00	2590.7
Sports	12.1	26.6	67.9 $\pm$ 96.2	79.7	346.7
Total PA	289.4	467.7	1040.2 $\pm$ 1563.8	875.7	5790.6
<b>Third trimester (N = 75)</b>					
Sedentary	17.5	52.3	95.0 $\pm$ 118.5	126.0	373.8
Light intensity	54.5	143.4	198.3 $\pm$ 196.6	265.3	577.0
Moderate intensity	19.7	47.6	179.1 $\pm$ 285.0	180.9	826.3
Vigorous intensity	0.00	3.4	10.4 $\pm$ 24.5	8.5	56.0
Household	70.4	141.8	261.6 $\pm$ 308.9	367.3	949.6
Occupational	0.00	0.00	57.9 $\pm$ 175.0	0.00	353.9
Sports	7.7	18.8	36.2 $\pm$ 50.6	46.9	158.4
Total PA	169.8	310.0	471.6 $\pm$ 471.6	608.9	1554.7
<b>All trimesters (N = 140)</b>					
Sedentary	18.4	70.0	128.2 $\pm$ 179.1	158.0	485.0
Light intensity	92.0	168.9	250.8 $\pm$ 252.9	323.7	844.5
Moderate intensity	20.3	60.3	277.0 $\pm$ 702.8	228.2	1168.3
Vigorous intensity	0.00	3.4	14.3 $\pm$ 30.8	11.2	80.4
Household	87.9	203.1	347.0 $\pm$ 452.1	418.4	1445.9
Occupational	0.00	0.00	99.8 $\pm$ 447.0	0.00	507.4
Sports	10.5	21.6	46.9 $\pm$ 67.9	57.3	185.9
Total PA	181.4	339.0	640.3 $\pm$ 957.6	731.2	2059.7

Abbreviation: PA, physical activity.

other PA types (sedentary, light intensity, vigorous intensity, sport, and total PA). Anokye et al. (35) suggests that there is a relationship between PA and HRQoL in adults.

Bahadoran and Mohammedirizi (1) found a significant relationship between PA and social support (one of the important aspects of quality of life) among pregnant females.

**Table 3.** Mean and Values and Percentile Data of the Respondents' Health-Related Quality of Life (N = 140)

Variables	25th	Median	Mean $\pm$ SD	75th	95th
<b>First Trimester (N = 25)</b>					
Physical functioning	58.3	83.3	73.5 $\pm$ 31.2	100.0	100.0
Role-physical	85.0	85.0	83.6 $\pm$ 13.6	92.5	100.0
Bodily pain	45.0	65.0	69.6 $\pm$ 25.2	100.0	100.0
Health perception	85.0	85.0	83.6 $\pm$ 13.6	92.5	100.0
Energy/fatigue	60.0	80.0	72.0 $\pm$ 22.4	90.0	100.0
Social functioning	50.0	100.0	76.0 $\pm$ 43.6	100.0	100.0
Role-mental	0.00	100.0	60.0 $\pm$ 50.0	100.0	100.0
Mental health	53.5	60.0	69.5 $\pm$ 21.8	66.7	78.0
<b>Second trimester (N = 40)</b>					
Physical functioning	33.3	66.7	58.3 $\pm$ 30.9	83.3	100.0
Role-physical	60.0	85.0	80.1 $\pm$ 19.0	96.3	100.0
Bodily pain	45.0	65.0	64.0 $\pm$ 26.8	100.0	100.0
Health perception	60.0	85.0	80.1 $\pm$ 19.0	96.3	100.0
Energy/fatigue	60.0	80.0	74.5 $\pm$ 26.8	100.0	100.0
Social functioning	0.00	100.0	57.5 $\pm$ 50.1	100.0	100.0
Role-mental	0.00	100.0	57.5 $\pm$ 50.1	100.0	100.0
Mental health	46.7	60.0	62.1 $\pm$ 22.8	60.7	93.0
<b>Third trimester (N = 75)</b>					
Physical functioning	33.3	50.0	55.4 $\pm$ 26.0	66.7	100.0
Role-physical	66.0	85.0	82.5 $\pm$ 19.3	100.0	100.0
Bodily pain	25.0	65.0	57.7 $\pm$ 24.8	65.0	100.0
Health perception	60.0	85.0	82.5 $\pm$ 19.3	100.0	100.0
Energy/fatigue	20.0	80.0	71.7 $\pm$ 19.8	80.0	100.0
Social functioning	0.00	100.0	56.0 $\pm$ 50.0	100.0	100.0
Role-mental	0.00	100.0	50.7 $\pm$ 50.3	100.0	100.0
Mental health	32.0	60.0	59.1 $\pm$ 15.4	66.7	82.7
<b>All trimesters (N = 140)</b>					
Physical functioning	33.3	66.7	59.4 $\pm$ 29.0	83.3	100.0
Role-physical	60.0	85.0	82.0 $\pm$ 18.3	100.0	100.0
Bodily pain	45.0	65.0	61.6 $\pm$ 25.7	65.0	100.0
Health perception	60.0	85.0	82.0 $\pm$ 18.0	100.0	100.0
Energy/fatigue	60.0	80.0	72.6 $\pm$ 22.3	80.0	100.0
Social functioning	0.00	100.0	60.0 $\pm$ 49.2	100.0	100.0
Role-mental	0.00	100.0	54.2 $\pm$ 50.0	100.0	100.0
Mental health	53.3	60.0	58.9 $\pm$ 21.2	66.7	80.0
<b>Domain</b>					
Physical health	62.1	71.3	71.3 $\pm$ 14.5	82.5	95.7
Mental health	38.3	61.7	61.4 $\pm$ 23.4	85.0	91.7



