(RESEARCH ARTICLE)

Association between lifestyle trends and obesity among adults in Imo state

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Abstract

Background: Obesity is a rising global public health concern that has complex causes. The aim of study was to ascertain the association between lifestyle trend and obesity among adults in Imo State and to ascertain the awareness of obesity and its lifestyle modification among the participants.

Methods: This study used a cross-sectional, community-based methodology and focused on some communities in each of the three geopolitical zones of Imo State, South East, Nigeria. Using multistage proportionate stratified random cluster sampling technique, study areas were chosen. Participants' information were obtained using a standardised, validated questionnaire that was designed to have both open-ended and closed-ended questions. After the questionnaire have been administered, anthropometric measures were taken. Multiple linear regression was used to determine associations.

Results: Awareness of obesity was low, with only 21.6% of obese participants recognising their condition. Multiple linear regression to test for association between regression lifestyle trends and obesity was insignificant (R^2=0.793, F=2.09, P=0.189).

Conclusions: This study highlights a low awareness of obesity status among obese participants pointing to a critical gap in health literacy in the area. Lifestyle trends did not independently predict obesity, suggesting the complexity of obesity determinants in this population.

Keywords: Body mass index (BMI); Health behaviour; Adult; Obesity; Diet; Physical activity

1. Introduction

Obesity affected 1 in 8 persons worldwide in 2022 [1]. Between 1990 and 2022, the global prevalence of obesity more than doubled[1]. Worldwide, obesity has become an epidemic, and being overweight or obese causes at least 2.8 million deaths annually [2]. It was often thought to be a problem in high-income nations, but is now increasingly common in low- and middle-income nations as well [2]. Obesity is a chronic, complicated condition, characterized by excessive fat accumulation that can harm one's health [1]. Obesity raises a person's chance of acquiring depression, osteoarthritis, Alzheimer's disease, cardiovascular disease, metabolic illnesses, and several forms of cancer [3]. Obesity is linked to a 2–20 year lower life expectancy, depending on the severity of the condition and the prevalence of associated conditions [3]. People are diagnosed with overweight and obesity by taking their height and weight and determining their body mass index (BMI), which is calculated as follows: weight (kg)/height^2 (m^2). The waist circumference and other measures can aid in the diagnosis of obesity, but the body mass index serves as an equivalent indicator for fatness [1]. A BMI of 25 or above is considered overweight, while a BMI of 30 or higher is considered obese [1]. At the most basic level, a

person's weight is determined by how many calories ingested, burnt off and how many stored [4]. When the number of calories consumed is greater than the number of calories the body burns, the body stores the extra energy as fat, which contributes to weight gain over time. However, the number of calories one consume does not always serve as the only possible cause for weight gain, because the quality of food eaten matters just as much [4].Nevertheless, the environment and genes have an impact on each of these variables. They can influence both a person's behavior (e.g., the foods the person eats) and the physiology (e.g., how quickly the person burns calories). All of these elements interact with one another starting at conception and continuing all the way through life [4]. Inotherwords, weight gain is influenced by several factors; genes, hormones, nutrition, and lifestyle factors including stress, physical exercise, and sleep. When people consume more calories than they burn, or when they burn less calories than they consume, they gain weight [5] Studies have demonstrated that individuals may accurately self-report their height and weight, but normal weight persons tend to overestimate their body weight while overweight and obese adults prefer to underestimate it. [6]. The incapacity of obese individuals to accurately identify themselves as such may lead to their disregarding obesity-related health information and lacking the will to lose weight [6]. According to den Engelsen et al.[7] and Johnson et al. [8] the lack of awareness is also a significant obstacle to adopting healthier lifestyle choices. This study set out to ascertain the association between lifestyle trend and obesity among adults in Imo State and to ascertain the awareness of obesity and its lifestyle modification among the participants.

2. Materials and methods

2.1. Study Design

This study is a community-based, cross-sectional study design targeting some communities across the three geo-political zones of Imo State South East, Nigeria.

2.2. Study Population

The study included adults males and females living in the selected study area, aged 18 years and above, who gave consent and met the inclusion criteria.

