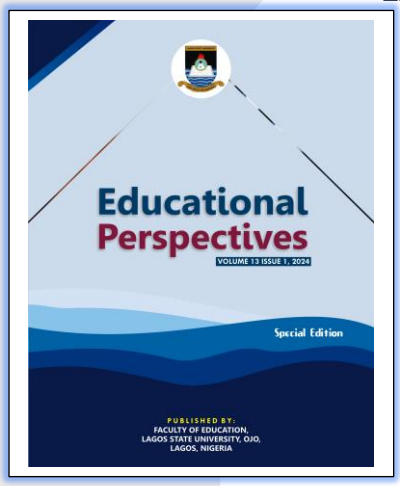

Assessment of The Relationship Between Anthropometric Indices and Age of School Children in Ojo Local Government, Lagos State

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ABSTRACT

The study examined the relationship between Waist-hip ratio and Body Mass Index of school children in Ojo Local Government Area of Lagos State. Quasi-experimental research design was adopted for this study and the population of the study includes all male and female Junior Secondary School students in Ojo Local Government Area of Lagos State. Simple random sampling technique was used to select 60 male and female students that form the sample of the study. The instrument for data collection includes weighing scale and stadiometer and tape rule. The measuring tape was used to measure the student's waist girth and hip girths, stadiometer was used to take the students heights and a weighing scale which was used to take the students weight respectively. The Body mass index of the students was measured by measuring the height and the weight of the student while waist-hip ratio was measured by measuring the waist and the hip. The Body mass index was calculated by dividing the weight by the square of the height while the waist-hip ratio was calculated by dividing the waist value by the hip value. Data collected was analyzed using descriptive statistics of frequency count and percentage and correlation analysis at 0.05 level of significance. Result reveals t=43.23 P>0.05, this implies that there is significant difference in the BMI of school age children in Ojo Local Government Area. The study recommended that Periodic assessment of body mass index and waist-hip ratio should be carried out to monitor the body composition and any risk factors among the students in Ojo Local Government Area of Lagos State

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Introduction

Childhood obesity has reached epidemic proportions worldwide, with prevalence rates escalating in both developed and developing countries. According to the World Health Organization (WHO, 2019), the number of overweight or obese children under the age of five globally stood at over 38 million in 2019, and this figure is projected to increase significantly unless urgent action is taken. Lifestyle modification, through regular exercise and healthy diet are widely acknowledged as playing a significant role in improving and maintaining overall health and well-being in people of all ages (Taiwo et al. 2023). Body Mass Index is calculated as weight in kilograms divided by height in meters squared (kg/m^2), is commonly used to assess body fatness in children. High Body Mass Index values in children are associated with an increased risk of developing chronic diseases such as type 2 diabetes, cardiovascular diseases, and certain cancers later in life (WHO, 2019). While Body Mass Index provides a general measure of obesity, Waist- to-Hip Ratio offers insights into the distribution of body fat, particularly central adiposity. Central obesity, characterized by excess fat accumulation around the abdomen

High Waist-to-Hip Ratio values indicate the accumulation of visceral fat around the abdomen, which is particularly concerning as it is strongly associated with metabolic abnormalities and increased cardiovascular risk. Jiang et al., (2013), found that a higher waist-to-hip ratio was associated with a greater risk of developing metabolic syndrome, a group of risk factors that increase the likelihood of developing cardiovascular disease and type 2 diabetes.

The World Health Organization recommends that men maintain a waist-to-hip ratio of less than 0.90 and women maintain a waist-to-hip ratio of less than 0.85 to reduce their risk of chronic diseases (World Health Organization, 2011).

Body mass index and waist-to-hip ratio are both measures of body composition that are used to assess an individual's risk for weight-related health problems. While these measures are related, they provide different information about an individual's body composition. Body mass index is a measure of body fat based on an individual's weight and height, and is calculated by dividing an individual's weight in kilograms by their height in meters squared. Body mass index values are generally categorized into four groups: underweight, normal weight, overweight, and obese. However, Body Mass Index does not take into account the distribution of body fat, which can also affect an individual's overall health. On the other hand, waist-to-hip ratio is a measure of the distribution of body fat, and is calculated by dividing an individual's waist circumference by their hip circumference. Waist-to-hip ratio values are generally categorized into two groups: a waist-to-hip ratio of 0.85 or lower for women, and a waist-to-hip ratio of 0.90 or lower for men, is considered healthy, while a waist-to-hip ratio above these values is associated with an increased risk for weight-related health problems

However, research has shown that the relationship between body mass index and waist-to-hip ratio can vary depending on factors such as age, sex, and ethnicity. For example, some studies have suggested that waist-to-hip ratio may be a better predictor of weight-related health problems than BMI in older adults, while others have suggested that body mass index may be a better predictor in younger adults.

