PREVALENCE OF OVERWEIGHT AND OBESITY AND PERCEPTION OF HEALTHY AND DESIRABLE BODY SIZE IN URBAN, GHANAIAN WOMEN

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SUMMARY

Objective: To determine if the perceived ideal body size of urban women in Accra, Ghana influences current body size.

Methods: The sample (n=2,814) consisted of Ghanaian women aged 18 years and older, living in the Accra Metropolitan Area. Data were collected between October 2008 and June 2009 in the Women's Health Study of Accra, Wave II household survey. Height (m), weight (kg), waist (cm) and hip (cm) measurements were used to calculate body mass index (BMI, measured in kg/m^2), waist circumference, and waist-to-hip ratio. In addition to reported socio-demographic characteristics, medical history, and exercise and diet history, the standardized Stunkard Figure Rating Scale (FRS) was used to identify silhouettes of varying body sizes that most closely resemble a woman's current body image (CBI), the body image she sees as the ideal for Ghanaian women (IBI), and the body image she sees as healthiest (HBI). The validity of using the standardized Stunkard FRS to assess body image in a population of Ghanaian women was assessed using Receiver Operating Curve (ROC) analysis. Household wealth, a proxy for income, was assessed using an index derived by principal components analysis from a selection of 20 variables measuring quality of the dwelling (e.g water source, sewage arrangements, type of housing, roof etc.) and possession of household durable goods (e.g. television, radio, iron, refrigerator and car).[1] Logistic and linear regression was used to test the association between various socio-demographic characteristics, BMI and body image satisfaction.

Results: Using the WHO criteria for BMI, 3.6% (95) of women were underweight, 31.5% (828) normal weight, 27.8% (730) overweight and 37.1% (973) obese. In total, 64.9% of women sampled were either overweight or obese. A WC of greater than 88 cm revealed 78.7% (2,113) obesity. A WHR cut-off for obesity of 0.8 revealed 78.9% (2,119) obesity. ROC analysis confirmed the validity of using the standardized Stunkard FRS to assess body image in a population of Ghanaian women. Age, relative wealth, being married, having grown up in an urban environment and having parity ≥2 are associated with higher risk of overweight or obesity. Education level is not associated with overweight status. Overall, 72.2% (1,936) of women were dissatisfied with their current body size and 41.8% of women preferred a smaller figure. Overweight and obese women were significantly more likely than normal weight women to desire weight loss (OR: 10.12, CI: 8.04 – 12.72).

Conclusion: Ideal body image in urban, Ghanaian women should not be viewed as an inhibitor to healthy weight maintenance. Interventions should be designed to help women achieve their ideal and healthy weights.

Keywords: Obesity, body mass index (BMI), anthropometric measures, body images, Ghana.

INTRODUCTION

The prevalence of obesity in West Africa rapidly increased during the last two decades of the 20th century and continues to increase in the 21st century. A recent review of obesity prevalence in West Africa indicates that between 2000 and 2004, 10% of West African adults were obese.[2] In this time period, according to the same study, half of the urban population in general and 60% of urban, West African women were either overweight or obese. As in earlier reviews of socio-economic status and obesity in developing countries,[3] this review also found a direct relationship between obesity prevalence and increased socio-economic status. In Ghana, the DHS surveys indicate that the percentage of women aged 15-49 overweight or obese grew from 25% to 30% between 2003 and 2008 with the highest values among urban women.[4] Wave 1 of the Women's Health Study of Accra (WHSA-1) found 62.2% of 1,237 non-pregnant women living in Accra were overweight or obese; the same study found no relationship between obesity prevalence and socio-economic status.[5]

Though the public health and medical consequences of the rise in obesity in West Africa are evident, the reasons for the rapid increase in body size and body mass remain speculative.

Overweight and obesity are well understood to be the result of an energy imbalance – consuming more calories than are equivalently expended in physical activity. Two popularly cited theories for the West African change in energy balance include increases in urbanization and westernization. In theory, urbanization and westernization lead to decreased physical activity and increased food supply, including access to high caloric fast foods and sugar sweetened beverages.[5] Such environmental changes, however, do not completely explain why women, in particular women of high socio-economic status, are disproportionally affected by the obesity epidemic in West Africa.