2.3. Sample Size

Five hundred (500) adults participated in the study. The sample size was determined using the Cochrane formula below;

$$N = Z^2 Pq / d^2$$

Where, N is the minimum sample size , Z is the normal standard deviation usually set at 1.96 which corresponds to 95% confidence interval, P is the proportion or the target population estimated to have a particular characteristic. In a study done in Umuahia Abia state, the prevalence of obesity was 33.7% [9]. Thus 33.7% (0.337) was used in the study to give minimum sample size estimate. q: 1–P (1.-0.337)=0.663, d: Degree of accuracy desired usually set at 0.05.

$$\text{Hence } N = (1.96)2 \text{ X } (0.337) \text{ X } (0.663) / (0.05)2$$

$$N = 344.$$

However, a sample size (NS) of 500 was used for the study to take care of non-response in the study. The selected sample size NS was calculated considering an anticipated response rate of 80% (0.8). This was calculated by dividing the original calculated sample size (N) by the anticipated response rate as follows: NS = N / 0.8. Where N = minimum sample size, NS = selected sample size. 0.8 = anticipated response rate.

Substituting in the above formula

NS = 344

0.8 = 430

Therefore the minimum sample size was summed up to 500.

2.4. Sampling Method

2.4.1. Selection of study settings

Multistage proportionate stratified random cluster sampling method was used to select the study settings in the state. In the first stage, Imo state was clustered into the already existing three senatorial zones (Owerri, Orlu and Okigwe zones). In the second stage, each zone was further clustered into the already existing local government areas (LGA). In the third stage, proportionate sampling method was used to sample the local government areas (LGA) from each zone as they are not of equal number. 30% of the LGAs was used for the study. There are 27 LGAs in Imo state. $30/100 \times 27 = 9$, therefoe 9 LGAs will be selected. For Orlu zone: $12/27 \times 9/1 = 4$, for Owerri zone : $9/27 \times 9/1 = 3$, for Okigwe zone: $6/9 \times 9/1 = 2$. Stratified sampling was used to select the LGAs based on security, proximity & road accessibility. Four, three and two LGAs were selected from Orlu, Owerri and Okigwe zones respectively and the communities were randomly chosen from them.

2.4.2. Selection of study participants

The community and some church leaders were met and informed about the study.and permission obtained from them. Awareness was created in the communities through announcements by their leaders. On the selected days for the collection of data, data were collected from the participants who met the selection criteria and gave consent. Stratified systematic sampling method was used to select the study participants. The participants were chosen at an interval, randomly until the required sample size was met. The selected participants were tested with the questionnaire and anthropometric measurements taken.

2.5. Inclusion criteria

- Adults aged 18 years and above.
- Adults who gave consent for the study.
- Apparently healthy adult.

2.6. Exclusion criteria

- Adults who are taking any medication
- Adults who have ascites and other forms of edema
- Adults who have physical deformities affecting the spine and/or the limbs
- Pregnant and lactating mothers were excluded from the study.

2.7. Instrument for Data Collection

A structured validated questionnaire constructed as both open and closed ended questionnaire was used to obtain data from the participants. Verbal consent were obtained from the participants after discussing about the procedures with the study participants. Standard weighing scale for weight was used for this study whose unit is in kilograms (kg). Participants height were measured using stature meter.

2.8. Validity of Instrument

The instrument was validated through face validity method. The contents of the study questionnaire was carefully prepared by the researcher with relevance to the topic of the study after consulting a specialist in the field and was examined by the research supervisor for corrections after which the final draft copies was approved by the research supervisors.

2.9. Reliability of Instrument

Parallel reliability test was used to test the reliability of the instrument. Two sets of the copies of the questionnaire of equivalent contents were administratted to 10 people that are not part of the study but with similar characteristics at different communities at the same time. The two sets of results were ranked and spearman correlation was used to calculate the correlation co-efficient. The spearman's rank correlation takes value between -1 and +1 (i.e 0.1 to 1.0).

2.10. Data Collection

Data were collected through interviewer-administered technique. The data was collected after informed verbal explanation and consent was obtained from the participants. The interview was done with the participants preferred language (either English or Igbo). The literate respondents were allowed to fill the questionnaire by themselves while

the illiterate ones was aided by the researchers. Each questionnaire took about 10 minutes to administer. During investigation, after each completed questionnaire the researcher re-examined them to ensure validity and consistency.

