

## A Survey of Weight Perception and Social Desirability of Obesity Among Adults in Kano Metropolis, Northern Nigeria

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### ABSTRACT

**BACKGROUND:** Obesity and its complications are emergent health challenges in developing countries including Nigeria. We determined the concordance of perceived with measured weight and assessed the social desirability of obesity among adults in Kano metropolis in northern Nigeria.

**METHODS:** A cross sectional descriptive study was conducted among 400 adults using structured interview questionnaires.

**RESULTS:** Among 386 respondents, 58 (84.1%) of underweight adults, 106 (46.2%) of healthy weight adults, 46 (66.7%) of overweight adults and 16 (84.2%) of obese adults incorrectly perceived their weight category. Sixty (15.5%) participants considered obesity as socially desirable and a sign of good living and affluence. Older respondents ( $\geq 40$  years) ( $P=0.0001$ ), Igbo or Yoruba ethnicity ( $P=0.0035$ ) and non-formal or primary education ( $P<0.0001$ ) were significantly associated with positive view of obesity. However, only ethnicity; Yoruba-Adjusted Odds Ratio (aOR) =1.60, 95% Confidence Interval (95% CI) (1.20-2.86),  $P=0.018$ , Igbo (aOR=3.22, 95% CI (1.64-6.3),  $P=0.005$  and educational status; non-formal (aOR=4.61, 95% CI (1.62-16.9),  $P=0.01$ ; primary (aOR=4.95, 95% CI(1.4-17.8),  $P=0.015$  remained significant predictors after adjusting for confounding.

**CONCLUSION:** The discordance between perceived and measured weight is worrisome but the low social desirability of obesity should be encouraged. Weight control using periodic weight measurements, nutritional education and physical exercise are paramount.

**KEY WORDS:** Weight, perception, obesity, social desire, Nigeria

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### INTRODUCTION

Obesity and its complications are viewed as one of the major global health challenges of the 21<sup>st</sup> century.<sup>1</sup> It is stigmatized in the modern western world, though it has been perceived as a symbol of wealth and fertility at other times in history and still is in many parts of Africa.<sup>2,3</sup> Globally, more than 300 million people are overweight and an estimated 2.5 million deaths are attributable to obesity and overweight.<sup>4,5</sup>

The World Health Organization (WHO) and the International Obesity Task Force classify obesity based on Body Mass Index (BMI) as follows; underweight (BMI < 18.5), healthy weight (18.5 = BMI < 25), overweight (25 = BMI < 30), and obese (BMI = 30).<sup>1</sup> In the developed world, obesity is a subject of increased public discourse, but this is not the case in most poor and middle income countries like Nigeria that are overwhelmed by under nutrition and the continuing challenges posed by infectious diseases.<sup>6</sup>

More than 20% of adults in the United Kingdom and more than 30% of their counterparts in the United States of America are obese with a slight preponderance of women.<sup>7,8</sup> Similarly, it has been observed to be commoner among people with lower income. In South Africa, obesity levels equal the USA figures with one in three men and more than one in two adult women being overweight or obese.<sup>9</sup> In Morocco, 40% of the population is overweight, while in Kenya, it is 12%.<sup>9</sup> In Nigeria, between 6% and 8% of the people are obese.<sup>9</sup> Obesity results from a chronic energy imbalance such that the rate of energy intake exceeds the rate of expenditure. Evidence seems to suggest that high-fat food intake has increased and that at the same time, energy expenditure has declined due to increasingly sedentary lifestyles.<sup>10</sup>

Elevated television viewing has also been identified as an important promoting factor for obesity.<sup>11,12</sup> Obesity is partially determined by genetic factors.<sup>13</sup> It involves the interaction of multiple genes with lifestyle factors such as diet and physical activity.<sup>13</sup> It has been found that 80% of the offspring of two obese parents were obese, in contrast to less than 10% of the offspring of parents with normal weight.<sup>13</sup> The rising trend in obesity could be due to increased caloric intake in form of high fat, energy dense animal based diets without commensurate increase in physical activity.<sup>14,15</sup> Furthermore, urbanization, automation and motorized transportation have all contributed to higher obesity rates by conserving energy. The health effects of obesity include but are not limited to cardiovascular diseases, diabetes mellitus, obstructive sleep apnoea and osteoarthritis. On average, obesity reduces life expectancy by 6-7 years.<sup>16</sup>