West African social desirability for overweight women is frequently cited as cause for the continued direct relationship between obesity and socio-economic status in the region.[6-11] Indeed, it is well documented that some ethnic groups in Africa historically preferred overweight women and embraced cultural practices that encouraged female obesity (as in the pre-marital "fattening rooms" of Nigeria).[12] This argument suggests that the recent increase in overweight and obesity in West Africa may not be a consequence of changes in the environment but rather is the result of society-wide intentional weight gain enabled by the increased availability of food concurrent with decreased need for physical exertion.

Because behavioural interventions are only successful if individuals agree to participate in the intervention, understanding this preference for body size is crucial to understanding the approach of future overweight and obesity interventions.

Although understanding preference for body image is critical to crafting public health obesity interventions, studies examining the relationship between socially desirable body size and overweight/obesity are rare. In reviewing the literature restricted to West Africa, ten articles address the relationship between body image and obesity.

In the largest study considered here, Duda *et al* used culturally specific silhouettes and surveyed urban Ghanaian women on whether improved health outcomes would incentivize women to change their current body image.[13] Of the 305 participants, 86% of 214 overweight or obese women stated they would be willing to decrease their body weight if it meant leading a healthier life. Women over the age of 50, however, were significantly less willing to decrease their body weight.

These small sample size studies on urban, West African women suggest a general dissatisfaction with body image irrespective of body weight. These studies offer some evidence that women in general preferred a normal weight figure, even though some obese women wanted to gain weight in order to achieve their ideal image. Additionally, some evidence from these studies suggests that age may be an important determinant of both a woman's weight preference and her willingness to lose weight, older women being less willing to lose weight for health. At least one study suggests that the majority of women would be willing to lose weight if requested by her husband or to improve her health.[13]

Taking this history into account, in this study we examined a large sample of urban, Ghanaian women (n=2,814) to determine if indeed an urban, West African woman's ideal body size influences her current weight.

METHODS
The Women's Health Study of Accra
The Women's Health Study of Accra, Wave II (WHSA-II) conducted in 2008-2009 is the second cross-sectional, community-based population study of a longitudinal assessment of health in a sample of women age 18 and older residing in Ghana's Accra Metropolitan Area. Older women were over-sampled to provide enough elderly cases for analysis but otherwise, the sample, after stratification for socio-economic status, is representative of all adult women in Accra. WHSA-II was conducted by the joint partnership between the University of Ghana Institute for Statistical, Social, and Economic Research and the Harvard School of Public Health.

The WHSA-II sample consists primarily of participants from Wave I of the study (WHSA-I), conducted in 2003. Participants to WHSA-I were selected by a two-stage cluster probability sample stratified by socioeconomic status based on the 2000 Ghanaian census data, and older women were progressively over-sampled. When a participant from WHSA-I could not be located, a woman of similar age, socioeconomic status and geographic location as the initial participant in WHSA-I replaced the woman in the sample. A total of 995 replacement women were interviewed for a total of two thousand eight hundred and fourteen (2,814) WHSA-II participants interviewed between October 2008 and June 2009. The complete methodology and sampling of WHSA-I and WHSA II are described elsewhere.[14,15]

All women interviewed in WHSA-II were eligible for this study (n=2,814). Following WHO protocol, women who were pregnant or less than three months post partum (n=130) at the time of interview were excluded from the analysis of body weight and body size.

In this analysis, the WHSA-II sample population is not weighted nor are the findings standardized.

Questionnaires

The WHSA-II included a twenty-five section household questionnaire, a household roster and details of the dwelling's characteristics. The questionnaire was field tested and administered by trained interviewers. The questionnaire included a variety of questions addressing health-related subject areas chosen to address major health issues identified in WHSA-I and to address topics of interest to policy makers and programs. The main sections examined in this analysis include self-reported general health, medical history, physical activity, nutrition, food security, and body image assessment.

The household questionnaire also included a standardized Stunkard Figure Rating Scale (FRS) and records of anthropometric measurements taken at the participant's home by a trained field interviewer at the time of questionnaire administration. No laboratory tests or physical examinations were conducted during WHSA-II.

Anthropometric Measurements

Overweight and obesity were assessed using three measures, body mass index (BMI), waist circumference (WC), and waist-to-hip ratio (WHR). Trained interviewers at home obtained anthropometric measurements at the time of survey administration with women wearing lightweight clothing without shoes. Height (m) was measured with a Shorr height board to the nearest 0.01 cm with women standing upright. Weight was measured on a separate calibrated Fazzini scale to the nearest 0.5 kg. BMI was calculated as weight (kg) divided by height squared (m^2), and weight categories were defined following the WHO standard as <18.5 kg/m^2 underweight, 18.5 – 24.9 kg/m^2 normal weight, 25.0-29.9 kg/m^2 overweight, and >30 kg/m^2 obese.

