

Socioeconomic status and obesity in Abia State, South East Nigeria

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Background and objectives: Obesity is a major risk factor for cardiovascular disease in developed and emerging economies. There is a paucity of data from Nigeria on the association between socioeconomic status and obesity. The aim of this study is to highlight that association in Abia State, South East Nigeria.

Material and methods: This was a cross-sectional survey in South East Nigeria. Participating subjects were recruited from the three senatorial zones of Abia state. A total of 2,487 adults took part in the study. The subjects were classified based on their monthly income and level of educational attainment (determinants of obesity). Monthly income was classified into three groups: low, middle, and upper income, while educational level was classified into four groups: no formal education, primary, secondary, and tertiary education. Body mass index of subjects was determined and used for defining obesity. Data on blood pressure and other anthropometric measurements were also collected using a questionnaire, modified from the World Health Organization STEPwise Approach to Chronic Disease Risk Factor Surveillance.

Results: Overall, the prevalence of obesity in low, middle, and upper income groups was 12.2%, 16%, and 20%, respectively. The overall prevalence of obesity in individuals with no formal education, primary, secondary, and tertiary education was 6.3%, 14.9%, 10.5%, and 17.7%, respectively. Educational status was found to be significantly associated with obesity in women, but not in men, or in the combined group. However, level of income was observed to be significantly associated with obesity in men, women, and in the combined group.

Conclusion: Sociodemographic and socioeconomic factors are important determinants of obesity in our study population, and therefore may be indirectly linked to the prevalence and the outcomes of cardiovascular disease in Nigeria.

Keywords: obesity, body mass index, BMI, income, education, socioeconomic status, Naira (₦)

Introduction

There are several classifications and definitions of obesity. However, the classification commonly adopted is that of the World Health Organization (WHO), which defines obesity as a body mass index (BMI) of 30 kg/m² or greater.¹ Obesity is known to predispose individuals to several diseases; almost no system in the body is spared by obesity.²⁻⁷ Poor nutritional habits, including the increased consumption of more energy-dense, nutrient-poor foods, with high levels of sugar and saturated fats, combined with reduced physical activity, have led to increased rates of obesity in many parts of the world. A high rate of increase is noted within emerging economies.⁸⁻¹⁰

Obesity is one of Nigeria's major health problems, with a prevalence range of 8.1%–22.2%.⁹ It is associated with a myriad of health problems, which can be classified into major and minor diseases. The major diseases associated with obesity include hypertension, diabetes mellitus, and atherosclerosis, as well as certain types of cancer. There are also many additional less-known complications of the disease.⁹ The major and minor health diseases associated with obesity exert a toll on the meager incomes of sub-Saharan African countries, including Nigeria. In many developed countries, the annual health care costs of managing obese patients run into several billions of US dollars.^{11–13} These costs include expenditure on prevention, as well as the investigation and treatment of obesity and its related problems. The annual health care cost of treating obesity in developing countries, including Nigeria, is currently unknown, but is likely to be enormous.

Socioeconomic status (SES) is commonly measured as a combination of income, education, and occupation. However, in most cases, it is measured by the income and level of education.¹⁴ Globally there is considerable interest in the relationship between SES and obesity.^{14–18} We decided to carry out this study due to the paucity of population-based studies on the socioeconomic determinants of obesity in the

sub-Saharan African countries. In addition, currently available studies have not thoroughly addressed the independent influence of income and education on obesity.¹⁹

Materials and methods

Study populations and sampling

The Igbo ethnic group (Ndị Igbò, in the Igbo language) is one of the three largest ethnic groups in Nigeria. They speak Igbo, with some dialectical variation. They occupy the south eastern geopolitical zone and some neighboring communities in the south south zone of Nigeria. There are ethnic Igbo populations in other countries, including Equatorial Guinea and Cameroon, resulting from the Atlantic slave trade and from migration. In addition, many Afro-Caribbean and African-American people are of Igbo descent.²⁰ The study was carried out in Abia State. Which is one of five states in the south eastern geopolitical zone of Nigeria (Figure 1). Presently, it is largely inhabited by Igbo people, and it has three senatorial zones, like all states in Nigeria. These three zones were covered during the study. A rural and an urban Local Government Area (LGA) was selected from each zone. Individuals who took part in the study were adults (18 years and above). These individuals were permanent residents of the