Many sub-Saharan African cultures do not consider obesity as a problem. Instead, obesity and fatness are widely viewed as positive and a sign of good living and index of affluence. This cultural attitude takes a special

toll on women. Women in some African cultures perceive being overweight or obese as a sign of beauty. Among certain tribes in Nigeria, women are traditionally fattened before marriage to make them more attractive to suitors.<sup>17</sup>

Similarly, the mismatch between self perceived and measured weight has been documented for decades; women typically view themselves as heavier than they really are, whereas men often underestimate their weight.<sup>18</sup> Little research has been conducted in the culturally distinct northern region of Nigeria regarding the concordance between perceived and actual weight.<sup>19</sup> Similarly, the aesthetic desirability of obesity has not been explored. This study was therefore conducted in Kano, the commercial nerve centre of northern Nigeria in order to compare perceived weight with measured weight of adults and to assess the social desirability or otherwise of obesity. It also identified the factors associated with these perceptions. The findings could inform policy makers, program managers, health workers and the general public of the need to develop strategies that would prevent unhealthy lifestyles and reduce the burden of non-communicable diseases.

#### **Participants and methods Setting/Study population**

The study was conducted in Kano metropolis. It is the administrative capital of Kano state and the commercial nerve centre of northern Nigeria. It shares borders with Jigawa state to the North East, Bauchi State to the South East, Kaduna state to the South and Katsina state to the North West. Kano State is located in north western Nigeria and is one of the oldest, largest and perhaps one of the most traditional states. Commerce and agricultural production have been the backbone of the Kano economy. Islam is the dominant religion, though there are significant groups of Christians. Urban drift from rural areas within Kano, other states in Nigeria and West Africa, has provided a steady stream of migrants adding to Kano's growing population. Kano is therefore a cosmopolitan melting pot of people. The city is characterized by overcrowding, poor sanitation, pollution from cars, motorcycles and ailing industries. There were over 9 million people in Kano state during the 2006 National census.<sup>20</sup> The study was carried out on adult males and females (18 years and older) resident in Tarauni Local Government Area (LGA) randomly selected from the eight metropolitan LGAs. Included in the study were men and women who were resident in Tarauni LGA for at least one year prior to the conduct of the study and those who agreed to participate by providing informed consent. Excluded from the study were visitors and those who declined consent.

#### **Design and sampling**

The survey was descriptive and cross-sectional in design. A minimum sample size of 384 was obtained

using the Fisher's formula, assuming weight is misperceived by half of the people and a desired precision of five percent.<sup>21</sup> The calculated minimum sample size was increased to 400 to account for anticipated subject non-response. A multistage sampling technique was used for the selection of respondents. In the first stage, one local government area was selected using simple random sampling from the eight local government areas in Kano metropolis. In the second stage, five wards were selected from the existing 10 in the selected local government area using the same method. One settlement was selected from each ward and this was followed by a proportionate selection of 103, 88, 72, 90 and 47 eligible respondents from each of the five settlements based on the populations of the settlements. Finally, the systematic sampling technique was used to select respondents in each sampled settlement. In each sampled settlement, mapping and house numbering was done. To identify the first house to be studied, a random number table was used to select a number between one and the sampling interval for each settlement. The sampling interval was obtained from the total number of houses and the sample size. For the five selected settlements, the number of houses was 2,368, 1,231, 1,167, 2,157 and 1,156. With the respective sample sizes, these gave corresponding sampling intervals of 23, 14, 16, 24, and 25. Subsequent houses were identified by adding the respective calculated sampling interval for each settlement. In each sampled house, one household was selected using a onetime ballot. All eligible adults in the selected household were approached to participate in the survey.