WC was measured at the widest girth to the nearest 0.1 cm. Hip circumference (HC) was measured at the level of the greater trochanter to the nearest 0.1 cm. Waist-to-hip ratio was calculated by dividing WC by HC. WHR and WC are used as indirect measures of abdominal obesity, and fat distributions around the waist are associated with greater risk for metabolic and cardiovascular disease.[16] WC and WHR are better predictors of obesity in the elderly than BMI due to differential muscle loss associated with aging.[17] Recommended by the National Institutes of Health, cut points for obesity defined by WHR and WC are >0.8 and >88 cm respectively. While WHR provides no advantage over WC alone in the measurement of obesity risk, it is reported here due to its clinical significance.

Body Image Assessment

Stunkard's FRS, a silhouette scale originally developed to determine weight of parents of Danish adoptees,[18] is the standard scale used in obesity studies and was used in the WHSA-II. Though designed for a white population and not preferred by black women to other scales, the Stunkard FRS achieves comparable results to other less widely used but culturally adapted scales.[19] The Stunkard FRS consists of a series of nine silhouette images of women whose weight ranges from emaciated to morbidly obese. These images do not correspond to specific anthropometric measurements.

To assess body image in the WHSA-II, a series of three questions were asked in reference to the Stunkard FRS images: 1.) What image do you think most closely resembles the way you look at this time (CBI)? 2.) Which image do you think looks like the healthiest woman (HBI)? 3.) Which image represents the way you think Ghanaian women should look (IBI). A body image dissatisfaction score was calculated by subtracting a woman's IBI from her CBI. Negative values indicate a desire to be heavier and positive values indicate desire to be slimmer; a null difference indicates satisfaction with CBI.

Statistical Methods

All analysis was performed using SPSS version 17.0 for Windows (SPSS, Inc., Chicago, IL). Analysis included descriptive statistics for frequencies, ROC analysis, bivariate logistic regression and linear regression. A p-value of <.05 was considered significant. Strength of association is expressed as an odds ratio with a 95% confidence interval (CI).

Body image assessment tools have rarely been validated in non-Caucasian populations. Following the methodology of Bulik et al,[20] a validation study constructing receiver operating curves (ROC) was conducted on the Stunkard FRS data obtained in WHSA-II. Receiver operating curves are created by plotting the fraction of true positives out of the positives vs. the fraction of false positives out of the negatives at various threshold settings.

To test for relative wealth, a wealth index was created using principal components analysis from a selection of 20 variables measuring quality of the dwelling (e.g water source, sewage arrangements, type of housing, roof etc.) and possession of household durable goods (e.g. television, radio, iron, refrigerator and car).[1]

To test for the influence of education, relative wealth, parity, region of birth and marital status on obesity outcomes, logistic regression models controlling for survey age group were created (Table 3). To test for the influence of education, relative wealth, parity, region of birth and marital status on body satisfaction (a desire to be heavier and a desire to be skinnier), logistic regression models controlling for BMI category were created (Table 6).

RESULTS
Demographic Characteristics
Mean self-reported age ($\pm$ standard deviation) was 46.28 ± 18.21 years (range 18 to 99 years). Of the women, over half were born in Greater Accra (58.7%), and almost all lived in an urban area until the age of twelve (88.0%). At the time of survey, approximately half of women were currently married (49.3%), one fifth were nulliparous (19.1%) and just over two-thirds

were multiparous (68.1%). Approximately one fifth of women had no education (20.8%), and a similar percentage had no employment (23.7%).

Anthropometric Measurements
Mean BMI across all ages was 28.34 ± 6.69. Using the WHO criteria for BMI, 3.6% of women were underweight, 31.5% normal weight, 27.8% overweight and 37.1% obese. In total, almost two-thirds of women sampled were either overweight or obese (64.9%). In this sample, WC measurements revealed 78.7% obesity, and WHR measurements revealed 78.9% obesity.

Table 1 shows age group specific means and standard deviations for height, weight, WC, HC, BMI, and WHR. As seen in Table 1, mean weight, BMI, WC, HC, and WHR all increase monotonically across ages 18-55. Table 2 shows the categorical distribution of BMI and WC by age group.

Table 1 Mean anthropometric (standard deviation) variables grouped by age category: findings of the WHSA-II.