Research Hypotheses

1 There is no significant difference in the BMI of school age children in Ojo Local Government Area

ii. There is no significant difference in the waist-hip ratio of school age children in Ojo Local Government Area

iii. There is no significant relationship between waist-hip ratio and age of school age children in Ojo Local Government Area
iv. There is no significant relationship between BMI and age of school age children in Ojo Local Government Area

Methodology

The descriptive research design was adopted for this study. This involved using a structured questionnaire to collect data from the target respondents. The population for this study consists of all school children in public Junior Secondary Schools in Ojo Local Government, Lagos State.

Procedure for Measurement

Centripetal and Anthropometric Measurement

Anthropometric measurements such as body weight, height and waist circumference and hip circumference were measured according to the protocol of the International Society for the Advancement of Kinanthropometry (ISAK). These measurements were performed by the same skilled testers with good knowledge of ISAK guidelines. For body weight, each participant stepped on the weighting scale barefooted with eyes looking straight. The weighing scale was calibrated to 0kg before each measurement and the participant body weight measured was recorded in kilogramme using a digital scale. The height was measured to the nearest 0.1 metres using a mounted stadiometer. The waist circumference was measured using measuring tape and recorded in centimeter. The waist circumference was measured while the participants are in standing position using a well calibrated tape rule. The hip circumference was also measured with a calibrated measuring tape. The measuring tape was placed on the uppermost part of the hip bone and recorded in centimeter.

Procedure for Data Analysis

The data collected were analyzed using descriptive statistics of mean and simple percentage for demographic data while inferential statistics of t-test will be used to test the stated hypotheses. All hypotheses will be tested at 0.05 level of significance. Data analysis was carried out using Statistical Package for Social Sciences (SPSS) version 26.

Results

Table 1: Distribution of Respondents by Gender

Gender	Frequency	Percent
Male	26	43.3
Female	34	56.7
Total	60	100.0

From table 1 above, it could be observed that 26 male students representing 43.3% and 34 female students representing 56.7% of the total respondent.

Table 2: Distribution of Respondents by Age

Age	Frequency	Percent
12.00	12	20.0
13.00	26	43.3
14.00	16	26.7
15.00	4	6.7
16.00	2	3.3
Total	60	100.0

From table 2 above, it is observed that 12 (20.0%) of the participants were 12 years of age, 26 (43.3%) of the participants were 13 years of age, 16 (26.7%) were 14 years of age, 8 (6.7%) were 15 years of age while the remaining 2 (3.3%) were 16years of age.

Table 3: Distribution of Respondents by Class

Class	Frequency	Percent
JSS1	26	35.3
JSS2	18	30
JSS3	16	26.7
Total	60	100.0

From table 3 above, it is observed that 26 (35.3%) of the participants were from JSS 1, 18 (30%) of the participants were from JSS 2, while 16 (26.7%) were from JSS 3. This implies that majority of the respondents were from JSS 1.

Table 4: BMI and Weight Status of Male Participants

Participants	Age	BMI	Percentile	Weight Status
1	12	15.60	12th	Underweight
2	12	15.20	7th	Underweight
3	12	17.70	48th	Underweight
4	14	15.20	7th	Underweight
5	14	21.20	1	Healthy weight
6	14	19.70	75th	Healthy weight
7	14	16.4	58th	Underweight
8	15	14.80	99th	Obesity
9	16	16.40	2nd	Healthy weight
10	14	17.10	17th	Healthy weight
11	12	17.30	41st	Healthy weight
12	13	17.00	25th	Healthy weight
13	14	13.80	1st	Healthy weight

Table 4 presents the BMI and weight status of male participants. From the table, it is observed that 2 male participants have Healthy weight status and 11 male participants have underweight.

