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Statistical Analysis of Body Mass Index (BMI) of People in Rural and Urban Area in Nigeria.

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ABSTRACT :

This research was carried out on the Statistical Analysis of Body Mass Index (BMI) Of People In Rural And Urban Area In Nigeria between 20014 To 2024. To assess the prevalence of the Body Mass Index among Nigerians living in urban and the rural settlements and also to test the significant differences on the yearly Body Mass Index. The statistical method employed was paired t-test and descriptive statistics to carry out the differences on the yearly body mass index. The result revealed that underweight, overweight and obesity exist in adults. The Body Mass Index (BMI) of people leaving in urban settlement is higher than those in rural settlement. It also reveals that there is significant difference in the yearly BMI except for year (2018-2022),(2019-2022), (2021-2022) and (2022-2023) based on the fact that their P-value are less than 0.05. The BMI of the female generally are higher than the male that is, there is significant difference on the yearly body mass index.

Keywords: Rural, Urban, Body Mass Index, Paired t- test (BMI) and P-value

1.0 INTRODUCTION

Obesity is a chronic disease that results in substantial global morbidity and mortality. The efficacy and safety of tirzepatide, a novel glucose-dependent insulin tropic polypeptide and glucagon-like peptide-1 receptor agonist, in people with obesity are not known. The increasing prevalence of obesity among male and female, rural and urban is a public health problem, as more and more people are facing it. Body mass index (BMI) is a person's weight in kilograms divided by the square of height in meters.

BMI is a low-cost and simple way to screen for underweight, healthy weight, overweight, and obesity. Although BMI is not a direct indicator of body fat, it has a moderate correlation with other measures of body fat. Moreover, BMI seems to have a substantial correlation with a number of metabolic and illness outcomes, just like these more straightforward indicators of body fatness.

The interpretation of BMI varies for children and adolescents, despite being calculated with the same formula as it is for adults. For children and teens, BMI must be tailored to their age and sex, as body fat levels change with growth and differ between males and females. In contrast, adults' BMI interpretation is not influenced by gender or age. Overweight and obesity are characterized by an abnormal or excessive accumulation of body fat that could negatively affect health. In recent decades, obesity and overweight have gained recognition as significant health issues in both industrialized and developing nations. Over the past 20 years, the prevalence of overweight and obesity has significantly increased in the majority of industrialized and developing nations, affecting people of all ages, genders, races, ethnicities, economic levels, and educational attainment.

People who have obesity are at increased risk for many diseases and health conditions including the following:

*All causes of death(mortality)
* High blood pressure (hypertension)
*Type 2 diabetes
* Coronary heart disease
*Stroke
*Gallbladder disease
*Some cancer(endometrial, breast,colon, kidney, gallbladder and liver)
* Chronic inflammation and increased oxidative stress
*Mental illness such as clinical depression, anxiety and other mental disorders

Since BMI is the same for adults of all ages and genders, it is the most practical population-level indicator of overweight and obesity. Since 1975, the global obesity rate has almost tripled. Over 1.9 billion persons aged 18 and over were overweight in 2016. More than 650 million of them were obese. In 2016, 13% of adults over the age of 18 were obese, and 39% were overweight. The majority of people on the planet reside in nations where obesity and overweight cause more deaths than underweight. Between 1975 and 2016, the prevalence of obesity has tripled globally. An estimated 38% of adults worldwide are predicted to be obese by 2030.(Olusanya & O.A. Omotayo, 2011).

With the exception of some areas of Asia and sub-Saharan Africa, there are more obese individuals than underweight people in the world. An energy imbalance between calories burned and ingested is the primary cause of overweight and obesity. Due to the increasingly sedentary nature of many types of work, shifting modes of transportation, and growing urbanization, there has been an increase in the consumption of foods high in fat and energy density as well as a rise in physical inactivity. Changes in the environment and society brought about by development, as well as a lack of supportive policies in areas like health, agriculture, transportation, urban planning, the environment, food processing, distribution, marketing, and education, frequently lead to changes in dietary and physical activity patterns. These results led to the creation of this study. (Pacific, 2018).

According to Blackett et al. (2012)involving 51,529 U.S. male health professionals,40-75 years of age found that men with a BMI over 35kg/m2 had a significantly higher risk of developing type 2 diabetes than men with BMIs lower than 23kg/m2. Chinedu et al. (2013) examined the two tools to see if there was a correlation between them. They examine 489Nigerian participant's aged 18-75 yeas for waist circumference, height and weight. The results showed a significant, positive relationship between BMI and waist circumference (r=0.75) indicating that as BMI increased so did waist circumference. Zou et al. (2015) in a study showed that the prevalence of obesity was 10.1% among adults in urban area which was significantly lower than our study results. Ayatollahi and Ghoreshizadeh (2010) showed that the prevalence of overweight or obesity (body mass index> or=25) was 49.7% in men and 63.9% in women.