Age Group	N	Height	Weight	BMI	WC	HC	WHR
18-24	168	161.6 (6.1)	63.2 (13.0)	24.2 (4.7)	81.8 (12.7)	99.6 (13.3)	0.82 (0.10)
25-34	813	160.9 (5.8)	68.0 (15.9)	26.2 (5.9)	86.8 (16.1)	103.9 (16.7)	0.83
35-55	915	161.0 (6.4)	77.3 (17.3)	29.7 (6.3)	96.7 (16.6)	109.3 (17.8)	0.88 (0.09)
> 55	917	157.7 (6.6)	72.9 (19.1)	29.4 (7.3)	99.0 (18.3)	107.6 (19.1)	0.92 (0.09)
Total	2,813	159.9 (6.5)	72.5 (17.8)	28.3 (6.7)	92.9 (17.8)	106.7 (17.9)	0.87 (0.10)

Table 2 Prevalence of obesity among women in Accra: findings from the WHSA-II.

Age Group	BMI (%)				WC (%)		
	Underweight	Normal	Overweight	Obese	Normal	Overweight	Obese
18-24	7.8	58.8	21.6	11.8	47.4	25.7	27.0
25-34	3.9	45.7	26.7	23.6	34.5	22.4	43.2
35-55	1.8	22.8	29.3	46.1	10.6	14.9	74.5
> 55	4.5	24.0	28.1	43.4	11.1	11.1	77.8
Total	3.6	31.5	27.8	31.1	19.4	16.3	64.3

Socio-demographic Correlates of Obesity
Table 3 shows that after controlling for age, in this sample, higher levels of relative wealth and having given birth to two or more children are both associated with higher risk of overweight and obesity. Having grown up in a rural area and being unmarried both have modest protective effects against overweight and obesity. Education appears to have no association with a woman's weight status.

Validation of Stunkard Figure Rating Scale
Receiver operating curves (ROC) confirm that figural stimuli are effective in classifying Ghanaian women as

obese. According to ROC analysis, 85.7% of obese women can be correctly identified as obese by using their responses to the Stunkard FRS (Figure 1). This is a slightly lower but comparable percentage to Bulik *et al.*'s 93% correct identification in a Caucasian population. Upon examination, a similar cut-off between lean and obese as identified in Bulik *et al* can also be identified for Ghanaian women. For the Stunkard FRS, image six is an ideal cut-off point for obesity as very few non-obese women chose figures greater than this size to represent their current image (Figure 2).

Table 3 Overweight and obesity among women in Accra by socio-demographic characteristic: results from logistic regression models controlling for age category at time of survey.

	n[a]	Woman is obese[b] (n = 973)		Woman is overweight/obese[c] (n = 1,702)	
		Prevalence (%)	Odds Ratio (95% CI)	Prevalence (%)	Odds Ratio (95% CI)
	2,684	36.30		63.40	
Age in years					
18-24	154	11.70	1.00	33.30	1.00
25-34	719	23.50	2.32 (1.38, 3.90)	50.30	2.03 (1.41, 2.93)
35-54	893	45.60	6.33 (3.80, 10.52)	75.40	6.14 (4.24, 8.88)
> 55	917	41.30	5.32 (3.20, 8.85)	71.50	5.01 (3.47, 7.23)
Wealth Index (controlling for age)					
Lowest	527	30.70	1.00	58.60	1.00
Low	538	38.10	1.51 (1.16, 1.96)	64.40	1.44 (1.11, 1.87)
Middle	534	38.60	1.48 (1.14, 1.92)	72.20	2.02 (1.54, 2.65)
High	554	38.40	1.59 (1.23, 2.07)	68.70	1.86 (1.43, 2.43)
Highest	482	35.90	1.45 (1.11, 1.91)	60.70	1.29 (0.98, 1.68)
Parity (controlling for age)					
0	514	20.40	1.00	44.40	1.00
1	325	31.70	1.32 (0.95, 1.85)	57.70	1.28 (0.95, 1.72)
> 2	1,839	41.60	1.55 (1.18, 2.05)	72.00	1.81 (1.42, 2.32)
Education (controlling for age)					
None	567	36.30	1.00	66.40	1.00
Primary	320	38.80	1.15 (0.86, 1.54)	64.40	0.96 (0.71, 1.30)
Middle	1,054	34.90	0.96 (0.79, 1.19)	64.50	0.95 (0.75, 1.19)
Secondary	441	35.80	0.93 (0.72, 1.22)	62.00	0.77 (0.59, 1.02)
Higher	266	36.50	0.99 (0.73, 1.36)	65.90	0.97 (0.70, 1.35)
Region of Childhood (controlling for age)					
Rural	320	36.70	1.00	64.40	1.00
Urban	2,319	32.50	1.46 (1.13, 1.88)	64.80	1.31 (1.02, 1.70)
Current Marital Status (controlling for age)					
Married	1,271	42.40	1.00	58.90	1.00
Single	1,413	30.70	0.64 (0.54, 0.76)	71.30	0.62 (0.52, 0.74)