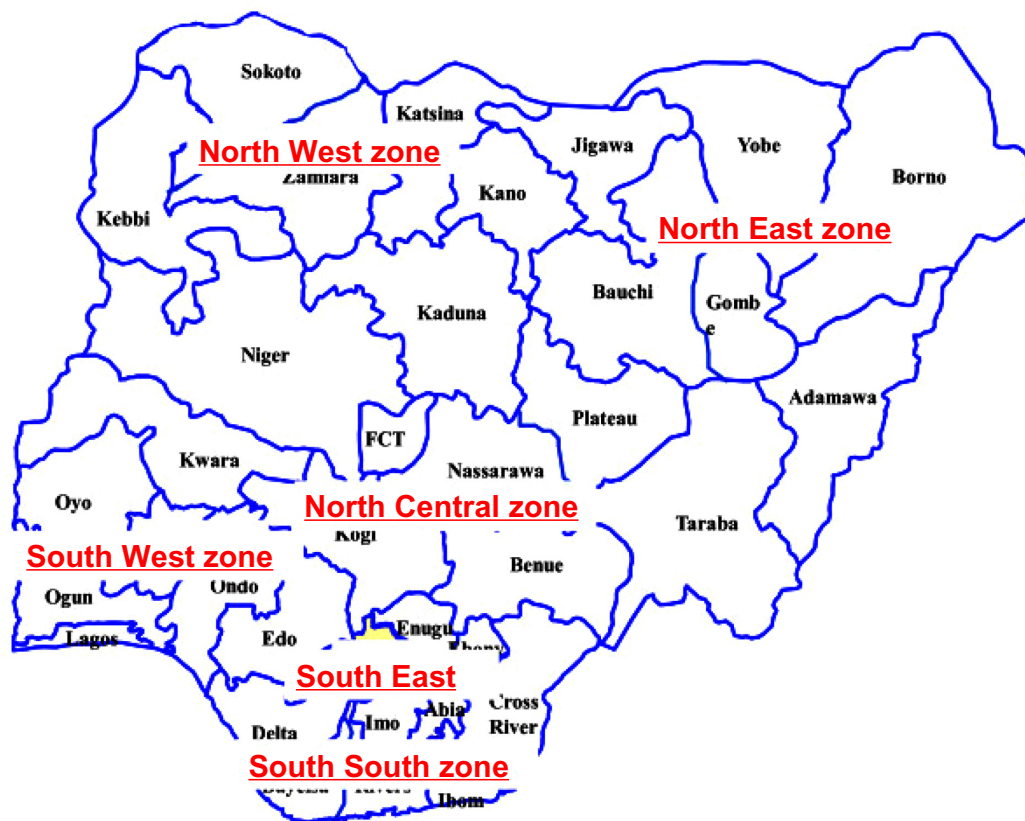


Figure 1 Showing the six geopolitical zones of Nigeria, a West African country.

state. Individuals who were in transit or on temporary visits were excluded from the study. Pregnant women and those with malignancies, chronic debilitating illnesses, and those who refused to give consent were also excluded from the study.

This was a cross-sectional and predominantly descriptive study, aimed at determining the association between socioeconomic status and obesity.

The calculated minimum sample size for the survey was 2,880. In each selected LGA, four Enumeration Areas (EAs) were randomly selected from a listing of all EAs. The households in each selected EA were listed, and eligible respondents in each household identified beforehand, such that not more than two eligible respondents of either sex were selected from each household. Trained interviewers proceeded from household to household, interviewing eligible listed respondents until a minimum of 120 respondents had been interviewed.

