

# Prevalence and risk factors for obesity in a Nigerian obstetric population

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**Abstract:** Background: An obese pregnant woman is at increased risk of pregnancy complications with resultant adverse pregnancy outcomes. This study was undertaken to ascertain the magnitude of this nutritional disorder and its predictive factors among an obstetric population in Nigeria. Materials and methods: A descriptive study of pregnant women who registered for antenatal care within the first trimester in a private University Teaching Hospital over a 7-month period. They were interviewed to document the requisite data, their weights and heights were also taken. Body mass index obesity and obesity were classified based on the WHO criteria. Data was analyzed using SPSS version 16 for windows (SPSS Inc., Chicago, IL, USA). Results: The mean weight and height of the women were  $71.2 \pm 14.9$  Kg and  $1.59 \pm 0.06$  meters respectively. The prevalence of obesity was 33.1%. Thirty two women (60.4%) had mild obesity, 16 (30.2%) had moderate obesity while 5 (9.4%) had severe or morbid obesity. Also, 32.5% (52/160) of the study population were overweight while 34.4% (55/160) had normal BMI. Maternal age > 35 years ( $P = 0.04$ , OR 3.9, 95% CI 1.01 – 8.15), history of previous delivery ( $P = 0.03$ , OR 4.8, 95% CI 1.08 – 5.55) and self-reported satisfactory income ( $P = 0.03$ , OR 4.6, 95% CI 1.11 – 8.86) were significant independent predictive factors of obesity among the study population. Conclusion: Obesity is common in this obstetric population and older women, previous delivery and self-reported satisfactory income were its predictive factors. The need for prenatal health awareness about obesity and identification of these women aimed at instituting early antenatal surveillance and identification of complication(s) is advocated.

**Keywords:** Obesity, Body Mass Index, Risk Factors, Obstetric Population, Nigeria

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## 1. Introduction

Obesity defined as body mass index (BMI) greater or equal to  $30 \text{ Kg/m}^2$  is one of the emerging public health concern particularly in developed countries and its prevalence has risen to an epidemic proportion<sup>1,2</sup>. It has been estimated that about 20% of pregnant women booking for antenatal care in the United Kingdom (UK) are obese<sup>3</sup>. This nutritional disorder is associated deleterious effects on female reproduction, pregnancy outcomes as well as a contributor to maternal mortality<sup>4,5</sup>. Hence, obesity has major impacts on maternity services including significant

implications for the delivery of obstetric care in any society.

There are reports of increasing prevalence of obesity among pregnant women in developing countries<sup>6,7</sup>. Increased rates of obesity among pregnant women are a significant public health concern with wide implications for prenatal care and supervision of delivery. This may ultimately increase the cost of obstetric care as a result of negative impacts of obesity in pregnancy including increased risk of miscarriages, gestational hypertension and pre-eclampsia, gestational diabetes, prolonged pregnancy, increased caesarean section rates, postpartum hemorrhage, fetal macrosomia and fetal deaths. In Nigeria, there are

reports of significant level of obesity in pregnancy in the South-eastern parts of the country with prevalence range of 10.7 to 22.6% with associated reported adverse maternal and fetal outcomes<sup>8,9</sup>.

The World Health Organization (WHO) describes obesity as “one of the most blatantly visible, yet most neglected, public-health problems that threaten to overwhelm both developed and developing countries”<sup>10</sup>. Hence, obesity is conferring a high risk status to pregnant women and there may be the need for routine antenatal identification of these so that appropriate proactive are instituted to reduce the poor obstetric outcomes associated with this emerging health risk.

Several risk factors for obesity in pregnancy have been identified in published literatures including urban residence, increasing maternal age, women of high parity, cigarette smoking and lower educational status<sup>7,8,11</sup>. Identification of risk factors for obesity in an antenatal population may prompt the need among health professionals to purposefully screen for the disorder.