[a] Totals may be less than 2,684 due to missing values

[b] BMI $\geq$ 30 kg/m^2

[c] BMI $\geq$ 25 kg/m^2

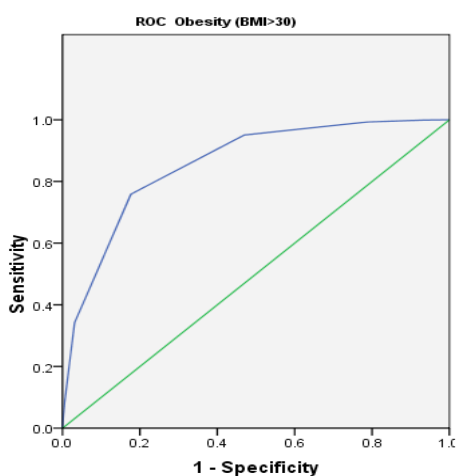**Figure 1** Receiver Operating Curve for female obesity (BMI>30), Area Under Curve = **.857**
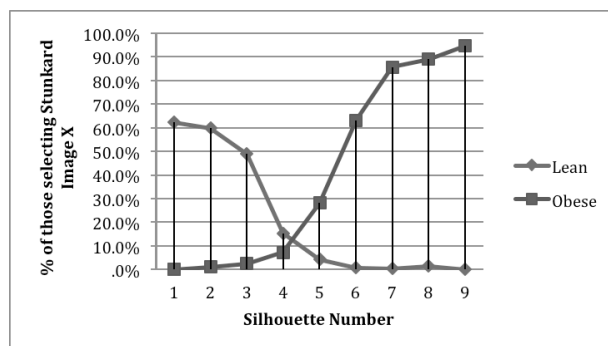

Figure 2 Per cent of obese (BMI > 30) and lean (BMI < 21) women by silhouette

Distribution of Body Image Preferences

Table 4 describes the distribution of participant responses when asked to identify the Stunkard FRS images that represent a woman's current and ideal weight as well as the healthiest and least healthy weights. The associated mean BMI for women selecting each image as their "current" image is included.

Table 4 Frequency of images selected by women as CBI, IBI, HBI and least healthy. Mean body mass index (BMI) of all women selecting each Stunkard FRS image to represent CBI.

Stunkard FRS Images	BMI of Participant selecting image as CBI		Frequency of figure selected as CBI (Current)		Frequency of figure selected as IBI (Ideal)		Frequency of figure selected as HBI (Healthiest)		Frequency of figure selected as least healthy	
Figure #	Mean	S.D.	n	%	n	%	n	%	N	%
1	20.1	3.4	17	0.6	27	1	146	5.6	1,068	40.5
2	20.8	2.8	94	3.5	59	2.3	158	6.0	12	0.5
3	21.5	3.4	253	9.5	262	10.1	406	15.5	10	0.4
4	24.2	3.6	567	21.4	736	28.5	802	30.6	9	0.3
5	27.9	4.7	671	25.3	801	31.0	700	26.7	5	0.2
6	31.5	4.7	651	24.5	447	17.3	279	10.7	8	0.3
7	35.7	5.8	300	11.3	138	5.3	67	2.6	7	0.3
8	39.0	6.8	79	3	63	2.4	20	0.8	27	1
9	43.7	8.0	21	0.8	53	2.0	39	1.5	1,488	56.5

Notes: Sample size may not add up to 2,684 due to missing values; percent reported is adjusted for missing values.

