Recreation, transportation or labor saving? Examining the association between household asset ownership and body mass index among Ghanaian women

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In most of the developing world, ownership of modern household assets such as television sets, refrigerators, microwave ovens and washing machines is becoming more common. Ownership of these household assets however, promote sedentary behavior which has implications for obesity and non-communicable disease conditions such as hypertension, diabetes, stroke and other cardiovascular conditions. Very few studies have examined the association between household assets ownership and obesity in sub-Saharan Africa where asset ownership is becoming a norm. In this paper, we examine the association between household ownership of different types of assets and body mass index (BMI) among a nationally representative sample of Ghanaian women. We performed a cross-sectional analysis using data from the 2008 Ghana Demographic and Health Survey involving a total of 4,916 women aged 15-49 years. The analytical sample consists of 3,987 non-pregnant females who had valid data on all the variables used in the analyses. The BMI of the women was used as the dependent variable. We used multinomial logistic regression models to examine the association between household ownership of assets and BMI. Obesity was more common among women whose household own a television-15.6%, DVD/VCD-18.58%, computer-20.70% and washing machine-27.43%, but less common among women whose household own a motorcycle/scooter-7.74% and a bicycle-7.92%. Household ownership of a television and motorcycle was associated with a higher chance of overweight (OR=1.65 and 2.11 respectively), while ownership of a DVD/VCD was associated a 65% higher chance of being obese. Obesity and overweight were found to be associated with recreational and transportation assets that promote sedentary behavior but not with labor saving assets.

Keywords: household asset ownership, body mass index, Ghanaian women

Introduction

Over the last three decades, there has been a steady increase in the prevalence of obesity in all regions of the world including sub-Saharan Africa (SSA) which is among the regions with the lowest prevalence rates (Ellulu et al., 2014). Changing modes of transportation coupled with changes in work and recreational physical activity are reported to be among the major drivers of the current global obesity epidemic (Popkin, 2006). Gradual changes in our daily routine from activities such as walking for transportation and engaging in physically tasking household activities, to the use of elevators, cars and automated domestic appliances have resulted in lower levels of physical activities which may be contributing to the global rise in the prevalence of obesity (McMichael and Butler, 2007; Banos, 2005).

Ownership of automobiles, modern household appliances and labor saving equipment such as washing machines, microwave ovens, refrigerators and food processors is gradually increasing in developing countries as these countries develop, improve their socio-economic status and urbanize at a rapid rate (Romling and Qaim, 2011). Ownership of these modern technological devices have been found to be associated with weight gain in several regions of the world (Banks, 2011).

Research has demonstrated declining levels of physical activity in most developing countries (Popkin, 2006). Access to modern technological devices, including domestic appliances which impact physical activity have been suggested as contributing to the rising obesity levels in the Global South, yet very few studies have empirically investigated the association between asset ownership and obesity. In filling this research gap, this study examines the relationship between household asset ownership and obesity among Ghanaian women.

Methodology

Source of data

This study uses data from the 2008 Ghana Demographic and Health Survey (GDHS). The GDHS is a nationally representative sample survey which is conducted every five years. Respondents for the 2008 GDHS were selected using a two-stage sample design. At the first stage, a total of 412 cluster were selected nationwide using an updated master sampling frame constructed from the 2000 Population and Housing Census. The clusters were selected with probability proportional to size. At the second stage, thirty households were sampled from each of the sampled clusters. Eligible individuals in the selected households were identified and interviewed. The GDHS sampling procedure and methodology has been described in detail elsewhere (Ghana Statistical Service, Ghana Health Service, & ICF Macro, 2009).

Subjects and sample size

The subjects in this study are females aged 15–49 years who are usual residents of the selected households. A total of 5,096 females were identified to be eligible out of which 4,916 were interviewed. Those who were pregnant and those who had missing or flagged BMI values were excluded from the analyses. The analytic sample consist of 3,987 non-pregnant females who had valid information on all the variables used in the analyses.