Ethical approval for the survey was obtained from the Abia State Ministry of Health. Participation in the survey was voluntary, and written consent was obtained from participants prior to enrollment, after due explanation of the purpose, objectives, benefits, and risks of the survey.

Data were collected from the respondents using an interviewer-administered pre-validated modified version of the WHO STEPwise questionnaire.²¹

Anthropometry and blood pressure measurement

Each subject had their blood pressure, height, and weight measured. Both systolic and diastolic blood pressures were measured three times, in a sitting position, using the Omron M2 Upper Arm Blood Pressure Monitor (Omron Healthcare, Kyoto, Japan), with appropriate cuff size, and after 5 minutes of rest. Three blood pressure readings were taken at intervals of 2 minutes. Then, the average blood pressure from the second and third readings (systolic or diastolic) were calculated. Using a stadiometer (RGZ - 160 by Pyrochy Medical, UK), each respondent's height was measured, in centimeters, while their weight was measured, in kilograms, using a weighing scale, and BMI was determined.

Definition of terms

BMI

BMI was classified by WHO as follows:¹ underweight (BMI: <18.5 kg/m²); normal weight (BMI: 18.5–24.9 kg/m²); overweight (BMI: 25–29.9 kg/m²); class 1 obesity (BMI: 30–34.9 kg/m²); class 2 obesity (BMI: 35–39.9 kg/m²); class 3 obesity (BMI: ≥ 40 kg/m²).

Hypertension

Subjects were categorized as hypertensive who had systolic blood pressure of ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg, or who had a normal blood pressure but were pharmacologically treated for hypertension.^{22,23}

Diabetes mellitus

A history of previously known diabetes, or a fasting plasma glucose of 126 mg/dL or greater, and impaired fasting glucose, defined as fasting plasma glucose of 100–125 mg/dL, or a random blood glucose of 180 mg/dL or greater, was classified as diabetes mellitus. Impaired glucose tolerance was defined as random blood glucose between 140–180 mg/dL.²⁴

Determinants of SES

There is no consensus on various socioeconomic classifications in Nigeria, because of the unstructured nature of the society. However, we used monthly income and individual educational level as independent determinants of SES. Yoon et al¹⁴ used income level and educational status in assessing socioeconomic status in a similar study. Income included all possible sources of income available to the individual. Therefore, for the purpose of this study, respondents were categorized into three classes, according to their reported income. Low income earners received 18,500 Naira (₦) or less per month – the minimum wage in Nigeria. The middle income class earned ₦85,000 or less per month – about the salary level of a newly employed Nigerian graduate. The upper income class earned more than ₦85,000 per month, (one US dollar is equivalent to 150–155 Naira). Educational level was defined as the highest level of individual education completed, and was categorized into four groups: No formal education; primary (1–6 years); secondary (7–12 years); and, tertiary (≥ 13 years).

Statistical analysis

The data were stored electronically using EpiData version 3.1 data entry software (EpiData Association, Odense, Denmark). Analysis was carried out using SPSS version 17.0 statistical analysis software (IBM, Armonk, NY, USA). Means and standard deviations were calculated for continuous variables. Binary logistic regression was used to estimate association between obesity and socioeconomic determinants of obesity. Findings were presented using relevant frequency tables.

Results

A total of 2,487 participants took part in the study. All participants were adult; the minimum age was 18 years. Most

of the participants were Igbos (97%). There were 1,203 men (48.37%) with obesity, with a prevalence of 7.98%, while there were 1,284 women (51.63%), with a prevalence of 16.74%. The overall prevalence of obesity was 12.51%. A total of 957 participants (38.48%) had hypertension, while 62 (2.45%) had diabetes mellitus. Although we obtained complete data from all participants regarding their educational status, only 1,706 (68.6%) gave information on their income. The overall mean age was 41.7 ± 18.5 years, while the overall mean BMI was 24.7 ± 4.62 kg/m².