The most frequently selected CBI was image 5 (25.3%), and mean CBI was image 5.06 ± 1.45. However, over half the sample population (58%) selected an IBI of size 5 or greater. Image 5 is also the image most frequently selected as IBI (31%), and mean IBI was image 4.84 ± 1.40. Based on the recorded BMI of women selecting image 5 as representative of their current body image, in this population, image 5 corresponds to a mean BMI 27.9 kg/m^2. The most frequently selected HBI is image 4 (30.6%). Mean HBI is 4.22 ± 1.51. More women found image 9 of a morbidly obese woman to be less healthy than image 1 of an emaciated woman (56.5% compared to 40.5%). Figure 3 and Figure 4 compare the distribution of current and healthiest body image against ideal body image in this population.
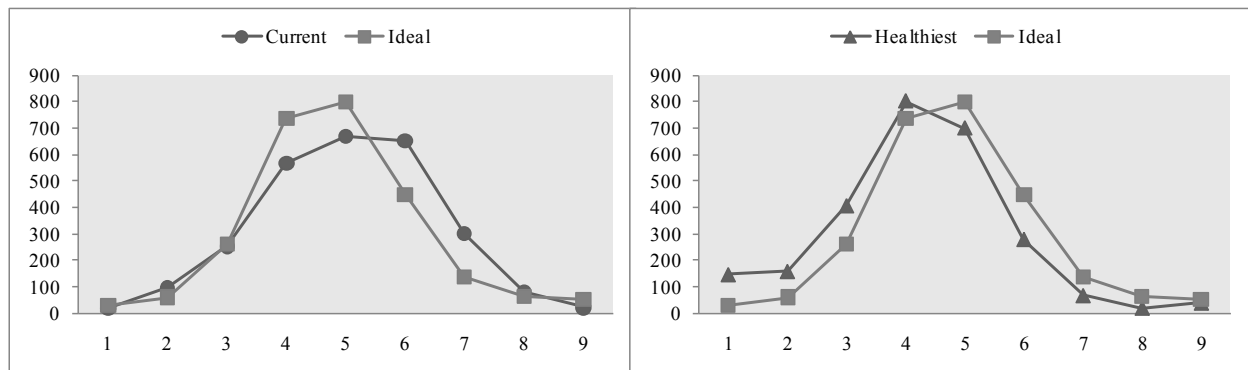
Figures 3 (Left) and 4 (Right) Distribution of WHSA-II women by Stunkard Figure Rating Scale image selected as "current" and "healthiest" compared to image selected as "ideal"

Satisfaction with current body size

Nearly three quarters of all women in the sample were dissatisfied with their CBI (72.2%). Slightly more women would prefer to have a slimmer image (41.8%) than would prefer to have a heavier image (30.4%). Of the quarter of women who were satisfied with their CBI, the majority (61.0%) were overweight or obese (see Table 5).

In the sample, body image satisfaction scores were strongly correlated to BMI categories. When asked of their desire to lose weight, overweight and obese women were significantly more likely than normal weight women to desire to lose weight (OR: 10.12; CI: 8.04 - 12.72), and obese women alone were 17.99 (CI: 14.01 - 23.11) times more likely than normal weight women to desire to lose weight.

Controlling for BMI in multiple linear regression analyses, the index of body satisfaction was independent of age (p=.051), relative wealth (p=0.83), marital status (p=0.295), education level (p=.117), and region of birth (p=0.25). In several logistic regression analyses controlling for BMI, those in the low and middle wealth categories were less likely to desire to be heavier than those in the lowest wealth category.

Those women who spent the first twelve years of life in an urban area were also less likely to desire to be heavier than their rural counterparts (Table 6). Compared with the lowest wealth quintile, all other wealth quin-tiles desired to be slimmer. No other characteristics were significantly associated with a desire to be slimmer.

Table 5 Relationship between body satisfaction (measured as CBI – IBI) and BMI (n = 2,584)

	BMI (kg/m^2)			
	Underweight	**Normal**	**Overweight**	**Obese**
Would like to be heavier (n = 799)	8.5%	57.4%	22.2%	11.9%
Would like to be slimmer (n = 1,100)	0.4%	9.2%	27.3%	63.2%
Satisfied at present (n = 639)	2.3%	36.6%	35.8%	25.2%

Table 6 Body image discrepancy among women in Accra by socio-demographic characteristic: results from logistic regression models controlling for BMI category.