Anthropometric measurements of the participants were carried out immediately after questionnaire administration. Hana mechanical scale model BR was used for weight measurement. The scales was calibrated and re-calibrated by re-adjusting their pointers to zero. Participants were informed to remove their footwear, headwear, heavy outer garments and any heavy items from their pockets. Afterwards they were asked to stand still on the scale unaided. The weight were measured and recorded to the nearest 0.1 kg [10]

Height was measured in centimeters using a stature meter tape with the participants standing erect against a flat surface and without any footwear or headgear. The measuring indicator was then lowered until it rested on top of the head of the participant and the height was read off and recorded to the nearest 0.1 centimetres (cm), which was later converted to meters. BMI was calculated as weight (in kilograms) divided by height (in meters) squared and categorized as underweight < 18.5 kg/m2, normal weight 18.5 - 24.9 kg/m2, Overweight 25 - 29.9 kg/m2, Obese ≥ 30 kg/m2. Obesity was defined as BMI ≥ 30 mg/m2 based on WHO criteria [11].

2.11. Data Analysis

Data was analyzed using IBM SPSS version 22. Descriptive statistics comprising of frequency tables was used and was expressed as the percentage of the distribution. Multiple linear regression was used to determine association between variables.

2.12. Ethical Consideration and Informed consent

Ethical approval was obtained from the Ethics Committee of Public health Department, Federal University of Technology, Owerri. Informed verbal consents was obtained from the selected study participants before participating in the study

3. Results

3.1. Characteristics of study participants

Among the 500 participants recruited for the study, 190 (38%) were males. For the age distribution, Age group 48-57years were highest in number 127 (25.4%), comprising of 25.4% of the total study population. Four hundred and five (81%) of the participants were married. For education, 23 (4.6%) had non-formal education, 112 (22.4%) had primary education, 163 (32.6%) had secondary education and 202 (40.4%) had tertiary education. Three hundred and fifty-seven (71.4%) of the participants reside in urban areas while 143 (28.6%) reside in rural areas. 148 (29.2%) of the participants were obese (Table 1)

Table 1 Characteristics of study participants

Variable	Sub-variable	Number of participants	Percentage (%)
SEX	Male	190	38
	Female	310	62
	Total	500	100
AGE	18-27years	43	8.6
	28-37years	121	24.2
	38-47years	99	19.8
	48-57years	127	25.4
	58-67years	72	14.4
	68-77years	27	5.4
	78-87years	11	2.2
	Total	500	100

MARITAL STATUS	Single	60	12
	Married	405	81
	Widow	23	4.6
	Separated	07	1.4
	Divorced	5	1
	Total	500	100
LEVEL OF EDUCATION	Non formal	23	4.6
	Primary	112	22.4
	Secondary	202	40.4
	Tertiary	164	32.8
	Total	500	100
DOMICILE	Rural	357	71.4
	Urban	143	28.6
	Total	500	100
OBESITY STATUS	Obese	148	29.6
	Non-obese	352	70.4
	Tota	500	100

3.2. Awareness of obesity lifestyle modification among the study participants

Out of the 148 obese participants, 32 (21.6%) were aware that they are obese while 116 (78.4%) were unaware. Among the 32 that were aware, 08 (25%) got know from family members, 09 (28.1%) knew by themselves, 04 (12.5%) knew from friends and 11 (34.4%) knew from health professionals. With regard to ways of modifying obese condition, 61 (41.2%) of the obese participants believe that adequate diet is the way, 53 (35.8%) believe it is through exercise while 34 (23%) believe it is through behavioral changes.

Table 2 Awareness of obesity lifestyle modification among the study participants

Variables	Response	Frequency	Percentage (%)
Knowledge of being obese	Aware Unaware Total	32 116 148	21.6 78.4 100%
Sources of awareness	Family Self Friends Health professionals Total	08 09 04 11 32	25 28.1 12.5 34.4 100%
Ways of modifying obese condition.	Adequate diet Exercise Behavioural changes Total	61 53 34 148	41.2 35.8 23 100%

3.3. Multiple linear regression analysis for association between obesity and lifestyle trend

The multiple linear regression analysis was used to test if lifestyle trend like daily eating pattern, Consumption of Sweetened beverages, Consumption of vegetable and fruits, Alcohol Consumption, Weekly exercise, Exercise duration,

Night sleep duration TV viewing duration and Computer screen time did not significantly predict obesity. The overall regression was insignificant (R^2 = 0.793, F=2.09, P=0.189). The t-test of the individual variables were statistically insignificant (Table 3).