Obesity and income

The prevalence of obesity in low income, middle income, and upper income classes of subjects was 12.2%, 16%, and 20%, respectively. In men, the prevalence of obesity in low, middle, and upper income classes was 6.6%, 12.0%, and 14.8%, respectively. In women, the prevalence of obesity in low, middle, and upper income classes was 17.6%, 23.3%, and 30.8%, respectively.

A total of 579 (64.55%) of males earned ₦18,500 or less per month, 291 (32.44%) earned up to ₦85,000 per month, and 27 (3.01%) earned more than ₦85,000 per month. In females, 637 (78.45%) earned ₦18,500 or less, 159 (19.58%), earned up to ₦85,000, while 16 (1.97%), earned ₦85,000 or more per month (Table 1).

Obesity and education

The overall prevalence of obesity in those with no formal education, primary, secondary, and tertiary education was 6.3%, 14.9%, 10.5%, and 17.7%, respectively (Table 2). In men, the prevalence was 1.8%, 10.0%, 6.0%, and 10.9%, respectively. In women, the prevalence was 7.7%, 19.3%, 15.1%, and 21.4%, respectively.

Fifty seven (4.74%) of the men had no formal education; 319 (26.52%) had primary education, 588 (48.88%) had secondary education, and 239 (19.87%) had tertiary education. Of the women, 181 (14.10%) had no formal education, 300 (23.37%) had primary education, 590 (45.95%) had secondary education, and 213 (16.59%) had tertiary education. A higher percentage of women than men had no formal education (Table 2).

Binary logistic regression

Table 3 summarizes the findings from binary logistic regression analysis on the relationships between socioeconomic factors and obesity in the study population. Educational level was significantly associated with obesity in women, while level of income was associated with obesity in men and women ($P < 0.05$).

Discussion

This survey looked at the association between socioeconomic status and obesity, using income and education as independent determinants. Most of the subjects who took part in the study were Igbos (97%), as expected, since the state is predominantly inhabited by that ethnic group. A direct relationship was observed between income and obesity in both men and women. In the combined group of men and women, the prevalence of obesity in low income, middle income, and upper income classes was 12.2%, 16%, and 20%, respectively. The prevalence of obesity in those with no formal education, primary, secondary, and tertiary education in the combined group was 6.3%, 14.9%, 10.7%, and 17.7%, respectively. The binary regression analysis showed that educational status is a predictor of obesity among women, while income was found to be a predictor of obesity among all respondents. The odds of being obese were found to be 31% or higher among women with higher educational status (odds ratio = 1.31; 95% confidence interval = 1.09–1.57; $P = 0.004$). On the other hand, higher income level was found to increase the odds of obesity by 57%, 60%, and 35% among men, women, and all participants, respectively.

Mbada et al found SES to be inversely related to weight and BMI ($P < 0.01$) and reported that subjects in the low socioeconomic class had a higher prevalence of obesity.¹⁹ However, there are studies from other African countries, and other third world countries, that observed a higher prevalence of obesity in the higher SES class, which is in agreement with our study.^{25–28} In addition, a review of 144 published surveys on the relationship between socioeconomic status and obesity revealed that, in developing countries, there is a strong direct relationship between SES and obesity among men, women, and children. In addition, the review showed that the relationship among men and children is inconsistent in developed countries, with an inverse relationship observed among women.²⁹

Our study has shown that the prevalence of obesity has a direct relationship with income in South East Nigeria. The relationship between obesity and income can be easily conjectured as arising through greater ability of the rich to afford better and/or excess amounts of food. Also, poorer people are more likely to have increased physical activity through walking to work, due to lack of transportation. Obesity is a known risk factor for cardiovascular diseases. But whether one can use the relationship between income and obesity as a surrogate for the relationship between income and cardiovascular diseases (in this part of Nigeria) is currently unknown and it was not the aim of this study.