To the best of our knowledge no study has been carried out on the prevalence and risk factors for obesity among the obstetric population in Jos, North-central Nigeria. This study was therefore undertaken to ascertain the magnitude and independent risk factors of obesity at booking in a Nigerian obstetric population in Jos.

## 2. Materials and Methods

This was a cross-sectional study of consecutive pregnant women presenting for antenatal care booking within the first trimester at Bingham University Teaching Hospital, Jos from January to July 2013. Bingham University Teaching Hospital, Jos, formerly ECWA Evangel Hospital, is a 250-bed private tertiary Hospital involved in training of medical students of the College of Health Sciences, Bingham University, Karu. It is also a center for postgraduate training in Family Medicine and serves as a referral center for hospitals throughout Plateau State and neighboring states. The hospital offers specialist services in all clinical areas including Obstetrics and Gynecology, Pediatrics, Surgery and Medicine. Dating of pregnancy was done using self-reported last menstrual period and confirmed by ultrasound. Women with multiple gestations, booking after the first trimester and those with any pre-pregnancy chronic medical conditions (e.g. hypertension, diabetes, and sickle cell disease) were excluded from the study.

Verbal consent was obtained from the women and they were interviewed using a pre-designed questionnaire to obtain their socio-demographic and obstetric parameters. The weight and height of each participant were taken using standard technique and recorded appropriately. An instrument with weighing scale/Stadiometer components (Detecto<sup>R</sup>) was used for this purpose. The Weighing scale and Stadiometer components of the instrument have accuracy of within 0.1 Kg and 0.1 cm respectively. The BMI were classified according to WHO<sup>12</sup> as; Underweight

(<18.5 Kg/m<sup>2</sup>), Normal (18.5 – 24.9 Kg/m<sup>2</sup>), Overweight (25.0 – 29.9 kg/m<sup>2</sup>) and Obese (≥ 30 Kg/m<sup>2</sup>).

Sample size of 147 was calculated using the formula  $n = Z^2Pq/d^2$  and a prevalence rate of 10.7% reported by Chigbu CO et al<sup>8</sup> from South-east Nigeria was used. Also, the sample size was adjusted to compensate for 5% possible attrition rate and thus, the minimum sample size was 154. Statistical analysis was done using SPSS 16 (SPSS Inc., Chicago, IL, USA) and results expressed as percentages and Mean ± Standard deviation. Chi square test was used to identify association between variables and obesity in pregnancy. Significant predictive factors on univariate analysis were subjected to multivariate logistic regression analysis to ascertain independent risk factors of obesity in pregnancy. P value < 0.05 at 95% confidence interval was considered as statistically significant. Ethical clearance was obtained from the Human Research and Ethics Committee (HREC) of Bingham University Teaching Hospital, Jos.

## 3. Results

A total of 160 eligible pregnant women who consented for the study were recruited and participated in the study. The women booked for antenatal care between 7 – 13 weeks of gestation with average gestational age of 11.7 ± 1.3 weeks. The parity of the women ranged between 0 and 7. Their mean age was 30.3 ± 4.6 years with a range of 19 – 43 years. Most of them (61.9%) had tertiary education and amongst those that were employed (self-employed or employed by government or private organizations), 14.4% (23/160) had self-reported satisfactory income. Table 1 shows the socio-demographic features of the study population.

The mean weight of the women was 71.2 ± 14.9 Kg while the mean height was 1.59 ± 0.06 meters respectively. The range of their heights and weight were 40 – 154 Kg and 1.46 – 1.74 respectively. The average BMI was 28.3 Kg/m<sup>2</sup> with a range of 18.6 – 72.5 Kg/m<sup>2</sup>. About one-third of the women who participated in the study were obese (33.1%) and out of these, 32 (60.4%) of them had mild obesity, 16 (30.2%) moderate obesity while 5 (9.4%) had severe or morbid obesity. However, 32.5% (52/160) of the study population were overweight while 34.4% (55/160) had normal BMI. None of the women was underweight. Table 2 depicts the obstetric and anthropometric characteristics of the study population.