Variables

Dependent variable

The BMI of the respondents was used as the dependent variable. BMI is computed by dividing weight in kilograms by height in metres squared. The BMI method is used internationally as the standard of defining

overweight and obesity. It is widely used for population level analysis of obesity in adult populations (WHO, 2014). In this study, the standard WHO BMI cut-off points was used to categorise the study participants into three categories. Those with BMI values in the range of 18.50-24.99 kg/m^2 were classified as being of normal weight, those who's BMI was within the range of 25.00-29.99 kg/m^2 were classified as being overweight and those with BMI $\geq$ 30.00 kg/m^2 were classified as being obese.

Independent variables
The main independent variables for this study is ownership of different types of household asset ownership including recreational, transportation and labour/energy saving appliances. Household asset ownership was measured using whether or not a household has a: television, computer, DVD/VCD, car/truck, motorcycle/scooter, bicycle and/or washing machine. In the first stage of the analysis, the assets are used as separate independent variables. In the second stage these items are aggregated into a household asset ownership index to assess its influence on BMI.

Control variables
The study controls for respondents' level of physical activity and sedentary behaviour (measured using frequency of watching television) as key confounding variables. Socio-demographic characteristics of the respondents including age, highest level of education, current marital status, region of residence, type of place of residence and parity were controlled for in the analyses.

Methods of analysis
Exploratory data analysis was conducted on all the variables of interest using frequencies, percentages and means. We present bivariate descriptions of the study variables across BMI categories, using the Chi-square test to examine the significance of the associations. We follow with a multinomial logistic regression model in which we assess the influence of household asset ownership on BMI controlling for other variables. Two models are fitted: the first model which examines the effect of each household asset independently. The second model examines the effect of the aggregate household assets index on BMI. The normal weight category was used as the reference category for the dependent variable (BMI). The analysis is performed using Stata version 12.1. In order to ensure representativeness across the country, and correct for non-response; the data is weighted taking into consideration the complex survey design, using the 'svyset' command.

Results
Overall, about one third of the women were either overweight or obese (Table 1). Specifically, about every 1 in 5 Ghanaian women were found to be overweight while about every 1 in 10 were obese. Among all the assets examined, television ownership was most common. Close to half of the women reported their household owning a television set while a little over a quarter reported having a DVD/VCD in their household (Table 1). Ownership of a computer was low, less than one-tenth of the study sample reported owning a computer. Among the assets classified under transportation, bicycle ownership was more common compared to ownership of a car/truck and ownership of a motorcycle.

The results from the bivariate analysis reveal a significant association between household asset ownership and obesity with car/truck and motorcycle being significant at P <0.10 (Table 2). Obesity was three times

more common among women whose households own a television set compared to women who belong to households that do not own a television set (Table 2). Similarly, while about 7% of the women from households that do not own a DVD/VCD were obese, close to 19% of their counterparts from households that own a DVD/VCD were found to be obese. With regards to computer ownership, about 1 in 5 of the women whose household own a computer were obese compared to a little under 1 in 10 of their counterparts whose households do not own a computer. In the domain of transportation asset ownership, obesity was more common among women in households that own a cars/truck and less common among women in households that own a motorcycle and a bicycle. The highest proportion of obese women was recorded among households that own a washing machine at an approximate 27 percent (Table 2).

Controlling for frequency of watching television, physical activity and socio-demographic characteristics, the results show that, television ownership increases the chances of the women being overweight by 38 percent relative to their being of a normal weight. Similarly, compared to women from households that do not own a television, those from households that own a television had a 45 percent higher likelihood of being obese (at $P < 0.10$) relative to being of a normal weight (Table 3). Ownership of a computer was also associated with a 40 percent higher chance of the women being overweight relative to their being of a normal weight (at $P < 0.10$). Ownership of a DVD/VCD was found to be associated with a 65 percent higher likelihood of obesity among the women in the household relative to their being of a normal weight.

Compared to their counterparts from households that do not own a motorcycle, women from households that own a motorcycle were two times as likely to be overweight relative to being of a normal weight. The result with regards to car/truck ownership was opposite of what was expected. Women from households that own a car/truck were significantly less likely (OR=0.65) to be overweight compared to those whose household does not own a car. Ownership of a washing machine did not show statistical significance even though women from households that own a washing machine had higher odds of being obese (Table 3).