Table 1 The prevalence of obesity in low income, middle income and upper income classes

Age by sex	Subjects	Mean BMI \pm SD	Distribution of BMI, % of subjects			
			<18.5	18.5–24.9	25.0–29.9	\geq 30.0
Men						
Low income						
<24	73	23.19 \pm 3.00	0.0	79.5	17.8	2.7
25–34	156	24.11 \pm 3.61	0.0	66.7	26.9	6.4
35–44	100	24.84 \pm 3.30	1.0	48.0	45.0	6.0
45–54	94	24.19 \pm 3.50	1.1	59.6	31.9	7.4
55–64	63	24.51 \pm 3.94	1.6	54.0	33.3	11.1
\geq 65	93	23.02 \pm 3.98	8.6	64.5	20.4	6.5
Total	579	24.00 \pm 3.61	1.9	62.2	29.4	6.6
Middle income						
<24	23	21.85 \pm 2.80	0.0	91.3	8.7	0.0
25–34	86	24.47 \pm 3.14	1.2	59.9	33.7	5.0
35–44	74	25.64 \pm 4.41	1.4	52.7	27.0	18.9
45–54	51	26.82 \pm 5.22	0.0	41.1	35.3	23.5
55–64	32	25.49 \pm 3.51	6.3	21.9	65.6	6.3
\geq 65	25	25.50 \pm 3.84	4.0	40.0	48.0	8.0
Total	291	25.18 \pm 4.13	1.7	51.2	35.1	12.0
Upper income						
<24	2	20.88 \pm 1.19	0.0	100	0.0	0.0
25–34	6	23.25 \pm 2.81	0.0	66.7	33.3	0.0
35–44	5	24.79 \pm 2.39	0.0	40.0	60.0	0.0
45–54	4	27.56 \pm 5.58	0.0	50.0	25.0	25.0
55–64	7	27.76 \pm 7.41	14.3	14.0	42.9	28.6
\geq 65	3	28.05 \pm 2.55	0.0	0.0	66.7	33.3
Total	27	25.70 \pm 4.99	3.7	40.7	40.7	14.8
Women						
Low income						
<24	79	24.00 \pm 3.89	1.3	65.8	24.1	8.9
25–34	165	25.42 \pm 4.87	1.2	52.7	27.6	18.2
35–44	119	26.83 \pm 5.15	8.0	37.8	33.7	27.7
45–54	115	26.27 \pm 5.98	9.0	50.4	30.4	18.3
55–64	84	25.08 \pm 4.60	1.2	50.0	33.3	15.5
\geq 65	75	24.84 \pm 4.72	1.3	58.6	29.3	10.7
Total	637	25.56 \pm 5.05	1.1	51.5	29.8	17.6
Middle income						
<24	8	24.50 \pm 6.04	12.5	50.0	25.0	12.5
25–34	58	25.33 \pm 5.28	3.4	53.4	29.3	13.8
35–44	34	28.20 \pm 5.68	0.0	29.4	41.2	29.4
45–54	38	27.09 \pm 4.07	0.0	39.5	39.5	21.1
55–64	15	30.63 \pm 6.01	0.0	26.7	20.0	53.3
\geq 65	6	27.03 \pm 8.20	0.0	66.7	0.0	33.3
Total	159	26.89 \pm 5.64	1.9	42.8	32.1	23.3
Upper income						
<24	0	0.00	0.0	0.0	0.0	0.0
25–34	4	27.76 \pm 8.83	25.0	0.0	25.0	50.0
35–44	4	31.59 \pm 6.34	0.0	0.0	33.3	66.7
45–54	4	24.57 \pm 4.91	0.0	50.0	50.0	0.0
55–64	2	21.43 \pm 1.74	0.0	100.0	0.0	0.0
\geq 65	0	0.00	0.0	0.0	0.0	0.0
Total	16	27.04 \pm 6.81	7.7	30.8	30.8	30.8
All participants						
Low income	1,216	24.80 \pm 4.48	1.5	56.8	29.5	12.2
Middle income	450	25.78 \pm 4.78	1.8	48.3	33.9	16.0
Upper income	40	26.16 \pm 5.63	5.0	37.5	37.5	20.0

Note: Age measured in years, BMI as kg/m².