Table 5: BMI and Weight Status of Female Participants

Participants	Age	BMI	Percentage	Weight Status
1	13	18.30	43rd	Healthy
2	12	18.40	55th	Healthy
3	12	18.50	56th	Healthy
4	13	19.40	58th	Healthy
5	13	18.80	51st	Healthy
6	13	15.70	8th	Underweight
7	13	18.60	47th	Healthy
8	15	19.80	48th	Healthy
9	13	20.10	67th	Healthy
10	13	17.40	29th	Underweight
11	13	18.40	38th	Healthy
12	13	22.00	82nd	Healthy
13	13	15.40	6th	Underweight
14	14	15.60	4th	Underweight
15	14	19.90	57th	Healthy
16	13	13.10	1st	Underweight
17	13	14.90	3rd	Underweight

Table 5 presents the BMI and weight status of female participants. From the table, it is observed that 11 female participants have normal weight status and 6 female participants are underweight.

Table 6: Waist-Hip ratio of Male Participants

Participants	Age	WHR	WHR Status
1	12	.86	Low risk
2	12	.86	Low risk
3	12	.91	Moderate risk
4	14	.87	Low risk
5	14	.89	Low risk
6	14	.94	Low risk
7	14	.94	Moderate risk
8	15	.94	Moderate risk
9	16	.78	Low risk
10	14	.91	Moderate risk
11	12	.89	Low risk
12	13	.85	Low risk
13	14	.90	Low risk

Table 6 presents the waist-hip ratio of male participants. From the table, it is observed that 9 male participants are at low risk and 4 are at moderate risk of of cardiovascular disease. For male WHR lower than 0.90 is considered to have low risk of Cardiovascular problems WHR between 0.91-1.0 are considered to be at moderate risk and WHR above 1.0 considered to be at high risk of cardiovascular diseases

Table 7: Waist-Hip ratio of Female Participants

Participants	Age	WHR	WHR Status
1	13	.87	Moderate Risk
2	12	.83	Moderate Risk
3	12	.85	High Risk
4	13	.84	High Risk
5	13	.86	High Risk
6	13	.85	High Risk
7	13	.91	High Risk
8	15	.78	Low Risk
9	13	.85	High Risk
10	13	.91	High Risk
11	13	.86	High Risk
12	13	.83	High Risk
13	13	.90	Moderate Risk

Table 7 presents the waist-hip ratio of female participants. From the table, it is observed that 1female participants at low risk, 3 are at moderate risk and 9 are at high risk of cardiovascular disease. For female WHR Lower 0.81 are considered to be at low risk, WHR between 0.81-084 are considered to be moderate and WHR with above 0.84 are considered to be high risk of cardiovascular diseases.

Testing Stated Hypotheses

Hypothesis One

There is no significant difference in the BMI of school age children in Ojo Local Government Area

Table 8: t-test analysis of BMI of School Age Children

	Test Value = 0					
	T	df	Sig.	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
BMI	43.125	29	.000	17.39000	16.5653	18.2147

Table 8 presents the one sample t-test analysis of the BMI of school age school. The table show a significant t=43.23 P>0.05, this implies that there is significant difference in the BMI of school age children in Ojo Local Government Area. Therefore, hypothesis one which states that there is no significant difference in the BMI of school age children in Ojo Local Government Area is hereby rejected.

Hypothesis Two

There is no significant difference in the waist-hip ratio of school age children in Ojo Local Government Area

Table 9: t-test analysis of Waist-Hip Ratio of School Age Children

	T	df	Sig.	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
WHR	90.934	29	.023	.87033	.8508	.8899

Table 9 presents the analysis of the waist-hip ratio of school age school. The table show a significant t=90.93 P>0.05, this implies that there is significant difference in the waist-hip ratio of school age children in Ojo Local Government Area. Therefore, hypothesis one which states that there is no significant difference in the waist-hip ratio of school age children in Ojo Local Government Area is hereby rejected.

Hypothesis Three

There is no significant relationship between waist-hip ratio and age of school age children in Ojo Local Government Area.

Table 10: Relationship between Waist-Hip Ratio and Age

		Age	WHR
Age	Pearson Correlation	1	-.129
	Sig. (2-tailed)		.499
	N	30	30
WHR	Pearson Correlation	-.129	1
	Sig. (2-tailed)	.499	
	N	30	30

Table 10 presents the correlation analysis of the relationship between waist-hip ratio age children. The table show a non-significant r= -.13 P<0.05, this implies that there is a weak negative non-significant relationship between the waist-hip ratio age of the children in Ojo Local Government Area. Therefore, hypothesis one which states that there is no significant difference in the waist-hip ratio of school age children in Ojo Local Government Area is hereby accepted.

