

## Perception of risk for hypertension and overweight/obesity in Cape Coast, Ghana

Derek A. Tuoyire<sup>1</sup>, Sarah McNair<sup>3</sup>, Samuel A. Debrah<sup>2</sup> and Rosemary B. Duda<sup>3,4</sup>

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<sup>1</sup>Department of Community Medicine, School of Medical Sciences, College of Health and Allied Sciences, University of Cape Coast, Ghana

<sup>2</sup>Department of Surgery, School of Medical Sciences, College of Health and Allied Sciences, University of Cape Coast, Ghana

<sup>3</sup>Harvard Medical School, 250 Longwood Avenue, Boston, MA, USA

<sup>4</sup>Department of Surgery, Beth Israel Deaconess Medical Centre, 330 Brookline Avenue, Boston, MA, USA

**Corresponding author:** Dr. Derek A. Tuoyire

**E-mail:** [d.anamaale@uccsms.edu.gh](mailto:d.anamaale@uccsms.edu.gh)

**Conflict of interest:** None declared

### SUMMARY

**Background:** This study examined the association between perception of risk for hypertension and overweight/obesity.

**Design:** Cross-sectional questionnaire-based survey

**Setting:** Out-patient department of the Central Regional Hospital in Cape Coast, Ghana

**Participants:** Adult men and women at least 18 years old

**Interventions:** None

**Main outcome measures:** Perception of risk for hypertension, overweight/obesity

**Results:** About 39% of the participants (N=400) were found to be overweight/obese, with disproportionately higher rates among women (50%) than men (28%). Results of the binary logistic regression models revealed a strong positive association (OR = 2.21, 95% CI =1.23, 3.96) between perception of risk for hypertension and overweight/obesity. Increasing age, high television exposure, female gender and being in a relationship were also noted to be associated with overweight/obesity.

**Conclusions:** These findings highlight the need for the design of programmes to help individuals appreciate the reality of weight-related health risks, as well as the need to embrace lifestyles that promote healthy weight outcomes.

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### INTRODUCTION

Obesity is no longer a problem only for Western or industrialised countries, but has now reached global proportions.<sup>1</sup> With an estimated 500 million obese adults and another 1.5 billion of them overweight or obese<sup>1</sup>, projections are that nearly 60% (3.3 billion) of the world's population could be overweight or obese by 2030.<sup>2</sup> Available evidence reveals that between 2000 and 2004, 10% of adults in West Africa were obese with about half of the urban population and 60% of women being overweight or obese.<sup>3,4</sup>

In Ghana, the Demographic and Health Survey (DHS) reports that the proportion of overweight or obese women increased from 25% in 2003 to 40% in 2014.<sup>5</sup> Obesity is a key risk factor for hypertension, which is an increasing public health challenge in both the developed and developing world.<sup>6</sup>

Recent trends indicate that the prevalence of hypertension in developing countries is already as high as is seen in the developed countries.<sup>6,7</sup> The evidence in Ghana suggests an increasing prevalence of hypertension in both rural and urban populations, with high body mass index as a risk factor.<sup>8,9</sup>

In Ghana, the prevalence of hypertension has increased sharply over the last two decades. For instance, in public health facilities alone, the number of reported new cases of hypertension is estimated to have increased 10-fold from about 49,087 in 1988 to 505,180 in 2007.<sup>10</sup>

The prevalence of hypertension in Ghana reported from various studies ranges between 25% and 48% with higher rates in urban populations than in rural populations.<sup>11</sup>

Health behaviour models suggest that recognizing a significant health risk is an important step towards the adoption of protective health behaviours such as seat belt use or diabetes self-management.<sup>12</sup> In that regard, perceiving a certain degree of risk for a weight-related chronic disease such as hypertension may strongly impact on weight-reduction behaviour and the consequent minimisation of such risks. Studies elsewhere have examined the association between obesity and other obesity-related chronic disease risk perception<sup>13</sup>, however, there remains a dearth of knowledge regarding the subject in the West African sub-region, particularly in Ghana.