#### **Instrument description/Data collection**

Informed consent was obtained from prospective respondents prior to commencement of the interviews. The content of the consent form was translated into local language (Hausa). Non-Hausa respondents spoke Hausa language or were interviewed in English language. Literate respondents indicated acceptance by signing the consent form, while non-literate participants used a thumbprint. Approval for the study was obtained from the institutional review board at Aminu Kano Teaching Hospital, Nigeria. Permissions were also obtained from the Chairman of Tarauni LGA, district head of Tarauni and the ward heads.

A pre-tested structured interviewer-administered questionnaire containing both open and closed-ended questions was used. The questionnaire was adapted from the survey tools used in a previous study.<sup>21</sup>

It was divided into four parts; the first section inquired about personal data including age, occupation, ethnicity, religion and educational level. The second part elicited information about respondent's perceived weight and social desirability of obesity. Adults were defined as those that were age 18 years or over at the time of the

survey. Weight perception was defined as the perception of one's body weight.<sup>22</sup>

Weight perception was assessed by the question, "How do you think of yourself in terms of weight?" Response choices included "too thin (underweight)", "about the right weight (normal)", "moderately fat (overweight)", or "excessively fat (obese)". Social desirability was assessed using a set of questions namely; "How do you feel about 'excessively fat' people?" Other questions include "do you wish to be fatter than you are", "would you be bordered if you were fatter than you are?" Furthermore, they were asked "do you intent to marry a fat woman or man"? Those that answered in the affirmative were considered to be desirous of obesity. A follow up question inquired about reasons for holding such views.

The questionnaire was professionally translated from English Language into the local language, Hausa. The accuracy of the translation was checked by back-translation by a different professional translator. The main purpose of this exercise was to identify differences in translations that could alter the meaning of questions and to establish cognitive understanding of the items in the questionnaire. Adjustments were made where needed. Once the translation had been finalized, the questions were again discussed during interviewer-training sessions on the basis of a question-by-question description of the questionnaire. The questionnaire was re-validated through a pre-test among adults in a different LGA (Kura) to assess comprehension and understanding. Respondents' weight and height were also measured to compare perception with reality. The height of the participants was measured using an anthropometric rule to the nearest 0.1 cm. The subject was asked to stand erect without shoes and to look straight ahead. The measuring rule was placed behind the subject in the centre of the heels perpendicular to the ground. The investigator stood on the left side and firmly applied the flat head piece. The weight was measured using a portable Seca® weighting scale.<sup>22</sup> After checking the zero reading, the participant was asked to stand on the platform without shoes. They were asked to stand without leaning against or holding anything.<sup>23</sup>

BMI was calculated as weight (in kilograms) divided by height (in meters) squared. The questionnaires were administered by five trained research assistants under the supervision of the researchers.

**DATA ANALYSIS** Data was analyzed using SPSS version 16.<sup>24</sup> Quantitative variables were summarized using appropriate mean and standard deviation. Categorical variables were presented as frequencies and percentages. Bivariate analysis involved the use of the Chi-square test for assessing the significance of associations between categorical variables. Crude odds ratios (OR) were obtained using Stat calc. Multivariate

logistic regression was used to compute adjusted ORs and to identify independent predictors of social desirability of obesity. Adjustments were made for the confounding effects of age, sex, ethnicity and education. The level of significance was set at  $P < 0.05$ .