**Table 4.** Comparison of Health-Related Quality of Life and Physical Activity Score Across Different Trimester of Pregnancy (N = 140)<sup>a,b</sup>

Variables	Trimester			F Ratio	P Value
	1st (N = 25)	2nd (N = 40)	3rd (N = 75)		
HRQoL					
Physical functioning	73.5 ± 31.2 <sup>A</sup>	58.3 ± 30.9 <sup>B</sup>	55.4 ± 26.0 <sup>B</sup>	3.863	0.023
Role-physical	83.6 ± 13.6	80.1 ± 19.0	82.5 ± 19.3	0.327	0.721
Bodily pain	69.6 ± 25.2 <sup>A</sup>	64.0 ± 26.8 <sup>A</sup>	57.7 ± 24.8 <sup>B</sup>	2.305	0.104
Health perception	83.6 ± 13.6	80.1 ± 19.0	82.5 ± 19.3	0.327	0.721
Energy/fatigue	72.0 ± 22.4	74.5 ± 26.8	71.7 ± 19.8	0.209	0.821
Social functioning	76.0 ± 43.6 <sup>A</sup>	57.5 ± 50.1 <sup>B</sup>	56.0 ± 50.0 <sup>B</sup>	1.639	0.198
Role-mental	60.0 ± 50.0 <sup>A</sup>	57.5 ± 50.1 <sup>A</sup>	50.7 ± 50.3 <sup>B</sup>	0.439	0.646
Mental health	58.4 ± 13.0	58.7 ± 15.8	59.1 ± 15.4	0.025	0.975
Physical activity					
Sedentary	117.3 ± 122.9 <sup>A</sup>	117.3 ± 267.1 <sup>A</sup>	95.0 ± 118.5 <sup>B</sup>	4.524	0.013
Light intensity	216.6 ± 198.3 <sup>A</sup>	370.5 ± 331.2 <sup>B</sup>	198.3 ± 196.6 <sup>C</sup>	6.863	0.001
Moderate intensity	179.6 ± 289.7 <sup>A</sup>	521.4 ± 1212.0 <sup>B</sup>	179.1 ± 285.0 <sup>A</sup>	3.509	0.033
Vigorous intensity	11.0 ± 16.6 <sup>A</sup>	23.7 ± 44.1 <sup>B</sup>	10.4 ± 24.5 <sup>A</sup>	2.685	0.072
Household	314.0 ± 392.5 <sup>A</sup>	527.6 ± 636.0 <sup>B</sup>	261.6 ± 308.9 <sup>C</sup>	4.851	0.009
Occupational	3.3 ± 15.1 <sup>A</sup>	238.6 ± 790.3 <sup>B</sup>	37.9 ± 175.0 <sup>C</sup>	2.920	0.057
Sports	45.1 ± 51.9 <sup>A</sup>	67.9 ± 96.2 <sup>B</sup>	36.2 ± 50.6 <sup>C</sup>	2.930	0.057
Total PA	507.7 ± 526.5 <sup>A</sup>	1040.1 ± 1563.8 <sup>B</sup>	147.1 ± 471.6 <sup>C</sup>	5.189	0.007

Abbreviation: HRQoL, health-related quality of life; PA, physical activity.

<sup>a</sup>Values are expressed as mean ± SD.<sup>b</sup>Superscripts (A, B, C) represent pair wise post-hoc comparison between groups. For a particular variable, mean values with different superscript are significantly (P < 0.05) different. Mean values with same superscripts are not significantly (P > 0.05) different.**Table 5.** Correlation Matrix Between Physical Activity and Health-Related Quality of Life