The few studies<sup>9,14,15</sup> conducted in Ghana, have mostly assessed awareness of general health risks associated with overweight or obesity, without looking at perception of risks. Though knowledge of risks associated with obesity is important, an individual's perception of risk presents a stronger motivation for weight-reduction behaviour.<sup>16,17</sup> This study examined the association between perception of risk for hypertension and overweight/obesity. Given the increasing prevalence of overweight/obesity and hypertension, this study highlights the importance of people's perceptions of weight-related health risks and the promotion of healthy weight outcomes.

## METHODS

### Sampling and data collection

The study was conducted at the Central Regional Hospital (now Cape Coast Teaching Hospital) in Cape Coast, Ghana, the main referral centre for both primary and secondary healthcare facilities within the Region. The 400-bed hospital serves the residents within the Cape Coast municipality, as well as the other districts in the region. On the average about 110,068 patients are seen at the outpatient department (OPD) annually.

Based on the annual average number of OPD cases, a minimum sample size of 383 was estimated to provide a representative sample assuming overweight/obesity prevalence of 50% in the population, absolute precision/confidence level of 5% with a design effect of 1.0 for a random sample. Although a minimum sample size of 383 was calculated, this was adjusted upwards by 10% to 421 to increase statistical power and cater for non-response or incompleteness of data.

A systematic random sampling procedure was employed in selecting participants who were at least 18 years old from the OPD between June and July 2012. The process began with a construction of a sampling frame based on patient folder numbers following which every  $n^{\text{th}}$  (systematic) folder was selected.

For instance, on the first day every 5<sup>th</sup> folder was selected, while on the last day every 3<sup>rd</sup> folder was selected. Individuals whose folder numbers were systematically selected were then identified for informed consent to be obtained and subsequent participation in the study. This process continued until the required sample size was attained.

To avoid response or measurement bias, pregnant women, lactating mothers, and patients who were too sick or had chronic diseases, particularly hypertension, diabetes mellitus, chronic kidney disease and heart failure were excluded from the study. Each eligible participant underwent a 15 to 20-minute survey interview conducted by the first and second authors. The survey was designed to elicit information covering relevant themes including socio-demographic details, mass media exposure, obesity-related chronic disease awareness, chronic disease risk perception, weight change among others.

In addition, each participant's weight and height were measured in kilograms and metres respectively, using standard procedures and equipment. The body mass index (BMI), expressed as  $\text{kg}/\text{m}^2$ , was calculated and recorded. The BMI scores were then used to categorise participants into WHO standard BMI groupings – underweight, BMI < 18.5; normal weight, BMI 18.5-24.9; overweight, BMI 25.0-29.9; obese, BMI > 30.0.<sup>18</sup>

Ethical approval was obtained prior to the study by the Institutional Review Boards of Harvard Medical School, Boston, MA, USA and the University of Cape Coast Institutional Review Board, Cape Coast, Ghana.

### Statistical Analysis

The data was entered into Microsoft Excel, 2007 and transferred to STATA version 11.0 for cleaning and further management. The current analysis is based on 400 (196 men and 204 women) participants with complete data for the purpose of this study. The analysis involved using proportions to describe the sample and factors associated with overweight/obesity. A BMI of 25  $\text{kg}/\text{m}^2$  increases one's risk for mortality and non-communicable diseases<sup>18,19</sup>, thereby informing the construction of the dependent variable (overweight/obesity) for the study.

Thus, participants with BMI scores of 25  $\text{kg}/\text{m}^2$  or above were classified as overweight/obese, while those with a BMI below 25  $\text{kg}/\text{m}^2$  were classified as not overweight/obese. This categorisation has widely been applied in similar studies.<sup>5,20,21</sup> and ensures that robust estimates are obtained in analysis.<sup>20</sup> Perception of risk for hypertension was the main independent variable.

The question on perception of risk for hypertension was “How likely do you think you are to develop HIGH BLOOD PRESSURE?” This was constructed as a dichotomous variable (not likely and likely).

In order to examine the robustness of association between overweight/obesity and perception of risk for hypertension, other covariates (knowledge factors, and socio-demographic factors) were controlled for. The knowledge factors considered were the participants’ knowledge of the effect of overweight/obesity on health, and mass media exposure (radio and television). The assumption is that knowledge of how overweight/obesity affects one’s health could influence his/her perception of risk for chronic diseases such as hypertension.