## RESULTS

### Socio-demographic Characteristics

Three hundred and eighty six respondents agreed to participate out of the 400 approached—a response rate of 96.5%. There were 214 (55.4%) males and 172 (44.6%) females giving a sex ratio of 1.2:1. Their ages ranged from 20 to 61 years. Majority (69.2%) of the respondents were in the fourth decade of life. The mean age ( $\pm$  SD) for the respondents was  $32.4 \pm 6.4$  years;  $37.0 \pm 1.3$  years for males and  $24.5 \pm 1.8$  years for females. The Hausa-Fulani ethnic group constituted 58.6% of respondents, and the rest were Yoruba (26.2%), Igbo (6.2%) and other Nigerian tribes (9.1%). Twenty two (5.7%) respondents had primary education, 36.0% had secondary education, and 54.2% had tertiary (post-secondary school) education. Sixteen (4.1%) respondents had no formal education. Muslims constituted 78.5% of the respondents and the remaining 21.5% were Christians. More than two-thirds (67.6%) of respondents were single, 27.2% were married, 3.9% were divorced and the remaining 1.3% were widowed. Thirty per cent of the respondents were engaged in commercial activities of trading and business, 18.6% were civil servants, 13.0% were teachers while 13.6% were engaged in farming and 25.0% were fulltime housewives.

The height of respondents ranged from 1.43 meters to 1.80 meters with a mean $\pm$ standard deviation (SD) of  $1.59 \pm 0.12$  meters. The mean $\pm$ SD was  $1.62 \pm 0.09$  meters for males and  $1.56 \pm 0.12$  meters for female respondents. Similarly, the weight of respondents ranged from 40.0 kilograms to 82.0 kilograms with mean $\pm$ SD of  $61.7 \pm 8.9$  kilograms. By sex, the mean weight was  $64.3 \pm 8.2$  kilograms for males and  $58.4 \pm 8.8$  kilograms for females as shown in Table I.

**Table I: Mean weight, height, and BMI based on measured data**

	Male	Female	Variables
Weight (Kg)	64.3 $\pm$ 8.2	58.4 $\pm$ 8.8	61.7 $\pm$ 8.9
Height (m)	1.62 $\pm$ 0.09	1.56 $\pm$ 0.12	1.59 $\pm$ 0.12
BMI (kg/m <sup>2</sup> )	24.6 $\pm$ 3.2	24.2 $\pm$ 3.78	24.4 $\pm$ 3.46

### Perception of body weight

Two hundred and twenty nine (59.3%) of the respondents said they were of (normal weight), 69 (17.9%) considered themselves as too thin (underweight), 69 (17.9%) said they were moderately fat (overweight) while 19 (4.9%) said they were excessively fat (obese). However, based on calculated BMI after height and weight measurements, only 136 (35.2%) of the respondents had a correct perception of their weight categories as shown in Table II.

**Table II: Accuracy of weight perception by socio demographic characteristics**

Characteristics	No.(%)		Total	$\chi^2$	p value
	Correct perception	Wrong perception			
<b>All respondents</b>	136(35.2)	250(64.8)	386(100)		
Male	81(37.9)	133(62.2)	214(100)		
Female	55(31.9)	117(68.0)	172(100)	1.44	0.23
<b>Age group</b>					
20-29	18(40.9)	26(59.1)	44(100)		
30-39	86(32.2)	181(67.8)	267(100)		
40-49	23(46.9)	26(53.1)	49(100)		
=50	9(34.6)	17(65.4)	26(100)	4.6	0.20
<b>Education</b>					
Non-formal	4(25.0)	12(75.0)	16(100)		
Primary	9(40.9)	13(59.1)	22(100)		
Secondary	51(36.7)	88(63.3)	139(100)		
Post Secondary	72(34.5)	137(65.6)	209(100)	1.23	0.75
<b>Ethnic group</b>					
Hausa	42(27.6)	110(72.4)	152(100)		
Fulani	27(36.5)	47(63.5)	74(100)		
Yoruba	43(42.6)	58(57.4)	101(100)		
Igbo	6(25.0)	18(75.0)	24(100)		
Others	18(51.4)	17(48.6)	35(100)	11.4	0.022*

\*Statistically significant at  $P < 0.05$

Specifically, among 386 respondents, 58 (84.1%) of underweight adults, 106 (46.2%) of normal weight adults, 46 (66.7%) of overweight adults and 16 (84.2%) of obese adults incorrectly perceived their weight category. A significantly higher proportion of non-Hausa Fulani respondents correctly perceived their weight compared to their Hausa/Fulani counterparts ( $P=0.022$ ). Age, sex and educational level did not significantly affect perception of body weight.

