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The Influence of Marital Status on BMI Level among Nigerian Adults

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Received: April 09, 2023; **Published:** April 24, 2023

Abstract

Introduction: The influence of socio-economic factors on overweight and obesity remains a complex issue. The effect of all these factors across varies across nation, whether developing countries or developed countries. This study aimed at evaluating the influence of marital status on BMI level.

Materials and Methods: 240 respondents were studied cross-sectionally in the rural and urban localities of Abeokuta, Ogun State, Nigeria. Socio-economic variables such as education, profession, occupation, employment, disposable income, residence, marital status, financial aid, age sex, heritage were obtained and assessed. The anthropometric measurements of weight and height were measured to compute the Body Mass Index (BMI kg/m^2) of the respondents). Descriptive statistics of numbers, percentages and mean ± standard deviation were constructed.

Results: The mean weight for rural subjects males and females, were 75.6 ± 8.11 kg and 81.5 ± 9.60 kg respectively. The mean BMI was higher among the rural married group (32.44 ± 3.36 kg/m^2 for males) than the urban married group (30.15 ± 4.59 kg/m^2 for males). The mean BMI was higher among the urban single/ never married/unmarried group (36.11 ± 5.13 kg/m^2 for females) than the rural single/never married/unmarried group (30.01 ± 4.13 kg/m^2 for females).

Conclusions: The Body Mass Index increased differently across the marital status groups, when compared. The values are higher among the females than the males in each of the groups, but much more prominent increase among the widow/divorce/separate. This can be said to be due to sedentary or less stress nature of this group of respondents increased health literacy, nutrition education and relationship is advocated for this vulnerable group.

Keywords: *BMI; Weight; Marital Status; Obesity*

Introduction

Several socio-economic factors have been implicated as have influence in the obesity epidemic worldwide, such include (Education profession, occupation, disposable income, residence, marital status, financial aid, sex, age, heritage etc) [1-4].

Personal date on socio-economic factors were reported with qualitative assurance and validated [4]. Age, sex and obesity-related comorbidities, such as diabetes were also reported to influence weight-gain and weight-loss [5-10]. Although it still remains unclear the influence of socio-economic factors [11,12], due to the difficulty in assessing the complication rates, outcome status and level of improvement in quality of life [13-17].

Wherever there has been less improvement in health-related quality of life on any issue relating to obesity including (preparative and post operative surgeries) [17,18]. The explanation has always been multifactorial, including behavioural, sociopsychological chronic stress, higher cortisol levels associated with urban life [19], less time for exercise due to congestion, increased travelling times and higher availability of energy dense food i.e. "Junk food". Also, inherited eating habits, different food cultural disposable income, absence of comorbidities (except for depression), employment, occupation, BMI level, social benefits, citizens' localities could be of importance.

In retrospective study in Sweden, higher % TWL (total weight loss) was seen in higher BMI and single status patients [4], showing that marital status can be implicated in the increasing providence of obesity worldwide. This study aimed to identify marital status as one of the socio-economic factors that is associated with increasing weight, BMI and prevalence of obesity.

Materials and Methods

The subjects were identified and assessed for inclusion in this study. They were selected by systematic random sampling where total of 240 respondents of which 120 were males and 120 were females across the rural and urban localities of Abeokuta, Ogun State, Nigeria. Socio-economic data were obtained based on personal data that include education, profession, occupation, employment, disposable income, residence, marital status, financial aid, heritage, age, sex). Anthropometric data were also collected through weight and height measurements. The weights were measured to the nearest 0.1 kg using digital scale. The heights were measured to the nearest 0.1cm using calibrated standing rule.

The data of the weights and heights were used to compute the BMI (kg/m^2) adopting World Health Organisation [23] classification of body weight in adults; normal weight (18.5 - 24.9). overweight (25.0 - 29.9), obese ≥ 30.0. The marital status was categorized as married/partner (M/P). widow/divorce/separate (W/D/Sep), and single/never married/unmarried (S/NM/U).