Abbreviation: BMI, body mass index; SD, standard deviation.

Table 2 The prevalence of obesity in those with no formal education, primary, secondary, and tertiary education

Age by sex	Subjects	Mean BMI \pm SD	Distribution of BMI, % of subjects			
			<18.5	18.5–24.9	25.0–29.9	\geq 30.0
Men						
No formal education						
<24	1	21.93 \pm 0.00	0.0	100.0	0.0	0.0
25–34	1	23.05 \pm 0.00	0.0	100.0	0.0	0.0
35–44	3	23.12 \pm 0.92	0.0	100.0	9.9	0.0
45–54	4	21.09 \pm 0.53	0.0	100.0	9.9	0.0
55–64	11	24.84 \pm 3.32	0.0	45.5	54.5	0.0
\geq 65	37	22.20 \pm 3.64	18.9	59.5	18.9	2.7
Total	57	22.69 \pm 3.64	12.3	63.2	22.8	1.8
Primary						
<24	11	21.95 \pm 2.63	9.1	81.8	9.1	0.0
25–34	47	24.02 \pm 4.30	0.0	63.8	29.8	6.4
35–44	51	24.26 \pm 4.41	3.9	60.8	23.5	11.8
45–54	66	24.69 \pm 4.35	1.5	57.6	24.2	16.7
55–64	59	24.00 \pm 4.31	6.8	49.2	33.9	10.2
\geq 65	85	23.55 \pm 4.08	5.9	65.9	18.8	9.4
Total	319	24.00 \pm 4.23	4.1	60.5	24.8	10.0
Secondary						
<24	180	22.61 \pm 2.99	2.8	84.4	10.0	2.8
25–34	184	24.17 \pm 3.14	5.0	66.8	27.2	5.4
35–44	85	25.30 \pm 3.27	0.0	44.7	47.1	8.2
45–54	65	25.00 \pm 3.79	1.5	47.7	43.1	7.7
55–64	34	26.33 \pm 4.90	0.0	32.4	52.9	14.7
\geq 65	40	21.17 \pm 3.97	5.0	57.7	30.0	7.5
Total	588	24.06 \pm 3.51	1.5	64.3	28.2	6.0
Tertiary						
<24	31	22.78 \pm 2.48	0.0	80.6	19.4	0.0
25–34	82	24.45 \pm 3.66	1.2	54.9	35.4	8.5
35–44	52	26.13 \pm 3.80	0.0	44.2	40.4	15.4
45–54	31	26.20 \pm 5.28	0.0	54.8	29.0	16.1
55–64	24	26.56 \pm 2.48	4.2	29.2	45.8	20.8
\geq 65	19	25.43 \pm 3.34	0.0	36.8	57.9	5.3
Total	239	25.12 \pm 3.95	0.8	51.9	36.4	10.9
Women						
No formal education						
<24	2	23.01 \pm 1.12	0.0	100.0	0.0	0.0
25–34	7	21.69 \pm 2.36	0.0	85.7	14.3	0.0
35–44	6	22.28 \pm 4.75	0.0	83.3	0.0	16.7
45–54	30	24.24 \pm 3.99	0.0	63.3	33.3	3.3
55–64	31	23.05 \pm 4.17	3.2	74.2	9.7	12.9
\geq 65	105	23.12 \pm 4.78	6.7	68.8	21.0	7.6
Total	181	23.20 \pm 4.45	4.4	68.0	19.9	7.7
Primary						
<24	14	24.84 \pm 3.06	0.0	78.6	7.1	14.3
25–34	42	24.88 \pm 4.34	0.0	61.9	23.8	14.3
35–44	46	26.55 \pm 4.93	0.0	45.7	30.4	23.9
45–54	72	26.56 \pm 6.31	1.4	45.8	30.6	22.2
55–64	76	26.04 \pm 4.86	2.6	43.4	32.9	21.1
\geq 65	50	25.71 \pm 5.47	4.0	52.0	30.0	14.0
Total	300	25.98 \pm 5.24	1.7	50.0	29.0	19.3