Similarly, perception of risk may be influenced by one’s exposure to obesity-related health information through the mass media. The second group of mediating factors considered in this study were socio-demographic factors including age, sex, educational level and marital status. In that regard, three successive binary logistic models were estimated, starting with a model with perception of risk for hypertension (Model 1). This was followed with a second model (Model 2) which included knowledge factors and a final model (Model 3) with the addition of the socio-demographic factors (age, sex, educational level and marital status).

This modelling technique aimed at assessing the influence of other factors on the initial relationship between perception of risk for hypertension and overweight/obesity. Consequently, the estimates from the composite model (Model 3) were relied on in assessing the overall association between perception of risk for hypertension and overweight/obesity. Post-hoc model fitness was obtained using the Hosmer-Lemeshow goodness-of-fit test.

## RESULTS

Table 1 presents background characteristics of participants used for this study, as well as the prevalence of overweight/obesity by each characteristic. With the sample almost equally distributed between men (49%) and women (51%), the mean age was 33 years (SD=12.5) with more than half (64%) of participants younger than 35 years. Over three-quarters (80%) of the participants had obtained higher education, while 38% were married.

More than two-thirds (64%) of participants perceived themselves as not likely to develop hypertension. In terms of knowledge of the effects of obesity on health, a greater proportion (74%) of participants believed that

obesity has a large effect on health. Mass media exposure was very high, with about 92% and 90% of participants having access to radio and television, respectively. 39% of the participants were overweight/obese. More than half of the respondents in each age group were found to be overweight/obese, except for participants in the age groups below 25 years.

**Table 1** Characteristics of respondents and overweight/obesity prevalence

Characteristics	Frequency (n=400)	Percentage	Overweight /obesity (%) <sup>a</sup>
<b>Age</b>			
<25	113	28.3	22.1
25-34	145	36.1	35.9
35-44	65	16.3	57.8
45-54	43	10.8	51.2
55+	34	8.5	64.7
<b>Sex</b>			
Men	196	49.0	28.6
Women	204	51.0	50.0
<b>Educational level</b>			
No education	9	2.2	44.4
Primary	16	3.9	50.0
Secondary	57	14.2	40.4
Higher	318	79.7	38.7
<b>Marital status</b>			
Single	133	33.2	33.3
In a relationship	114	28.5	25.6
Married	153	38.3	54.6
<b>Perception of hypertension risk</b>			
Not likely	256	64.0	32.3
Likely	144	36.0	45.9
<b>Obesity effect on health</b>			
No effect	31	7.7	25.8
Some effect	74	18.4	37.8
Large effect	295	73.9	41.4
<b>Radio exposure</b>			
No	31	7.7	35.5
Yes	369	92.3	39.8
<b>Television exposure</b>			
No	37	9.2	22.2
Yes	363	90.8	41.2
<b>BMI categories</b>			
Underweight	17	4.2	Na
Healthy weight	225	56.3	Na
Overweight	102	25.5	Na
Obese	56	14.0	Na
Overweight/obese	158	39.5	Na

Na = Not applicable

<sup>a</sup> Proportion in each category found to be overweight/obese

Half of the women were overweight/obese, compared with about 28% of men. Half of those with primary education were overweight/obese, compared with their

counterparts with higher education (39%). More married participants (55%) were overweight/obese.

Overweight/obesity was higher among those who perceived themselves as likely to develop hypertension (46%) than those who perceived themselves as unlikely to develop the condition (33%).

Overweight/obesity was higher among those who acknowledged that obesity has a large effect (41%) on health, compared with those who indicated that obesity has no effect (26%) on health. From the results, overweight/obesity was more common among those with mass media exposure (40% for radio and 42% for television) than those without mass media exposure (36% for radio and 22% for television).

Table 2 presents the results of three logistic regression models fitted to examine the association between perception of risk for hypertension and overweight/obesity, starting with the bivariate association between perception of risk for hypertension and overweight/obesity (Model 1). The odds of being overweight/obese were significantly higher (OR = 1.77, 95% CI = 1.09, 2.88) for those who perceived themselves to be likely to develop hypertension than those who did not perceive themselves as likely to develop hypertension (reference category).