The values were categorically presented as numbers and percentages and continuously as mean ± standard deviation for values with normal distribution. Charts were also used to describe the data distribution [22].

Results

The mean age for the rural subjects was males 41 ± 10.33 years; female 39 ± 12.84 years; and for the urban subjects were males 40 ± 11.16 years, female 38 ± 9.14 years. The mean weight for the rural subjects was males: 75.6 ± 8.11 kg, females: 81.5 ± 9.60 kg and for the urban subjects were males: 77.3 ± 7.63 kg, females: 67.8 ± 17.52 kg. The mean height for the rural subjects was males: 172.1 ± 8.5 cm, females: 169.3 ± 5.2 cm; and for the urban subjects were males: 179.6 ± 3.4 cm, females: 163.8 ± 6.5 cm. The mean BMI for the rural subjects was males: 26.17 ± 3.63 kg/m^2, females: 27.69 ± 6.01 $kg/m^2$for the urban subjects were males: 29.30 ± 4.69 kg/m^2, females: 28.49 ± 5.80 kg/m^2 (Table 1).

	Weight (kg)		Height (cm)		BMI (kg/m^2)		Age (year)	
	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD
Rural								
Male (n = 60)	63.4-91.7	75.6 ± 8.11	161.4-179.2	172.1 ± 8.5	22.82-32.88	26.17 ± 3.63	22-64	41 ± 10.33
Female (n = 60)	49.9-91.6	81.5 ± 9.60	149.8-171.4	169.3 ± 5.2	20.75-36.43	27.69 ± 6.01	23-64	39 ± 12.84
Urban								
Male (n = 60)	96.1-89.9	77.3 ± 7.63	169.7-183.9	179.6 ± 3.4	22.31-44.61	29.30 ± 4.69	20-64	40 ± 11.16
Female (n = 60)	52.7-85.6	67.8 ± 17.52	141.3-160.0	163.8 ± 6.5	25.80-46.31	28.49 ± 5.80	21-64	38 ± 9.14

Table 1: *Range, mean and standard deviation of weight, height, BMI and age of respondents.*

The numbers of married/partner (M/P) respondents were 24 males and 22 females, while 20 males and 20 females were widow/divorce/separated (W/D/Sep) and 19 males and 15 females were single/never married/unmarried (S/NM/U) among the respondents in the rural locality (Table 2a). The numbers of married/partner (M/P) respondents were 21 males and 22 females, while 15 males and 20 females were widow/divorce/separated (W/D/Sep) and 18 males and 24 females were single/never married/unmarried (S/NM/U) among the respondents in the urban locality (Table 2b).

Rural	No.	Mean Height (cm) ± SD		Mean Weight (kg) ± SD		Mean BMI (kg/m^2) ± SD	
		Male: n=60	Female: n=60	Male: n=60	Female: n=60	Male: n=60	Female: n=60
Married	46	179.1 ± 9.4	163.1 ± 8.1	81.3 ± 9.3	52.7 ± 9.2	32.44 ± 3.36	36.93 ± 2.28
Widow/Divorce/Separate	40	180.9 ± 8.1	160.5 ± 9.2	89.1 ± 7.9	85.6 ± 10.4	31.15 ± 4.13	38.19 ± 3.88
Single/Never married/ Unmarried	34	178.3 ± 8.4	162.1 ± 10.1	79.6 ± 8.0	64.7 ± 8.1	28.45 ± 2.23	30.01 ± 4.13

Table 2a: *Mean distribution of height, weight and BMI of rural respondents according to their marital status.*