**Table III: Classification based on weight and height measurements**

Characteristics	No.(%)				Total	$\chi^2$	P-value
	Underweight BMI (<18.5)	Normal weight (18.5-24.9)	Overweight (25.0-29.9)	Obese =30.0			
<b>All respondents</b>	18(4.7)	212(54.9)	129(33.4)	27(7.0)	386(100.0)		
Male	8(3.7)	113(52.8)	82(38.3)	11(5.1)	214(100.0)		
Female	10(5.8)	99(57.6)	47(27.3)	16(9.3)	172(100.0)	7.1	0.07
<b>Age group</b>							
20-29	2(4.6)	29(65.9)	10(22.7)	3(6.8)	44(100.0)		
30-39	16(6.0)	154(57.7)	84(31.5)	13(4.9)	267(100.0)		
40-49	-	22(44.9)	22(44.9)	5(10.2)	49(100.0)		
=50	-	7(26.9)	13(50.0)	6(23.1)	26(100.0)	14.9	0.02*
<b>Education</b>							
Non-formal	-	9(56.3)	6(37.5)	1(6.3)	16(100.0)		
Primary	-	9(40.9)	10(45.5)	3(13.6)	22(100.0)		
Secondary	7(5.0)	78(56.1)	47(33.8)	7(5.0)	139(100.0)		
Tertiary	11(5.3)	116(55.5)	66(31.6)	16(7.7)	209(100.0)	3.2	0.79
<b>Ethnic group</b>							
Hausa/Fulani	15(6.6)	132(58.4)	65(28.8)	14(6.2)	226(100.0)		
Yoruba	2(1.9)	48(47.5)	44(43.6)	7(6.9)	101(100.0)		
Igbo	-	12(50.0)	7(29.2)	5(20.8)	24(100.0)		
Others	1(2.9)	20(57.1)	13(37.1)	1(2.9)	35(100.0)	10.2	0.12

\*Statistically significant at  $P < 0.05$

Table III shows that 18 (4.7%) of the participants were underweight, 212 (54.9%) were of normal weight, a third 129 (33.4%) were overweight and 27(7.0%) [95% Confidence Interval (CI)=4.7% to 10.0%] were obese. The prevalence of obesity was 5.1% among males and 9.3% among females. The concordance between perceived weight and measurements is shown in Table IV.

**Table IV: Concordance between perceived weight and actual measurements**

Perceived Weight	Measured BMI No.(%)				Total
	Underweight BMI (<18.5)	Healthy weight (18.5 = BMI < 25)	Overweight (25 = BMI < 30)	Obese BMI=30.0	
Underweight	11(15.9)	42(60.9)	13(18.8)	3(4.4)	69(17.9)
Normal weight	6(2.6)	123(53.7)	86(37.6)	14(6.1)	229(59.3)
Overweight	1(1.5)	38(55.1)	23(33.3)	7(10.1)	69(17.9)
Obese	-	9(47.4)	7(36.8)	3(15.8)	19(4.9)
<b>Total</b>	<b>18(4.7)</b>	<b>212(54.9)</b>	<b>129(33.4)</b>	<b>27(7.0)</b>	<b>386(100.0)</b>

Specifically, of the 27 obese respondents, more than half 14 (51.9%) misclassified themselves as having healthy body weight, 7 (25.9%) said they were overweight while only 3 (11.1%) correctly classified themselves as obese. Similarly, 86 of the 129 (66.7%) overweight individuals considered themselves as having healthy weight, while only 23 (17.8%) correctly classified themselves. One hundred and twenty three of the 212 (58.0%) respondents with healthy weight correctly assessed their weight, while 42 (19.8%) and 38 (17.9%) misclassified themselves as underweight and overweight respectively. Finally, 11 (61.1%) of underweight respondents correctly perceived their weight while a third considered themselves as having healthy weight.