With the inclusion of knowledge factors in Model 2 there was no change in the initial association found between perception of risk for hypertension and overweight/obesity. Those with exposure to television were found to be about 3.7 (95% CI = 1.17, 11.63) times more likely to be overweight/obese compared to those with no exposure.

When socio-demographic factors (age, sex, educational level and marital status) were fitted in Model 3, the association became stronger and more significant between overweight/obesity and those who perceived themselves to be likely to develop hypertension (OR = 2.21, 95% CI = 1.23, 3.96), and those with exposure to television (OR = 6.29, 95% CI = 1.57, 25.15).

With regards to age, the odds of being overweight/obese were significantly higher for those aged 55 and above (OR = 5.12, 95% CI = 1.49, 17.59), followed by those aged 35-44 (OR = 3.33, 95% CI = 1.32, 8.42), and those aged 25-34 (OR = 2.20, 95% CI = 1.10, 4.42) compared with those younger than 25 years. Women had more than three times (OR = 3.37, 95% CI = 1.98, 5.92) higher odds of being overweight/obese than men.

Compared to those who were single, those in relationships (but not married) were significantly less likely

(OR = 0.41, 95% CI = 0.200, 0.84) to be overweight/obese.

**Table 2** Results of logistic regression on perception of risk for hypertension and overweight/obesity

	Model 1	Model 2	Model 3
Characteristic	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Perception of hypertension risk</b>			
Not likely (Ref)	1.0	1.0	1.0
Likely	1.77 (1.09,2.8)*	1.75 (1.08,2.86)*	2.21 (1.23,3.96)**
<b>Obesity effect on health</b>			
No effect (Ref)	Na	1.0	1.0
Some effect	Na	2.32 (0.73, 7.31)	2.45 (0.17, 8.41)
Large effect	Na	2.18 (0.76, 6.22)	2.99 (0.94, 9.56)
<b>Radio exposure</b>			
No (Ref)	Na	1.0	1.0
Yes	Na	0.91 (0.39, 2.12)	1.08 (0.40, 2.92)
<b>Television exposure</b>			
No (Ref)	Na	1.0	1.0
Yes	Na	3.69 (1.17,11.63)*	6.29 (1.57,25.15)**
<b>Age</b>			
<25 (Ref)	Na	Na	1.0
25-34	Na	Na	2.20 (1.10, 4.42)*
35-44	Na	Na	3.33 (1.32, 8.42)*
45-54	Na	Na	2.58 (0.80, 8.27)
55+	Na	Na	5.12 (1.49, 17.59)**
<b>Sex</b>			
Men (Ref)	Na	Na	1.0
Women	Na	Na	3.43 (1.98, 5.92)***
<b>Educational level</b>			
No education (Ref)	Na	Na	1.0
Primary	Na	Na	0.25 (0.02, 2.23)
Secondary	Na	Na	0.33 (0.54, 2.05)
Higher	Na	Na	0.39 (0.07, 2.03)
<b>Marital status</b>			
Single (Ref)	Na	Na	1.0
In a relationship	Na	Na	0.41 (0.200, 0.84)*
Married	Na	Na	1.59 (0.76, 3.30)
Pseudo R2	0.0425	0.0621	0.1958
Wald chi2	17.88 3	22.26 6	69.50
Prob > Chi2	0.000	0.000	0.000

OR = Odds ratio; Ref = Reference category; Na = Not applicable; \*p ≤ 0.05, \*\*p ≤ 0.01, \*\*\*p ≤ 0.001

The Hosmer-Lemeshow goodness of fit test was applied in Model 3 to assess the fitness of the data for the model. The model's chi-square test statistic was 3.44 (degrees of freedom = 8) and a p-value (0.9036) greater than 0.05, implying that the model fits the data.

## DISCUSSION

This study found a notable disparity between men and women in terms of overweight/obesity, with half of the women categorized as overweight/obese compared to about 28% of men. This confirms the findings of a previous study in Cape Coast<sup>22</sup> and the burgeoning problem of obesity in Ghana and other developing countries.<sup>23</sup> This investigation determined that an independent association exists between perception of risk for hypertension and overweight/obesity, while controlling for the effect of other factors (socio-demographic and knowledge factors) using logistic regression models. Contrary to our expectation, that a positive risk perception for hypertension serves as a motivation to engage in healthy weight-seeking behaviours to prevent overweight/obesity, we found higher probabilities of overweight/obesity among those who perceived themselves as likely to develop hypertension.