Urban	No.	Mean Height (cm) ± SD		Mean Weight (kg) ± SD		Mean BMI (kg/m^2) ± SD	
		Male: n=60	Female: n=60	Male: n=60	Female: n=60	Male: n=60	Female: =60
Married	43	176.5 ± 9.2	162.5 ± 7.9	84.7 ± 7.7	65.7 ± 6.9	26.14 ± 4.10	33.63 ± 4.14
Widow/Divorce/Separate	35	175.6 ± 7.8	164.1 ± 5.6	90.4 ± 8.1	86.7 ± 7.8	32.63 ± 3.69	37.44 ± 3.14
Single/Never married/ Unmarried	42	175.6 ± 7.4	161.3 ± 4.8	84.9 ± 6.5	57.2 ± 6.3	30.15 ± 4.59	36.11 ± 5.13

Table 2b: *Mean distribution of height, weight and BMI of urban respondents according to their marital status.*

The mean distribution of the respondents heights, weight, BMI according to marital status were shown in table 2a and 2b. The marital status categorizes as married/partner (M/P), widow/divorce/separate (W/D/Sep), and single/never married/unmarried (S/NM/U). The results showed the rural settings, where males were M/P (179.1 ± 9.4 cm for height), W/D/Sep (180.9 ± 8.1 cm for height), and S/NM/U (178.3 ± 8.9 cm for height), M/P (81.3 ± 9.3 kg for weight), W/D/Sep (89.1 ± 7.9 kg for weight), and S/NM/U (79.6 ± 8.0 kg for weight), M/P (32.44 ± 3.36 kg/m^{2}for BMI), W/D/Sep (31.15 ± 4.13 kg/m^2 for BMI), and S/NM/U (28.45 ± 2.23 kg/m^2 for BMI).

The rural females had results as follows, M/P (163.1 ± 8.1 cm for height), W/D/Sep (160.5 ± 9.2 cm for height), and S/NM/U (162.1 ± 10.1 cm for height), M/P (52.7 ± 9.2 kg for weight), W/D/Sep (85.6 ± 10.4 kg for weight), and S/NM/U (64.7 ± 8.1 kg for weight), M/P (36.93 ± 2.28 kg/m^2 for BMI), W/D/Sep (38.19 ± 3.88 kg/m^2 for BMI), and S/NM/U (30.01 ± 4.13 kg/m^2 for BMI).

However, in the urban males' settings, M/P (176.5 ± 9.2 cm for height), W/D/Sep (175.6 ± 7.8 cm for height), and S/NM/U (175.6 ± 7.4 cm for height), M/P (84.7 ± 7.7 kg for weight), W/D/Sep (90.4 ± 8.1 kg for weight), and S/NM/U (84.9 ± 6.5 kg for weight), M/P (26.14 ± 4.10 kg/m^2 for BMI), W/D/Sep (32.63 ± 3.69 kg/m^2 for BMI), and S/NM/U (30.15 ± 4.59 kg/m^2 for BMI). The urban females showed that M/P (162.5 ± 7.9 cm for height), W/D/Sep (164.1 ± 5.6 cm for height), and S/NM/U (161.3 ± 4.8 cm for height), M/P (65.7 ± 6.9 kg for weight), W/D/Sep (86.7 ± 7.8 kg for weight), and S/NM/U (57.2 ± 6.3 kg for weight), M/P (33.63 ± 4.14 kg/m^2 for BMI), W/D/Sep (37.44 ± 3.14 kg/m^2 for BMI), and S/NM/U (36.11 ± 5.13 kg/m^2 for BMI).

Marital status and BMI results

Loss of weight was more common among patients who were single/never married/unmarried (S/NM/U) [4], which was attributed to low disposable income; while higher BMI was due to absence of comorbidities (except for chronic stress and depression). Similar trend