Hypothesis Four

There is no significant relationship between Body mass index and age of school age children in Ojo Local Government Area

Table 11: Relationship between Body mass index and Age

		Age	WHR
Age	Pearson Correlation	1	-.129
	Sig. (2-tailed)		.499
	N	30	30
WHR	Pearson Correlation	-.129	1
	Sig. (2-tailed)	.499	
	N	30	30

Table 11 presents the correlation analysis of the relationship between Body mass index and age of children. The table show a non-significant r= -.13 P<0.05, this implies that there is a weak negative non-significant relationship between the Body mass index and the age of the children in Ojo Local Government Area. Therefore, hypothesis one which states that there is no significant difference in the Body mass index and age of children in Ojo Local Government Area is hereby accepted.

Discussion of Findings

The result of this study shows that there is strong positive relationship between Body Mass Index and waist-hip ratio and age of school children in Ojo Local Government. Body Mass Index and waist-hip ratio are two commonly used anthropometric measures to assess body composition in both clinical and research settings. While both measures have been shown to be associated with health outcomes, they provide different information about body composition and distribution of body fat. The result of this study agrees with previous studies on the relationship between Body mass index and Waist-hip ratio. Shabnam et al., (2020) investigated the relationship between Body mass index and Waist-hip ratio of male university students in Iran. They found that Body mass index and Waist-hip ratio were positively correlated (r=0.637, p<0.001), indicating that as Body mass index increased, so did Waist-hip ratio. The authors also reported that Body mass index was a stronger predictor of Waist-hip ratio than age and physical activity level. Similarly, Safarzadeh et al., (2019), examined the relationship between Body mass index and Waist-hip ratio among male university students. They found a significant positive correlation between Body mass index and Waist-hip ratio (r=0.768, p<0.001), indicating that higher Body mass index was associated with higher Waist-hip ratio.

Another study by Oluboyo et al., (2019) investigated the relationship between Body mass index and Waist-hip ratio among male undergraduate students. The study found a significant positive correlation between Body mass index and Waist-hip ratio (r=0.469, p<0.001), indicating that higher Body mass index was associated with higher Waist-hip ratio.

In contrast, a study by Sardinha et al., (2013) in Portugal found that the correlation between Body mass index and Waist-hip ratio among male university students was weak (r=0.231, p=0.03). However, the authors noted that this may be due to the relatively small sample size and the fact that the study population consisted of athletes, who may have a different body composition compared to the general population.

Conclusion

The findings of this study provide critical insights into the body composition and anthropometric measurements of school-age children in the Ojo Local Government Area. The first hypothesis, which proposed no significant difference in the Body Mass Index (BMI) of school-age children, was tested, and the results indicated significant difference, suggesting that the BMI of the students varies. Similarly, the second hypothesis, which stated that there is no significant difference in the waist-hip ratio among these children, was examined, and result reveals that significant difference, suggesting that the WHR of the students varies Furthermore, the third hypothesis, concerning the relationship between waist-hip ratio and age, was assessed. The results showed no significant relationship. Finally, the fourth hypothesis explored the relationship between BMI and age among school-age children. The findings indicated no significant relationship. Overall, this study contributes to the understanding of childhood obesity and body composition patterns within the local context of Ojo. The results emphasize the need for targeted health interventions and policies to address potential risk factors associated with childhood obesity and related health outcomes. Future research should consider expanding the scope to include other local government areas and

incorporate additional variables such as dietary habits and physical activity levels to provide a more comprehensive view of the determinants of childhood obesity.

Recommendations

Based on the findings of this study, it is recommended that:

1. Schools should develop and implement health programs that promote physical activity, healthy eating, and body awareness among children. This could include introducing regular physical education classes, nutrition education, and organized sports activities to help maintain healthy Body mass index levels and waist-hip ratios.
2. Local health authorities, in collaboration with schools, should establish regular screening and monitoring programs for Body mass index and waist-hip ratios among school-age children. Such initiatives would help in the early identification of children at risk of obesity or related health issues, enabling timely interventions.
3. Parents should be actively involved in promoting healthy lifestyles for their children. Educational workshops or community-based programs should be organized to inform parents about the importance of maintaining a balanced diet, encouraging physical activity, and monitoring their children's growth patterns. This would help create a supportive home environment that fosters healthy behaviors.
4. Policies aimed at improving the nutritional quality of food provided in schools, such as incorporating more fruits, vegetables, whole grains, and lean proteins, should be established. Additionally, restrictions on the sale of unhealthy snacks and sugary drinks within and around school premises should be enforced to reduce the consumption of unhealthy foods.

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