	n[a]	Desire to be heavier[b] (n = 815)		Desire to be slimmer[c] (n = 1,121)	
		Prevalence (%)	Odds Ratio (95% CI)	Prevalence (%)	Odds Ratio (95% CI)
	2,684	30.40		41.80	
BMI					
Underweight	95	71.60	23.28 (14.21, 38.13)	4.20	1.00
Normal	828	55.40	11.50 (8.93, 14.80)	12.20	3.16 (1.14, 8.79)
Overweight	730	24.20	2.96 (2.26, 3.88)	41.10	15.87 (5.77, 43.67)
Obese	973	9.80	1.00	71.40	56.87 (20.70, 156.30)
Age in years (controlling for BMI)					
18-24	154	44.80	1.00	26.60	1.00
25-34	719	33.50	0.85 (0.58, 1.25)	35.50	0.97 (0.62, 1.52)
35-54	893	27.50	1.18 (0.80, 1.75)	48.80	0.90 (0.58, 1.41)
> 55	917	28.20	1.08 (0.73, 1.56)	42.20	0.72 (0.46, 1.14)
Wealth Index (controlling for BMI)					
Lowest	527	33.80	1.00		
Low	538	28.80	0.92 (0.69, 1.24)	43.70	1.22 (0.91, 1.63)
Middle	534	27.70	0.99 (0.74, 1.24)	45.10	1.13 (0.85, 1.51)
High	554	29.40	1.02 (0.76, 1.34)	42.40	1.04 (0.78, 1.38)
Highest	482	30.10	0.88 (0.65, 1.19)	42.10	1.24 (0.92, 1.68)
Education (controlling for BMI)					
None	567	30.00	1.00	43.60	1.00
Primary	320	30.10	0.87 (0.62, 1.21)	38.80	0.75 (0.54, 1.04)
Middle	1,054	29.70	0.87 (0.68, 1.12)	40.50	0.85 (0.67, 1.08)
Secondary	441	28.60	0.80 (0.59, 1.08)	42.20	0.96 (0.71, 1.30)
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Married	1,271	26.40	0.90 (0.75, 1.01)	46.60	1.11 (0.92, 1.33)
Single	1,413	34.00	1.00	37.40	1.00

[a] Totals may be less than 2,684 due to missing values

[b] Participant's current body image is slimmer than her ideal Ghanaian body image (CBI < IBI)

[c] Participant's current body image is larger than her ideal Ghanaian body image (CBI > IBI)

Table 7 The food and physical activity environment for women in WHSA-II

	Age Group			
	18-24 (n=168)	25-34 (n=813)	35-54 (n=915)	> 55 (n=917)
Workplace Physical Activity Level (%)				
Sedentary	43	35	33	54
Moderate activity alone	56	61	61	45
Moderate and intense activity	1	4	6	1
Leisure Time Physical Activity Level (%)				
No leisure time activity	79	83	83	84
Moderate activity only (walking)	18	16	16	16
Vigorous activity only (sport)	0	0	0	0
Vigorous and moderate activity	2	1	1	0
Food Security (%)				
Enough food and always kinds wanted	50	55	53	54
Enough food but not always kinds	43	39	40	39
Sometimes not enough food	7	6	6	6
Often not enough food	0	0	1	1

Weight Influencing Behaviours and Environment

Though 30.4% of women in the sample reported a desire to be heavier, only 6.3% of women in the sample have tried to increase weight by eating more food or calorie dense food. Similarly, though 41.8% of women desire to be lighter, only 17.7% have tried to decrease weight by eating less food or food with fewer calories, 12.6% have tried to decrease weight by exercising, and 2.6% have tried to decrease weight by taking diet pills. Women in this sample also report an awareness of the health risk associated with overweight and obesity (92.2%) and a desire to change body size to lead a healthier life (52.2%). Additionally, the food and physical activity environment is described in Table 7.

DISCUSSION

Compared to the relatively small body of prior work on body image and obesity in Ghana including publications from the WHSA-I, this study both confirms prior conclusions and brings new information into the obesity/body image dialogue. It is clear that female overweight/obesity is a pressing issue in Accra, and that reporting prevalence rates without gender stratification will lead to a misleading picture of obesity prevalence. For example, using World Health Survey 2003 data collected in Ghana, Biritwum *et al* calculate overweight and obesity prevalence in the Greater Accra Region to be 42.7%,[21] low compared with both the WHSA-I and WHSA-II which generated female overweight and obesity prevalence of 62.2% and 64.9% respectively.