was seen among the urban subjects that were single/never married/unmarried (S/NM/U) 30.15 ± 4.59 kg/m^2 for males, and 36.11 ± 5.13 kg/m^2 for females. In table 2a, the result among the rural respondents showed that the married/partner (M/P) 32.44 ± 3.36 kg/m^2 for males, and 36.93 ± 2.28 kg/m^2 for females. The mean BMI of the widow/divorce/separate (W/D/Sep) in the rural and urban localities were almost in the same range of 31.15 ± 4.13 kg/m^2 for rural males, and 38.19 ± 3.88 kg/m^2 for rural females; 32.63 ± 3.69 kg/m^2 for urban males, and 37.44 ± 3.14 kg/m^2 for urban females (Table 2a and 2b). Comparing the patterns of mean distribution of the BMI in relation to the marital status between the rural respondents and the urban respondents, little difference was seen between the two groups, but a bit higher for urban (W/D/Sep) females and a bit higher for rural (M/P) females (Figure 1 and 2). Lower values were seen among the urban (M/P) males and rural (W/D/Sep) females.

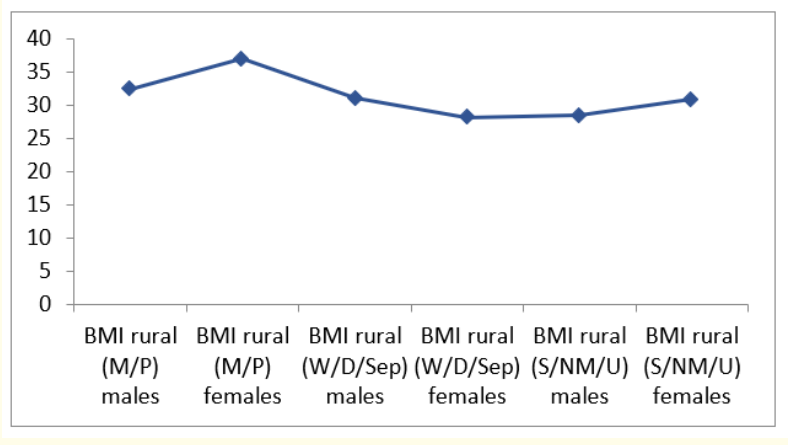

Figure 1: *The BMI (kg/m^2) distribution of the respondents in relation to marital status across gender in the rural localities.*

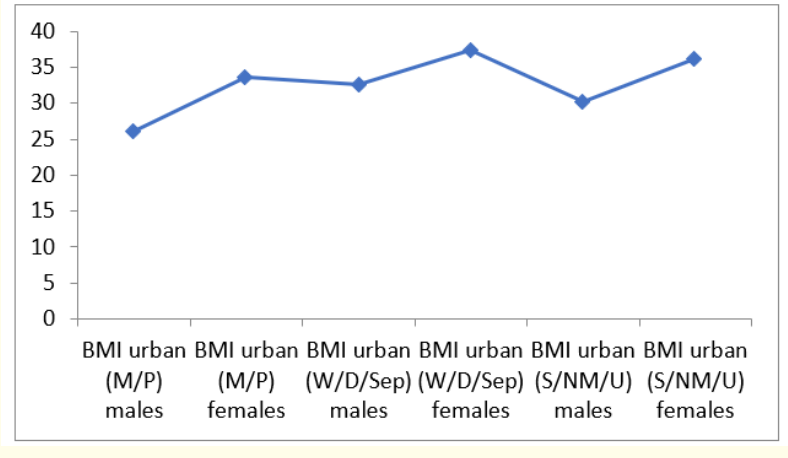

Figure 2: *The BMI (kg/m^2) distribution of the respondents in relation to marital status across gender in the urban localities.*

Sensitivity analysis

The risk factors based on the prevalence of overweight and obesity in the sampled population were analyzed and presented as percentages. The association between subject-specific risk factors and chance of being obese due to the marital status would have to be evaluated with logistic regression analysis; which was not included in this report.