Univariate analysis revealed association between obesity in pregnancy and maternal age > 35 years, history of previous delivery, last childbirth ≥ 5 years, and self-reported satisfactory income. Table 3 shows the results of univariate analysis. However, on multivariate logistic regression, only maternal age > 35 years (P = 0.04, OR 3.9, 95% CI 1.01 – 8.15), history of previous delivery (P = 0.03, OR 4.8, 95% CI 1.08 – 5.55) and self-reported satisfactory (P = 0.03, OR 4.6, 95% CI 1.11 – 8.86) were significant independent risk factors of obesity among this study population.

**Table 1.** Socio-demographic features of the study population

Features	Frequency	Percentage
Age (Years)		
≤ 20	2	1.2
21 – 25	21	13.1
26 – 30	70	43.8
31 – 35	46	28.8
36 – 40	18	11.2
>40	3	1.9
Total	160	100.0
Ethnic group		
Igbo	36	22.5
Berom	25	15.6
Yoruba	16	10.0
Irigwe	12	7.5
Rukuba	10	6.3
Others <sup>†</sup>	61	38.1
Total	160	100.0
Educational Level		
Primary	5	3.1
Secondary	56	35.0
Tertiary	99	61.9
Total	160	100.0
Employment Status		
Employed	34	21.2
Self-employed	75	46.9
Unemployed	51	31.9
Total	160	100.0
Level of income		
Satisfactory	23	14.4
Unsatisfactory	86	53.7
Unemployed	51	31.9
Total	160	100.0

Others<sup>†</sup> Include - Ngas, Mwaghvul, Tarok, Idoma, Eggon, Chawai, Tiv, Kataf, Mada, Fulani, Mupun, Tangalle, Ron, Anaguta, Kwalla, Afizare, Bajui, Igala, Sayawa

**Table 2.** Obstetrics and anthropometric characteristics of the Woman

Features	Frequency	Percentage
Parity		
0	64	40.0
1 – 4	87	54.4
≥ 5	9	5.6
Total	160	100.0
Gestational age at booking		
7 – 9	10	6.2
10 – 12	99	61.9
13	51	31.9
Total	160	100.0
Weight (Kg)		
≤ 60	38	23.8
61 – 80	86	53.7
81 – 100	27	16.9
101 – 120	4	2.5
>120	5	3.1
Total	160	100.0
Height (Metres)		
≤ 1.50	16	10.0
1.51 – 1.60	83	51.9
1.61 – 1.70	58	36.2
> 1.70	3	1.9
Total	160	100.0
Body Mass Index (Kg/m <sup>2</sup> )		
18.5 – 24.9	55	34.4
25.0 – 29.9	52	32.5
≥ 30	53	33.1
Total	160	100.0

**Table 3.** Univariate analysis of risk factors for obesity in pregnancy

Risk Factors	P value	Odd Ratio (OR)	95% CI
Age > 35	0.004	4.02	1.55 – 10.44
Ethnic group	0.44	0.73	0.32 – 1.64
Educational level	0.78	0.91	0.46 – 1.79
Employment status	0.26	1.56	0.72 – 3.41
Income level	0.004	3.91	1.56 – 9.77
Parity (≥ 1)	0.006	2.80	1.35 – 5.83
Last Childbirth ≥ 5 years	0.04	2.55	1.04 – 6.26

## 4. Discussion

Obesity considered as one of the emerging serious global health problems of the 21<sup>st</sup> century by the world Health Organization (WHO) has been demonstrated to be common in this Nigerian obstetric population with a prevalence of 33.1%. This is likely to be the true picture of obesity rate among this group of women as there is a good correlation between pre-pregnancy weights and those at early booking<sup>13</sup>. Hence, the differences in obesity rates at preconceptional period and early in pregnancy as conducted in this study have been found to be statistically insignificant<sup>8</sup>. The prevalence of obesity among early booked pregnant women found in this study is however higher than the reported range of obesity among pregnant women of 1.8 – 25.3% quoted by WHO<sup>4</sup>. Surprisingly, the value from our study is also about three times the reported rates of 7.4 – 10.7% from other regions of the country<sup>8, 14, 15</sup>, but a high rate of 22.6% has also been reported from Abakaliki, South-eastern Nigeria<sup>9</sup>.