The substantially increased obesity rates calculated from waist measurements compared with BMI may be attributed to the selection bias of the sample to include older women. Age related muscle loss can influence BMI such that WC and WHR may provide a more accurate picture of disease risk. Additionally, due to the increased risk for disease in obese persons, it is likely that there are fewer obese women in the oldest age group due to early death. Indeed, the life expectancy in Ghana during 2009 was just 58 years.[22]

The population-wide weight distribution did not change drastically in the 5 years between WHSA surveys (mean BMI 27.9 $\pm$ 7.2 vs. 28.3 $\pm$ 6.7). Similar to WHSA-I, this study of WHSA-II found age to be the strongest determinant of overweight/obesity status in urban, Ghanaian women. After adjusting for age, married women and women with two or more children were more likely than their peers to be overweight or obese. In this sample, education is not significantly associated with risk of overweight or obesity. Unlike the WHSA-I, relative household wealth was found to be a significant risk factor for obesity in this analysis. Of all the quintiles of the wealth index, only the poorest women had a lower risk for obesity when compared to the wealthiest quintile (OR:0.68 CI: 0.54-0.94). This reduced risk in the poorest women is likely a reflection of the poorest quintile's lack of access to foods, for example, only 28.7% of these women in the lowest wealth index category had full food security (compared with over 50% in each of the other wealth index categories). Interestingly, when comparing risk for overweight and obesity, the wealthiest and poorest wealth quintiles have the lower risk of obesity compared to the 2-4 quintiles.

A new finding is that women who spent the first 12 years of their childhood in an urban environment were at increased risk for overweight and obesity and at decreased risk for desiring to be heavier. This finding seems to suggest there may be some credence to the

westernization and urbanization hypotheses. According to this study, individual characteristics of the women themselves, like education level, are not as significant as age and parity suggesting that exposure to the environment (either social or physical) in Accra, as opposed to individual characteristics, influences weight status. Indeed, a brief examination of the obesogenic environment in Accra in Table 7 reveals the environmental hurdles women face. However, given the high prevalence of overweight and obesity, it seems unlikely that these factors alone capture all of the variation in obesity levels in the population. Additional cofounders likely exist and should be explored in future analyses.

The assessment of body image tests the hypothesis that it is the social environment and a preference for obesity that drives the epidemic. In this study, standardized Stunkard FRS were tested and used to evaluate perceptual and attitudinal body image. Results were comparable to an earlier study conducted in Accra using culturally relevant figural stimuli.

In 2005, Duda *et al* assessed body image preference and overweight/obesity status in a sample of 305 women visiting a radiology clinic in a public hospital in Accra, Ghana. These researchers used culturally adapted figural stimuli rather than the standardized Stunkard FRS.[13] Duda *et al* found similar prevalence of overweight and obesity as in WHSA-II (65.6% v. 64.9%) though mean BMI was not reported. Using a scale with 12 images, the researchers found preference for an ideal body image associated with images whose corresponding BMIs were 26.1 and 26.5 kg/m^2. When compared with the WHSA-II IBI preference for an image with mean BMI 27.9 kg/m^2, the two studies both illustrate a slight preference for a figure outside the normal weight range. Comparing the images preferred as healthiest (HBI), Duda *et al*'s women selected healthy body images equivalent to ideal body image (mean BMI 26.1-26.5 kg/m^2) while WHSA-II women selected healthy body images slightly smaller than ideal body image (mean BMI 24.2 kg/m2 vs. 27.9 kg/m2).

Dissatisfaction with CBI in both groups of women was quite high (76.4% vs. 75.9% in WHSA-II). Similar to Duda *et al*, the largest factor contributing to a woman's desire for a slimmer or a heavier image was her BMI. Controlling for BMI, age, education and marital status do not influence a woman's desire for a heavier or slimmer image. If heavier body image were indeed idealized, women with heavier BMI would not experience significantly greater body dissatisfaction than those in the normal or underweight range. In addition to this finding, women growing up in urban areas were less likely than their rural peers to desire a heavier image (OR: 0.71, CI: 0.53-0.93).

Though the results in this study suggest that preferred body image should no longer be viewed as a major inhibitor to maintaining normal weight status in the urban, female population of Ghana, qualitative studies are necessary to better understand the ideal weight desires of women in this population. Over half (52.2%) of the women in the WHSA-II sample expressed willingness to change her body size to improve health outcomes and 41.8% of women wanted a body image smaller than her current size. If these women were able to achieve their ideal body images, the mean BMI distribution in the population would shift resulting in a lower mean BMI than currently exists. Ideal body image in this group of women should not be viewed as an inhibitor to healthy weight maintenance, and interventions should be designed to help women achieve their ideal and healthy weights.

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