Sub-population	Male: no = 60	Female: no = 60
Rural		
%overweight (25-29 kg/m^2)	50	33.3
% obesity (≥ 30 kg/m^2)	16.7	33.3
Urban		
%overweight (25-29 kg/m^2)	39.1	31.9
% obesity (≥ 30 kg/m^2)	52.6	42.3

Table 3: *Prevalence of overweight and obesity among adults (20 - 64 years).*

Table 3 showed that the overall prevalence of 52.6% of male in the urban locality were obese, while 42.3% of females in the urban locality were also obese; contrary and higher than what was observed in the rural locality with 16.7% and 33.3% for males and females respectively. Viewing these prevalence data, the influence of the socioeconomic factors on obesity will remain unclear, unless the obesity determinant i.e. BMI is regressed with all the possible socioeconomic variables. The prevalence level is already increasing globally including Nigeria, and presently at alarming rate as reported by other researchers [24,25].

Discussion and Conclusion

The prevalence of obesity remains and appears to be plateauing in many high-income countries. This is also evident in the urban locality of this study. The inter quartile range (IQR) for value without normal distribution and the association between socioeconomic-specific risk factors and obesity needs to be evaluated using linear regression analyses with the regression coefficient (B) and 95% confidence interval as measures of association. Some of the socioeconomic factors had earlier been evaluated in a linear regression model adjusted for (age, BMI, sex, income, education employment and occupation) which are known to influence overweight and obesity, but marital status was excluded [1-3].

With these exceptions, marital status had impact on BMI due to its added stress, depression and associated comorbidities. This finding also affirm it, viewing the mean BMI of the respondents that are married in the urban localities as it increased gradually among the widow/divorce/separate (W/D/Sep) respondents and moderately obese single/never married/unmarried (S/NM/U) respondents (Figure 2).

However, the psychosocial outcome which is more of physical or mental disabilities may influence their ability to follow diet and exercise recommendations [4]. The biological outcomes may be more of body size moodiness, lower health literacy and weaker social network [20]. The respondents that are married/partner (M/P) could be living a sedentary life as house spouses or shop operator; while the professionals/higher education/career spouses could be experiencing longer working hours and poor work-life balance, which may contradict each other; which could be attributed to the patterns observed in figure 1 and 2. There may be weak association between marital status and BMI and prevalence of obesity if the data were subjected to linear regression analysis.

In some previous studies, greater weight loss and lower obesity-related comorbidities has been investigated and related to other factors such as mobility established insulin resistance, and medication [5,7,9,18,21]. Although, respondents within with any of the marital status group higher income will have better access to high energy dense food, known as “Junk food” or “Western diets”; which are the major contributors to weight gain and resulting obesity epidemic and its associated complications.

This study got its strength from the quality of data and the nature of the epidemic it is addressing. The present study is limited to marital status as a socioeconomic factor, and excluded behavioural factors (eating habits, sleep apnoea, diabetes, dyslipidemia, dyspepsia/GERD, resting time, level of depression, hypertension, level of stress, cardiovascular comorbidity), known to influence weight gain and obesity. The socioeconomically challenged respondents have weaker social network and exhibit lower health literacy [26], which contributed to the occurrence and prevalence of most of the non-communicable diseases that are associated with obesity epidemic among the respondents [27]. Also, inherited eating habits and differences in food culture could be of importance when looking into the differences that would be observed among the marital status groups. Conclusively, the interactions between obesity and marital status are complex thus requiring further research to implore information about their associations.

Acknowledgments

This article has not been presented at any conference, but it's an extract from the original research conducted for Master degree. The author has the sole responsibility for the opinions expressed which were based on the results of research thesis from Federal University of Agriculture, Abeokuta, Nigeria. They are not attributed to the sponsors or the editors of this publication. I acknowledged the contributions of the supervisors, reviewers and all other researchers and colleagues towards the success of this article. The authors appreciate statistical support and expertise from the Statistical Consulting Group. We also thank the anonymous reviewers for feedback to improve the manuscript.

Author Contributions

Conceived and designed the experiments. Performed the experiments. Analyzed the data. Wrote the first draft. Contributed to the final paper. All authors approved the final version.

Funding Support

The author received no specific funding for this project but acknowledges previous salary support from the Academics works.

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