These differing rates in the country may be attributable to the different obstetric populations with different life styles and dietary habits. Also, the varied periods in pregnancy in which these researches were conducted compared to this study probably influenced the rates of obesity reported. The finding of high rate of obesity in this study may be attributable to the advancing modernity of Nigerian women which is influenced by Caucasian life styles and dietary pattern obtainable from an urban setting like Jos. Dietary pattern have been known to influence rate of obesity<sup>7, 8</sup>. Also, the high prevalence of obesity in this study may have also been influenced by the high socio economic status of the participants who were majorly well educated and income earners. Their ability to pay for services in a private tertiary hospital supports this view.

Compared to African clinical settings, the reported figure is about four times higher than obesity rate of 17.9% from Ghana and twice higher than 9.1% reported from Tanzania<sup>6, 16</sup> even though the researches were also conducted among urban obstetric populations. The level of under-nutrition among the study populations in the studies from Tanzania and Ghana probably contributed to these lower rates as some of the women were either underweight or wasted compared to none in this study.

However, this reported high rate of obesity is comparable to those from other countries, with figures of 28.6% and 38.3% from Saudi Arabia and United States of America<sup>7,17</sup> but lower than figures of 13.5% and 10.9% among pregnant women at booking in Australia and UK respectively<sup>11,18</sup>. This may be attributable to differences in dietary life styles in this urban obstetric population compared to that of Caucasian settings as well as differing study populations.

About 32.5% of the women were overweight, and this is higher than 14.0% from Enugu, Nigeria<sup>8</sup> and 23.6% from Saudi Arabia<sup>7</sup> but lower than figure of 50.7% reported Benin<sup>19</sup>. The use of women scheduled for caesarean section in their third trimester as the study population in the Benin study and the limitation of using body mass index in assessing obesity in this group may be responsible for the very high rate reported.

Previous delivery (parity), maternal age > 35 years and satisfactory income were independent factors predictive of obesity in this study population. The risk of obesity increases 4.8-fold among women with parity of 1 or more compared to nulliparous women. This is in agreement with findings from other studies<sup>7,8,20,21</sup>. This may be related to the tendency to gain weight with each pregnancy and the fact that parous women tend to retain more of the weight gained during pregnancy<sup>21-23</sup>. There is a direct relationship between older aged women and obesity in this study. This corroborate with findings from other studies<sup>9,11,24</sup> but contrary to what was reported elsewhere<sup>7,8,20</sup>. This may reflect physiological changes associated with increased adiposity with increasing age and more so older women are more likely to be parous, with weight gain during previous pregnancies cumulatively predisposing them to obesity.

Women with self-reported satisfactory income are about five times more likely to be obese compared to those with unsatisfactory income. A number of studies have shown a positive relationship between satisfactory income and obesity<sup>7,11</sup> but contrary to reports by other researchers<sup>25,26</sup>. This finding may be a reflection of their sedentary life style and pattern of dietary consumption. Moreover, modern diets of developed countries in which affluent populace in developing countries are imbibing contain more fat and significantly less fibre and this is a significant contributor to the burden of obesity<sup>27</sup>.

The limitations of this study included its private hospital-based nature and the exclusion of late attendees from the study. The findings therefore may not be a true reflection of the disorder in the general populace. This study however adds to the body of evidences that suggest obesity is becoming common amongst pregnant women in developing countries.

## 5. Conclusion

Obesity in pregnancy is common in this obstetric population especially among women aged > 35 years, parous women and those with satisfactory income. Prenatal health education about risks of obesity and its screening is

therefore recommended so as to institute counseling regarding weight gain, nutrition, and food choices. It may also lead to early detection and treatment of complications associated with this emerging disorder.

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