Among the control variables, frequency of watching television exhibited a significant association with the likelihood of obesity. Compared to their counterparts who do not watch television, women who reported watching television almost every day had a two times higher chance of being obese relative to being of a normal weight. The women's level of physical activity was not significantly associated with their chances of being overweight or obese (Table 3). Urban residence, increasing age and increasing level of education were associated with a higher odds of being obese relative to being of a normal weight.

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Table 1: BMI distribution of the study sample and types of assets owned by their household

	Percentage (%)	Number (N)
BMI Category		
Normal weight	67.48	2,706
Overweight	22.40	898
Obese	10.12	406
Type of household asset		
Recreation		
Television		
Yes	47.85	1,919
No	52.15	2,091
DVD/VCD		
Yes	28.33	1,136
No	71.67	2,874
Computer		
Yes	6.71	269
No	93.29	3,741
Transportation		
Car/Truck		
Yes	8.70	349
No	91.30	3,661
Motorcycle		
Yes	5.91	237
No	94.09	3,773
Bicycle		
Yes	29.69	1,191
No	70.31	2,819
Labor saving		
Washing machine		
Yes	0.75	30
No	99.25	3,980
Total	**100.00**	**4,010**

Source: Ghana Demographic and Health Survey, 2008

Table 2: Distribution of study sample by type of household asset and BMI

Type of household asset	Percentage (%) in BMI Category			Chi-Square P-value
	Normal weight	Overweight	Obese	
Recreation				
Television				**0.000**
Yes	56.47	27.93	15.60	
No	77.59	17.32	5.09	
DVD/VCD				**0.000**
Yes	53.52	27.89	18.58	
No	73.00	20.23	6.78	
Computer				**0.000**
Yes	50.24	29.06	20.70	
No	68.72	21.92	9.36	
Transportation				
Car/Truck				**0.000**
Yes	58.68	23.06	18.26	
No	68.32	22.33	9.35	
Motorcycle				**0.057**
Yes	63.33	28.92	7.74	
No	67.74	21.99	10.27	
Bicycle				**0.057**
Yes	72.53	19.55	7.92	
No	65.35	23.60	11.05	
Labor Saving				
Washing machine				**0.014**
Yes	51.52	21.05	27.43	
No	67.60	22.41	9.99	

Source: Ghana Demographic and Health Survey, 2008

Table 3: Results of multinomial logistic regression analysis examining the relationship between ownership of household assets and obesity

Type of household asset	Odds ratio	
Recreation	**Overweight**	**Obese**
Television [No]	1.38*	1.45+
Computer [No]	1.40+	1.54
DVD/VCD [No]	1.04	1.65**
Transportation		
Car/truck [No]	0.65**	0.81
Motorcycle/scooter [No]	2.11***	1.25
Bicycle [No]	1.10	0.98
Labor saving		
Washing machine [No]	1.06	1.80
Control variables		
Frequency of watching television [Not at all]		
Less than once a week	1.20	1.66+
At least once a week	1.13	1.52+
Almost every day	1.32+	2.10***
Number of physical activity days/week [0]		
1-2	1.10	0.84
3-4	0.92	0.77
5-7	1.03	0.74
Age [15-19]		
20-24	1.67**	1.46
25-29	3.68***	4.43***
30-34	4.57***	8.70***
35-39	4.31***	15.13***
40-44	5.78***	23.30***
45-49	4.57***	17.61***
Education [No education]		
Primary	1.43*	1.79*
Middle/Junior High School	1.39*	1.65*
Secondary/Senior High School	1.50*	1.62+
Higher	1.82*	1.68
Current marital status [Never married]		
In union	1.03	1.76*
Formerly in union	1.23	2.18**

Table 3 continued

Region [Greater Accra]		
Western	1.17	0.68+
Central	1.36	0.66
Volta	1.12	0.99
Eastern	1.25	0.91
Ashanti	1.00	0.59**
Brong Ahafo	0.62**	0.32***
Northern	0.43***	0.22***
Upper east	0.53*	0.41*
Upper west	0.40***	0.18***
Type of place of residence [Rural]		
Urban	1.89***	2.11***
Parity	1.04	0.99

Source: Ghana Demographic and Health Survey, 2008

[ ] Reference Category

+ P<0.10   * P<0.05   ** P<0.01   ***P<0.001