Table 3 Multiple linear regression analysis for association between obesity and lifestyle trend

VARIABLE	COEFFICIENT (B)	STD ERROR	T	P-Value
Daily eating pattern	-1.522	1.86	-0.82	0.44
Consumption of Sweetened beverages	-0.814	2.54	-0.32	0.76
Consumption of vegetable and fruits	-0.069	2.25	-0.03	0.98
Alcohol Consumption	0.335	2.81	0.12	0.91
Weekly exercise	-3.326	4.88	-0.68	0.52
Exercise duration	1.352	3.30	0.41	0.70
Night sleep duration	-1.717	2.40	-0.72	0.50
TV viewing duration (Weekdays)	-0.418	1.82	-0.23	0.83
TV viewing duration (Weekends)	2.440	2.01	1.22	0.27
Computer screen time (Weekdays)	1.432	5.24	0.27	0.79
Computer screen time (Weekends)	0.986	5.30	0.19	0.86
F	2.09			0.189
R^2	0.793			

Note: n =: *** =** Significant at P≤0.05, n = 500, TV = Television.

4. Discussion

In this study, awareness of obesity was low, with only 21.6% of obese participants recognising their condition. A study carried out in the US by Truesdale and Stevens [6] also observed low awareness of obese status among their obese participants. They argued that the misidentification by the participants could be as a result of the term 'obese' since many people are more comfortable admitting that they are overweight or too fat rather than obese. Another reason cited by Truesdale and Stevens [6] is that the term obese may come with social stigma, thereby making it difficult for people to identify themselves as one.

Among participants that are aware of their obese status, health professionals were the primary source of their awareness (34.4%). This could be because one of the roles of healthcare professionals is to educate patients on their diagnosis and the general public on healthy living [12]. With regard to ways of modifying obese condition, many participants believed in diet modification (41.2%) and exercise (35.8%) as the primary methods for weight loss, aligning with established obesity management strategies by the WHO [1].

Nevertheless, the results of this study revealed that lifestyle trends such as eating patterns, beverage consumption, exercise, alcohol consumption, consumption of vegetables & fruits and screen time did not significantly predict obesity. This could be because obese people under-report their dietary intake [13,14]. However, this finding contrasts with numerous studies linking lifestyle factors to obesity [15,16,17,18,19]. The non-significance of these variables in this present study could be as a result of potential cultural or regional differences in Imo State with respect to other studies. It could also suggest that other factors, such as genetic predispositions or environmental influences, may play a more substantial role in this population. According to World Obesity Federation [20], people who are obese are frequently stigmatized and held responsible for their condition since many people do not realize that obesity is a chronic illness; instead, they mistake it for a simple lack of willpower, being lazy, or refusing to "eat less and move more." However, obesity's underlying causes are far more complex and can include genetic, psychological, social, economic, and environmental factors, just like those of any chronic disease [20].

5. Conclusion

This study highlights a low awareness of obesity among participants with only 21.6% recognising their condition, this points to a critical gap in health literacy. Futhermore, lifestyle trends did not predict obesity, suggesting the complexity of obesity determinants in this population.

Recommendations

A crucial recommendations from this study is the urgent need to enhance public health education in Imo State. The low awareness of obesity among participants underscores a significant gap in health literacy. Public health campaigns should focus on increasing awareness about the risks of obesity and the importance of maintaining a healthy weight. Educational programs should target various demographics, emphasizing the dangers of obesity-related health conditions such as diabetes, hypertension, and cardiovascular diseases. Schools, workplaces, and community centers can serve as focal points for these educational efforts, ensuring widespread dissemination of information. Engaging community leaders and influencers can also help in effectively reaching and educating this populations.

Limitation of study

The sample size of this study can be a limitation. The margin of error would have been less with a larger sample size. However, a good representation of the population was guaranteed by the study's stratified and random sampling approach. Secondly, the cross sectional design of this study was able to show possible associations among variables although it cannot be used to make causal inference.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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