Although this finding deviates from our theoretical expectations, we attempt some plausible explanations. First, once overweight/obesity has occurred, there is the possibility for perception of risk to be modified to reflect that weight status.<sup>24</sup> Given the cross-sectional nature of the study, it is difficult to say whether perception of risk for hypertension is based on overweight/obesity status or otherwise. One way to disentangle this type of interdependence between perception of risk and overweight/obesity is through a longitudinal study.<sup>25</sup>

Again, our findings could also be linked with the fact that higher health literacy is often associated with more knowledge of chronic diseases which may influence perception of risk for chronic diseases such as hypertension.<sup>13</sup> Majority of the study participants had high exposure to electronic media (92% radio and 91% television), and a greater proportion (74%) also believed that obesity had a large effect on health. This could be an indication of high knowledge of chronic diseases which could have influenced their perception of risk for hypertension based on their weight status.

Perhaps such participants are yet to or in the process of translating their knowledge of the impact of obesity on health and perception of hypertension risk into weight reducing behaviours towards attaining healthy weight. That notwithstanding, the nature of association between perception of risk for hypertension and overweight/obesity found in the current study presents a

window of opportunity for public health intervention, particularly the promotion of healthy weights.

The influence of television exposure on obesity is well documented. Evidence indicates that the more time people spend on watching television, the more they are likely to gain weight or become overweight/obese.<sup>26</sup> Similarly, this current study found significant higher odds of overweight/obesity among participants with exposure to television than those without exposure, as well as those with exposure to radio. Television viewing promotes overweight/obesity by displacing the amount of time spent in physical activity, and through one's exposure to advertisement or marketing of high calorie foods which influence diet patterns.<sup>27</sup> The high (91%) level of television exposure in the sample suggests a greater amount of "sit time" is spent in television viewing than engaging in physical activity. This also suggests a greater susceptibility to the influence of food advertising or marketing on their diet. However, these assumptions may be limited by the fact that this study did not measure the amounts of daily media exposure, as well as the content of the messages participants were exposed to, therefore, this finding should be interpreted with caution.

The amount and content of exposure to media messages is one research area that needs to be explored further. Except for those aged 45-54, the study found the probabilities of being overweight/obese to significantly increase with age. The association between increased age and overweight/obesity generally corroborates with prior studies.<sup>28,29</sup> This could be explained by changes in metabolism, as well as changes in people's daily routines characterized by less physical activity as they grow older. Like in most urban environments, majority of people in Cape Coast are not engaged in strenuous physical labour to earn their living. Thus weight gain becomes more likely, particularly if there is no conscious effort to exercise or engage in other physical activity.

Gender disparity in obesity is another issue that has been well documented in the literature. Studies in developing countries have observed women to be more overweight or obese than men. In that regard, this study found overweight/obesity to be highly significant and more likely among women than men. Amegah et al.<sup>22</sup> similarly found overweight and obesity to be higher among women than men in Cape Coast.

Other studies in Ghana also indicate higher prevalence of overweight and obesity among women, plausibly as a result of the historic Ghanaian social desirability for a larger female body as ideal.<sup>4,14</sup>

From the study, those who were in relationships but not married were less likely than their single and married counterparts to be overweight/obese.

Studies on obesity and marital status have generally found overweight and obesity to be more associated with being married than being unmarried.<sup>30,31</sup> The predominantly young nature of our study participants could account for the negative association between those overweight/obesity and those in relationship but not married. With high levels of media exposure, young adults may be more conscious of their body image and as a result they may take dietary or physical activity measures to control their weight.

## CONCLUSION

Overall, the study demonstrates a strong positive association between perception of risk for hypertension and overweight/obesity. The results highlight the need for the design of programmes to help individuals appreciate the reality of weight-related health risks, as well as the need to embrace lifestyles that promote healthy weight. In Cape Coast, overweight/obesity appears to cut across all adult age groups, and more so among women and those with exposure to television. Given the high levels of exposure, the mass media particularly television should be seen as a useful means to channel behavioural change communication messages. Beyond that, interventions aimed at promoting healthy weight outcomes should be instituted.

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