Objectives

1. To assess the prevalence of the Body Mass Index among Nigerians living in urban and the rural settlements.
2. To test the significant differences on the yearly Body Mass Index.

Theoretical Framework

BMI is calculated the same way for both adults and children. The calculation is based on the following formulas: Weight(Kg)/height(m2). Write the metric system, the formula for BMI is weight in kilograms divided by height in meters squared. Because height is commonly measured in centimetres, divide height in centimetres by 100 to obtain height in metres.

Example: Weight= 68kg, Height= 165cm (1.65m)

Calculation:68÷(1.65)^2= 24.98

For adults 20 years old and older, BMI is interpreted using standard weight status categories. These categories are the same for men and women of all body types and ages.

BMI	WEIGHT STATUS
Below 18.5	Underweight
18.5 – 24.9	Healthy Weight
25.0 – 29.9	Over weight
30.0 and Above	Obesity

2.0 METHODOLOGY

Data was collected from NCD Risk Factor Collaboration (NCDRisc) on Body Mass Index (rural and urban) from 2014 to 2024. SPSS Version 21 was used to analyses the data using paired t-test and descriptive statistics.

Method of Data Analysis

Model Specification

Paired t-test

1 Hypotheses

The null hypothesis for a paired t-test is: H_0: $\mu_d = \mu_0$ where:

H_1: μ_0 = the hypothesized mean of the differences

You can choose any one of three alternative hypotheses:

H_1: $_d$>□□□One-tailed test

H_1: $_d$<□□ One-tailed test

H_1: $_d$≠□□ One-tailed test

3.0 Data Analysis/Discussion

Collected data analyzed by descriptive statistical methods as table, mean± SD, t-test have been used to compare numeric and categorical variables. Data analyzed were performed using SPSS version 21 $P<0.05$ was considered as significant level.

Variable	Mean±SD	Correlation(P-value)	t-test(p-value)	Remark
Pair 1	22.9348±0.93043 22.9833±0.93155	1.000 (0.000)	-61.430 (0.010)	Significant
Pair 2	22.9348±0.93043 23.0276±0.93267	1.000 (0.000)	-58.766 (0.011)	Significant
Pair 3	22.9348±0.93043 22.0674±0.93379	1.000 (0.000)	-55.821 (0.011)	Significant
Pair 4	22.9348±0.93043 23.1032±0.9341	1.000 (0.000)	-53.221 (0.012)	Significant
Pair 5	22.9348±0.93043 23.1359±0.93603	1.000 (0.000)	-50.858 (0.013)	Significant
Pair 6	22.9348±0.93043 23.1669±0.93714	1.000 (0.000)	-48.924 (0.013)	Significant
Pair 7	22.9348±0.93043 23.2057±0.94887	1.000 (0.000)	-20.775 (0.031)	Significant
Pair 8	22.9348±0.93043 23.2295±0.93938	1.000 (0.000)	-46.553 (0.014)	Significant
Pair 9	22.9348±0.93043 23.2608±0.94051	1.000 (0.000)	-45.754 (0.014)	Significant
Pair 10	22.9348±0.93043 23.2921±0.94163	1.000 (0.000)	-45.149 (0.014)	Significant
Pair 11	22.9833±0.93155 23.0276±0.93267	1.000 (0.000)	-56.101 (0.011)	Significant
Pair 12	22.9833±0.93155 23.0674±0.93379	1.000 (0.000)	-53.025 (0.012)	Significant
Pair 13	22.9833±0.93155 23.1032±0.93491	1.000 (0.000)	-50.491 (0.013)	Significant
Pair 14	22.9833±0.93155 23.1359±0.93603	1.000 (0.000)	-48.220 (0.013)	Significant
Pair 15	22.9833±0.93155 23.1669±0.93714	1.000 (0.000)	-46.426 (0.014)	Significant
Pair 16	22.9833±0.93155 23.2057±0.94887	1.000 (0.000)	-18.153 (0.035)	Significant
Pair 17	22.9833±0.93155	1.000 (0.000)	-44.431 (0.014)	Significant