	PF	RP	BP	HP	E/F	SF	RM	MH	S	LI	MI	VI	HH	O	Sp	TPA	
PF	r	1	0.133	0.231 <sup>a</sup>	0.133	0.140	0.342 <sup>a</sup>	0.305 <sup>a</sup>	0.063	0.230 <sup>a</sup>	0.121	- 0.183 <sup>a</sup>	- 0.024	- 0.193 <sup>a</sup>	-0.136	- 0.033	0.195 <sup>a</sup>
RP	r		1	- 0.059	1.000 <sup>a</sup>	0.139	0.242 <sup>a</sup>	0.077	0.106	0.022	0.003	0.046	0.062	0.011	0.037	0.058	0.037
BP	r			1	0.059	0.189 <sup>a</sup>	0.111	0.175 <sup>a</sup>	- 0.095	- 0.045	- 0.057	0.011	-0.071	-0.011	0.037	- 0.098	- 0.020
HP	r				1	0.139	0.242 <sup>a</sup>	0.077	0.106	0.022	- 0.003	0.046	0.062	0.011	0.037	0.058	0.037
E/F	r					1	0.108	0.287 <sup>a</sup>	0.343 <sup>a</sup>	0.042	0.056	0.130	0.159	0.078	0.121	0.663	0.037
SF	r						1	0.363 <sup>a</sup>	- 0.004	- 0.041 <sup>a</sup>	0.005	-0.142	0.064	- 0.052	- 0.187 <sup>a</sup>	0.063	-0.101
RM	r							1	0.179	0.626 <sup>a</sup>	- 0.099	- 0.160	0.065	-0.147	-0.152	0.039	-0.148
MH	r								1	0.122	0.154	0.081	0.098	0.102	0.078	0.056	0.115
S	r									1	- 0.717 <sup>a</sup>	0.815 <sup>a</sup>	0.554 <sup>a</sup>	- 0.827 <sup>a</sup>	0.651 <sup>a</sup>	0.568 <sup>a</sup>	0.819 <sup>a</sup>
LI	r										1	0.651 <sup>a</sup>	0.601 <sup>a</sup>	0.981 <sup>a</sup>	0.445 <sup>a</sup>	0.681 <sup>a</sup>	0.819 <sup>a</sup>
MI	r											1	0.477 <sup>a</sup>	0.839 <sup>a</sup>	0.931 <sup>a</sup>	0.431 <sup>a</sup>	0.962 <sup>a</sup>
VI	r												1	0.560 <sup>a</sup>	0.285 <sup>a</sup>	0.902 <sup>a</sup>	0.582 <sup>a</sup>
HH	r													1	0.622 <sup>a</sup>	0.598 <sup>a</sup>	0.931 <sup>a</sup>
O	r														1	0.205 <sup>a</sup>	0.834 <sup>a</sup>
Sp	r															1	0.576 <sup>a</sup>
TPA	r																1

Abbreviations: BP, bodily pain; E/F, energy/fatigue; HH, household; HP, health perception; LI, light intensity; MH, mental health; MI, moderate intensity; O, occupation; PF, physical functioning; RM, role-mental; RP, role-physical; S, sedentary; SF, social functioning; Sp, sport; TPA, total physical activity; VI, vigorous intensity.

<sup>a</sup>Correlation is significant at the 0.05 level (2-tailed).

The study by Anokye et al. supports the hypothesis that higher levels of PA are associated with better HRQoL (35).

Generally, pregnant women, who participated in this study were relatively young ( $30.4 \pm 4.33$  years). Thus, the significant effect of variability of age on PA, as well as, on its relationship with HRQoL, is presumed to be limited, and thus may not constitute a significant co-founder, since pregnant women in this study were within a small age bracket. Studies have shown that age significantly influences PA (36, 37). Specifically, studies on PA in pregnancy have shown that physical functions were consistently decreased with increased age in elderly women, (38, 39). Dumith et al. (40) stated that age is an important factor in PA during pregnancy. Other studies also showed that age influences HRQoL (41, 42).

### 5.1. Conclusions

Light to moderate intensity and household PA are predominant among Nigerian pregnant women than vigorous intensity, occupational, and sports related PA. Higher health perception and physical role limitation in HRQoL were mostly demonstrated by the pregnant women. There was a significant inverse relationship between HRQoL and each of moderate intensity, occupational, and household PA.

### Footnotes

**Authors' Contribution:** Conception of study idea: Chidozie Emmanuel Mbada; Data collection: Hamdalah A Adesunkanmi; Data analysis: Chidozie Emmanuel Mbada; Interpretation of findings: Chidozie Emmanuel Mbada, Hamdalah A Adesunkanmi, Okechukwu Ernest Orji, David Olakorede, Adebajo Babalola Adeyemi, Esther Kikelomo Afolabi, Chidiebele Petronilla Ojukwu, Abolaji Blessed Adeyemi, Olabisi Aderonke Akinwande, Moses Oluwatosin Makinde and Dolapo Adeola Ojo; Writing of manuscript: Chidozie Emmanuel Mbada, Hamdalah A Adesunkanmi, Okechukwu Ernest Orji, David Olakorede, Adebajo Babalola Adeyemi, Esther Kikelomo Afolabi, Chidiebele Petronilla Ojukwu, Abolaji Blessed Adeyemi, Olabisi Aderonke Akinwande, Moses Oluwatosin Makinde and Dolapo Adeola Ojo; Review of manuscript: Chidozie Emmanuel Mbada, Hamdalah A Adesunkanmi, Okechukwu Ernest Orji, David Olakorede, Adebajo Babalola Adeyemi, Esther Kikelomo Afolabi, Chidiebele Petronilla Ojukwu, Abolaji Blessed Adeyemi, Olabisi Aderonke Akinwande, Moses Oluwatosin Makinde and Dolapo Adeola Ojo.

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