### Social Desirability of Obesity

Table V shows that only 60 (15.5%) of the respondents considered obesity as socially desirable and they saw it as a sign of good living, affluence and peace of mind. They also said it enhances charisma and denotes power. In contrast, (84.5%) of the respondents did not wish to be fat and more than a third said they would be bordered if they were fatter than they were. Furthermore, (60.4%) of the respondents did not intend to marry fat women or men. They said that it is no longer desirable and is associated with significant health risks. Specifically, a significantly higher proportion of older respondents considered obesity in the positive light compared to their younger counterparts ( $P=0.0001$ ). Similarly, a significantly higher proportion of non-Hausa/Fulani respondents viewed obesity as desirable compared to

other Nigerian tribes ( $P=0.0035$ ). Furthermore, a higher proportion of respondents who had non-formal or primary education perceived obesity as a good thing compared to those with secondary or tertiary education ( $P<0.0001$ ). However, only ethnicity; Yoruba-Adjusted Odds Ratio (aOR=1.60, (1.20-2.86),  $P=0.018$ , Igbo (aOR=3.22(1.64-6.3),  $P=0.005$  and educational status; non-formal (aOR=4.61, 95%CI, 1.62-16.9),  $P=0.01$ ; primary (aOR=4.95(1.4-17.8),  $P=0.015$  remained significant predictors of social desirability of obesity after adjusting for confounding as shown in Table VI.

**Table V: Social desirability of obesity by socio-demographic characteristics**

Characteristics	No.(%)			$\chi^2$	P-value
	Desirable	Not desirable	Total		
<b>All respondents</b>	60(15.5)	326(84.5)	386(100.0)		
<b>Gender</b>					
Male	35(16.4)	179(83.6)	214(100.0)	0.24	0.62
Female	25(14.5)	147(85.5)	172(100.0)		
<b>Age group</b>					
20-29	6(13.6)	38(86.4)	44(100.0)		
30-39	32(12.0)	235(88.0)	267(100.0)		
40-49	10(20.4)	39(79.6)	49(100.0)		
<b>Ethnicity</b>					
Hausa/Fulani	25(11.1)	201(88.9)	226(100.0)	13.6	0.0035
Yoruba	19(18.8)	82(81.2)	101(100.0)		
Igbo	9(37.5)	15(62.5)	24(100.0)		
Others	7(20.0)	28(80.0)	35(100.0)		
<b>Education</b>					
No formal	7(44.0)	9(56.0)	16(100.0)	25.8	<0.0001
Primary	10(45.5)	12(54.6)	22(100.0)		
Secondary	23(16.6)	116(83.5)	139(100.0)		
Tertiary	20(9.6)	189(90.4)	209(100.0)		

## DISCUSSION

The misperception of body weight by majority (64.8%) of our respondents is worse than the figures from Lagos (46%) in the south west and Nsukka (32.3% and 47.5% among students and staff in Nsukka) in south east Nigeria.<sup>26,27</sup> Our finding was also higher than the findings among adults in the US where 27.5% of women and 29.8% of men misclassified their own weight status compared to 68% and 62.2% among our respondents respectively.<sup>28</sup> Also, in Hong Kong, poor and fair agreement between actual body mass index and perceived weight in females and males respectively.<sup>29</sup> The direction of bias in perception of body weight where underweight individuals tend to overstate their weight while overweight or obese respondents considered themselves of normal weight is consistent with observations in a US study where more than 20% of healthy weight adults considered themselves overweight and close to 40% of overweight adults and ~8% of obese adults considered themselves to be “about the right