(Continued)

Table 2 (Continued)

Age by sex	Subjects	Mean BMI \pm SD	Distribution of BMI, % of subjects			
			<18.5	18.5–24.9	25.0–29.9	\geq 30.0
Secondary						
<24	196	23.26 \pm 3.28	3.1	69.4	24.0	3.6
25–34	208	25.47 \pm 5.25	2.4	51.4	27.9	18.3
35–44	103	26.89 \pm 5.13	0.0	37.9	35.9	26.2
45–54	49	25.99 \pm 5.59	2.0	51.0	26.5	20.4
55–64	17	27.76 \pm 4.59	0.0	35.3	41.2	23.5
\geq 65	17	25.24 \pm 6.06	5.9	47.1	29.4	17.6
Total	590	25.09 \pm 4.90	2.2	54.4	28.3	15.1
Tertiary						
<24	37	24.13 \pm 3.98	0.0	73.0	18.9	8.1
25–34	78	26.35 \pm 4.93	0.0	47.4	33.3	19.2
35–44	49	28.91 \pm 5.75	2.0	24.5	36.7	36.7
45–54	29	22.45 \pm 6.09	0.0	31.0	37.9	31.0
55–64	12	29.76 \pm 7.51	8.3	25.0	16.7	50.0
\geq 65	8	30.22 \pm 6.63	0.0	25.0	37.5	37.5
Total	213	27.31 \pm 5.68	0.9	42.3	31.5	21.4
All participants						
Illiterate	238	23.05 \pm 4.28	6.3	66.8	20.6	6.3
Primary	619	24.91 \pm 4.86	2.5	55.4	26.8	14.9
Secondary	1,178	24.57 \pm 4.29	1.9	59.3	28.3	10.5
Tertiary	452	26.15 \pm 4.96	1.5	47.3	33.6	17.7

Note: Age measured in years, BMI as kg/m².

Abbreviation: BMI, body mass index; SD, standard deviation.

In the educational classification, those with tertiary education tend to have more sedentary jobs. They usually constitute a higher percentage of those with high income, and this could be the reason for the higher prevalence of obesity with higher income. However, the binary regression analysis showed that educational status has a significant direct effect on obesity only in the female group.

There are several factors that play a role in the relationship between SES and obesity in developing countries. We could not determine the reasons for the aberrations noted in the educational status classification. However, Monteiro et al³⁰ noted that changing economic, social, and cultural environments, which characterize developing countries, point to the

existence of diversified, complex, and dynamic patterns in the social determination of obesity.

Conclusion

The results of this study point clearly to a link between sociodemographic factors and obesity in South East Nigeria. Therefore, there is a need to increase awareness of obesity and related complications in this population. Efforts to combat obesity through exercise and nutritional awareness programs are needed. Although beyond the scope of this study, there is also a need for poverty alleviation programs in Nigeria, and sub Saharan Africa, to enable many families to improve their nutrition. An important step in this direction was taken with the approval of the Global Strategy on Diet, Physical Activity and Health by the World Health Assembly in May, 2004.³¹

Table 3 Socioeconomic factors associated with obesity among study participants

Socioeconomic factor	P-value	OR	95% CI
Educational status			
Male	0.925	1.01	0.78–1.31
Female	0.004	1.31	1.09–1.57
All	0.712	1.14	0.99–1.32
Income per annum			
Male	0.012	1.57	1.11–2.23
Female	0.004	1.60	1.16–2.20
All	0.010	1.35	1.08–1.70

Abbreviations: OR, odds ratio; CI, confidence interval.

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The data used in this study was obtained from Abia State Ministry of Health survey on non-communicable disease risk factors using the WHO STEPwise approach to surveillance of chronic disease risk factors. The study was undertaken in 2011. It was pioneered by Dr OS Ogah, Honourable Commissioner for Health. The projected was supported financially by Health Systems Development Project II.

Disclosure

The authors report no conflicts of interest in this work.

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