	22.2295±0.93938			
Pair 18	22.9833±0.93155 23.2608±0.94051	1.000 (0.000)	-43.799 (0.015)	Significant
Pair 19	22.9833±0.93155 23.2921±0.94163	1.000 (0.000)	-43.344 (0.015)	Significant
Pair 20	23.0276±0.93267 23.0674±0.93379	1.000 (0.000)	-49.969 (0.013)	Significant
Pair 21	23.0276±0.93267 23.1032±0.93491	1.000 (0.000)	-47.694(0.013)	Significant
Pair 22	23.0276±0.93267 23.1359±0.93603	1.000 (0.000)	-45.598 (0.014)	Significant
Pair 23	23.0276±0.93267 23.1669±0.93714	1.000 (0.000)	-44.011 (0.014)	Significant
Pair 24	23.0276±0.93267 23.2057±0.94887	1.000 (0.000)	-15.537 (0.041)	Significant
Pair 25	23.0276±0.93267 23.2295±0.93938	1.000 (0.000)	-42.491 (0.015)	Significant
Pair 26	23.0276±0.93267 23.2608±0.94051	1.000 (0.000)	-42.046 (0.015)	Significant
Pair 27	23.0276±0.93267 23.2921±0.94163	1.000 (0.000)	-41.753 (0.015)	Significant
Pair 28	23.0674±0.93379 23.1032±0.93491	1.000 (0.000)	-45.405 (0.014)	Significant
Pair 29	23.0674±0.93379 23.1359±0.93603	1.000 (0.000)	-43.399 (0.015)	Significant
Pair 30	23.0674±0.93379 23.1669±0.93714	1.000 (0.000)	-42.013 (0.015)	Significant
Pair 31	23.0674±0.93379 23.2057±0.94887	1.000 (0.000)	-12.970 (0.049)	Significant
Pair 32	23.0674±0.93379 23.2295±0.93938	1.000 (0.000)	-40.987 (0.016)	Significant
Pair 33	23.0674±0.93379 23.2608±0.94051	1.000 (0.000)	-40.720 (0.016)	Significant
Pair 34	23.0674±0.93379 23.2921±0.94163	1.000 (0.000)	-40.574 (0.016)	Significant
Pair 35	23.1032±0.93491 23.1359±0.93603	1.000 (0.000)	-41.392 (0.015)	Significant

Pair 36	23.1032±0.93491 231669±0.93714	1.000 (0.000)	-40.316 (0.016)	Significant
Pair 37	23.1032±0.93491 23.2057±0.94887	1.000 (0.000)	-10.375 (0.061)	Not significant
Pair 38	23.1032±0.93491 23.2295±0.93938	1.000 (0.000)	-39.885 (0.016)	Significant
Pair 39	23.1032±0.93491 23.2608±0.94051	1.000 (0.000)	-39.785 (0.016)	Significant
Pair 40	23.1032±0.93491 23.2921±0.94163	1.000 (0.000)	-39.771 (0.016)	Significant
Pair 41	23.1359±0.93603 23.1669±0.93714	1.000 (0.000)	-39.241 (0.016)	Significant
Pair 42	23.1359±0.93603 23.2057±0.94887	1.000 (0.000)	-7.678 (0.082)	Not significant
Pair 43	23.1359±0.93603 23.2295±0.93938	1.000 (0.000)	-39.383 (0.016)	Significant
Pair 44	23.1359±0.93603 23.2608±0.94051	1.000 (0.000)	-39.385 (0.016)	Significant
Pair 45	23.1359±0.93603 23.2921±0.94136	1.000 (0.000)	-39.447 (0.016)	Significant
Pair 46	23.1669±0.93714 23.2057±0.94887	1.000 (0.000)	-4.672 (0.134)	Not significant
Pair 47	23.1669±0.93714 23.2295±0.93938	1.000 (0.000)	-39.454 (0.016)	Significant
Pair 48	23.1669±0.93714 23.2608±0.94051	1.000 (0.000)	-39.433 (0.016)	Significant
Pair 49	23.1669±0.93714 23.2921±0.94163	1.000 (0.000)	-39.498 (0.016)	Significant
Pair 50	23.2057±0.94887 23.2295±0.93938	1.000 (0.000)	-3.544 (0.175)	Not significant
Pair 51	23.2057±0.94887 23.2608±0.94051	1.000 (0.000)	-9.314 (0.068)	Significant
Pair 52	23.2057±0.94887 23.2921±0.94163	1.000 (0.000)	-16.869(0.038)	Significant

Pair 53	23.2295±0.93938 23.2608±0.94051	1.000 (0.000)	-39.390 (0.016)	Significant
Pair 54	23.2295±0.93938 23.2921±0.94163	1.000 (0.000)	-39.543 (0.016)	Significant
Pair 55	23.2608±0.94051 23.2921±0.94163	1.000 (0.000)	-39.696 (0.016)	Significant

Footnote: p-value **= sig. at 5%.

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
URBAN	11	.37	23.59	23.96	23.7911	.03621	.12009	.014
RURAL	11	.35	22.28	22.63	22.4655	.03436	.11396	.013
Valid N (listwise)	11							

Conclusion

This study revealed that underweight, overweight and obesity exist in adults. The Body Mass Index (BMI) of people leaving in urban settlement is higher than those in rural settlement. It also reveals that there is significant difference in the yearly BMI except for year (2011-2014),(2012-2014), (2013-2014) and (2014-2015) based on the fact that their P-value are less than 0.05. The BMI of the female generally are higher than the male that is, there is significant difference.

RECOMMENDATION

This work recommend that people in urban area should try and look into what they eat so that to prevent obesity. Also recommend pair t - test as a good statistical tools for comparison

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