**Table VI: Multivariate logistic regression analysis showing predictors of social Desirability of obesity**

Predictor	Crude OR	Adjusted OR(95%CI)	P value
<b>Sex</b>			
Male*	1.0		
Female	1.15	1.11(0.60-2.04)	0.74
<b>Ethnicity</b>			
Hausa/Fulan*	1.0		
Yoruba	1.86	1.60(1.20-2.86)	0.018
Igbo	4.82	3.22(1.64-6.3)	0.005
Others	2.01	1.55(0.91-2.58)	0.27
<b>Age</b>			
20-29*	1.0		
30-39	0.86	0.94(0.35-2.54)	0.91
40-49	1.62	0.90(0.27-2.93)	0.86
50-59	1.43	0.32(0.9-1.16)	0.08
<b>Education</b>			
Non-Formal	7.35	4.61(1.62-16.9)	0.010
Primary	7.88	4.95(1.4-17.8)	0.015
Secondary	1.87	1.39(0.32-6.14)	0.66
Tertiary*	1.0		

### \*Referent category

Multivariate logistic regression model for social desirability of obesity adjusting for age, sex, ethnicity and education en bloc

weight.”<sup>30</sup> A systematic review to determine empirical evidence of agreement between objective (measured) and subjective (reported) measures of height, weight and body mass index (BMI) also showed trends of under-reporting for weight and BMI and over-reporting for height.<sup>31</sup> Furthermore, another study in the US found that self-reported BMI values tend to overestimate measured BMI values at the low end of the BMI scale ( $< 22$ ) and underestimate BMI values at the high end, particularly at values  $> 28$ . The discrepancies also varied systematically with age (younger and older respondents underestimate their BMI more than respondents aged 42-55), gender and the ethnic/racial background of the respondents.<sup>32</sup>

The underestimation of weight among obese respondents and overestimation among underweight respondents could be due to social desirability bias, where people tend to perceive their weight in the range seen as optimum by society. Also, variations in the level of societal awareness of the problems associated with obesity in developed and developing countries may account for some of the differences.

This has implications for health education since behavior change is largely motivated by perceived risk.<sup>33</sup> The public's failure to accurately assess their weight status in accordance with clinically accepted categories has important implications for public health programs targeting overweight and obese people. As seen in this study, if a considerable proportion of overweight and

obese people misclassify themselves as having normal weight, they are unlikely to take action to address the weight problem. Therefore, healthcare professionals have an important role in encouraging such actions and providing correct messages regarding the steps to take in controlling weight in overweight individuals. This they can do through encouraging periodic weight and height measurements and encouraging physical exercise among their catchment populations. Simple weighting scales and simple height markings in bathrooms could encourage weight monitoring and detection of weight gains or loss. The incorporation of BMI calculators in common electronic devices such as mobile phones could encourage the periodic checking of weight status. Children are also likely to continue with this practice into adolescence and adulthood if they get use to it from home. Growth monitoring in child welfare clinics and anthropometric measurements in schools provide opportunities to imbibe this practice.

In addition, reinforcing health education and sports in elementary and secondary schools will help address these issues early. Even well educated respondents in the present study misclassified themselves showing the degree of complacency towards periodic weight and height measurements. Routine health check is still in its infancy in most developing countries where health care professionals are overwhelmed with emergencies and long queues of patients in need of consultation for acute and chronic ailments.

Cultural differences in perception was also clear in this study, the Hausa and Fulani who are less heavily built compared to the other major Nigerian tribes perceived obesity negatively while the other non-Hausa/Fulani cultures encourage obesity as exemplified by the Calabar fattening houses for brides.<sup>27</sup> It was also reported<sup>34</sup> that some traditional cultures in developing countries tend to view plumpness among ladies as an ideal condition for feminine beauty. Such harmful cultural practices should be discouraged in the long term and replaced with practices that positively influence health. In the US it was found that blacks and Mexican Americans-both men and women-had much lower odds of placing themselves in a higher weight-perception category when compared to whites. Therefore, race/ethnicity undoubtedly functions as a proxy for socio-cultural factors wherein some groups are more accepting of larger body sizes. It has been suggested that among some groups, higher weights may be culturally valued as a positive sign of health, or that overeating is less disparaged in communities where there has been a history of scarcity.<sup>35</sup> Or, these findings may reflect the fact that people evaluate their weight status, for the most part, with reference to the weight distribution of their peer groups.<sup>36</sup>

A cross-cultural critical review of the relationship

between social and biological perceptions of obesity showed that obesity is usually desirable in subsistence societies. This desirability is elaborated in fattening rituals as indicated earlier. This desirability of obesity is reversed in the course of modernization, when large body size becomes available to all and the health effect of obesity becomes apparent. The latter is seen in industrialized countries where thinness becomes the cultural obsession, especially among women.<sup>37</sup>

Recently, a study examined racial and ethnic differences in the relationship between weight perception and weight management behaviors among overweight and obese adults.<sup>38</sup>

They found that correct perception of body weight was positively associated with weight management behavior across all ethnic and racial groups in the US.

The negative attitude of most of our respondents towards obesity indicates a changing attitude towards the desire to be fat, in contrast to the results of previous studies in developing countries that showed a higher social desirability of obesity because of its role as a status symbol.<sup>2,27</sup>

In such societies the body is considered both as a symbol and a physical entity. Local tenets of social and cultural order incorporate aspects of body image. A large size is not only acceptable but fattening processes are socially supported. Large body sizes are considered prestigious not only for the individual, but the family and the cultural group to which they belong.<sup>37</sup> Furthermore, the non-preference for fat spouses concur with the findings of other workers.<sup>38,39</sup>

Multiple theories exist which attempt to identify determinants of change. One such theory, the theory of planned behavior, states that a central determinant of behavior is the individual's intention to perform the behavior in question.<sup>41</sup>

This model has been specifically validated in promoting physical activity<sup>40</sup> and links both intention and action to weight loss.<sup>41</sup>

Therefore, information regarding the current intention and recent actions of individuals would help physicians to formulate effective advice. There is evidence that interventions which focus on diet or physical activity have a modest but desired effect on obesity prevention.<sup>42</sup>

The scientific evidence that links behavior change regarding weight to obesity prevention is still accumulating.<sup>43</sup> For instance, there are some safe and reasonably well supported strategies that are applicable to adults and children alike in the short and long-term.

These include active living, reduced television time, and reduction in consumption of junk food, chocolates and beverages with high sugar content.

There are a number of issues to be considered when interpreting the findings of this study. First, adults were sampled in one metropolitan local government area of Kano state. Extrapolation of such results to the whole of the state or northern Nigeria should be done with caution given the heterogeneous nature of these diverse populations. In particular there are bound to be rural-urban variations in perceptions and social desirability of obesity. Secondly, respondents could give only socially acceptable responses when asked on personal issues. We minimized the effect of this by using both male and female interviewers. As strength however, we compared self-perceived weight with weight and height measurements. Finally, a mixed methods study triangulating the quantitative survey with focus group discussion could have provided more insight into weight perception and social desirability of obesity. Future studies should consider this recommendation.

In conclusion, our study showed inaccurate perception of body weight, low prevalence of obesity and its low social desirability. This underscores the importance of health promotion strategies that can improve the perception of weight especially among the overweight and obese people. This would enhance the capacity of overweight people to seek help and support. An early introduction of dietary advice, exercise and reduced sedentary life could reduce the burden of obesity on the individual and accelerate the momentum of change towards a healthier society. One of the implications of these results is the need for early identification, assessment and management of adults who exceed a healthy weight for height, gender and age, which would enable us to start prevention and management of overweight and obesity earlier, thus decreasing the potential for associated medical and psychosocial consequences. Addressing issues of misperception of weight at the population level is complicated. A single method may not succeed and perceptions take time to change. Most importantly is the need for public health education on healthy living and periodic weight check. There is a need to sensitize the populace to the importance of good nutrition, lifestyle modification and active living through the use of media messages and the provision of enabling environment at home and in the workplace. It is especially important that we inculcate these values early during the formative years and in schools and colleges through sports and recreational activities.

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