Middle-age Spread of Overweight and Obesity in Ghana; Myth or Reality? Evidence from WHO SAGE Wave 2 Data

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Authors' contributions

This work was carried out in collaboration among all authors. Authors MRA, JVB, SB and FAS wrote the abstract, introduction and methods. Authors MRA, PCA, KTN, GA and KI performed data analysis and results interpretation. Authors MRA, TSL, GM, RB and AEY wrote the discussion and conclusions. All authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

Aims: The aim of this study is to describe the age-related risk of overweight/obesity among Ghanaians using data from the WHO Study on global AGEing and adult health (SAGE) Wave 2.
Study Design: Cross sectional study.
Place and Duration of Study: Ghana; 2014-2015.

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Methodology: Primary study variables were extracted onto Microsoft Excel 14.0 spreadsheet. Secondary variables were generated through grouping, recategorization and combination of primary variables. Descriptive statistics were calculated for age and BMI. Associations between respondents' characteristics and BMI were evaluated with chi square(χ^2) and odds ratio (OR) at 95% confidence level.

Results: Data of 1322 respondents were included in data analysis. In all, 520 (39.3%) of the respondents were overweight/obese and nearly half (46.62%) were middle-aged adults. Middle-aged adults were nearly twice as likely to be overweight/obese compared with old adults (AOR=1.62; CI: 1.25-2.10) and the risk was higher for middle-aged females (AOR=2.38; CI: 1.84-3.09). Overall, being middle-aged (OR=1.73; CI: 1.35-2.21); living in an urban community (OR=2.01; CI: 1.61-2.52); being a female (OR=2.69; CI: 2.1-3.44); not engaging in regular physical activity (OR=1.49; CI: 1.18-1.88); and being an occasional drinker of alcoholic beverage (OR=1.58; CI: 1,12-2.22) were significantly associated with overweight/obesity.

Conclusion: Obesity/overweight are lifestyle driven phenomenon and can be controlled by risk modification. Public sensitization, imposition of special taxes on sugary beverages, promotion of healthy local staples and creation of enabling community environments to encourage physical activity may be useful approaches in controlling the epidemic.

Keywords: SAGE Wave-2; Body Mass Index; obesity; overweight; middle-age.

ABBREVIATIONS

BMI : Body Mass Index
MOH : Ministry of Health
SAGE : Study on Global Ageing and Adult Health
WHO : World Health Organisation

1. INTRODUCTION

Obesity is a complex chronic condition of public health concern affecting people worldwide and it is the fifth leading cause of mortality globally [1,2]. According to WHO, the global prevalence of obesity has doubled in more than 70 countries since 1980 [3]. About 500 million people are obese worldwide [3,4] and by 2020, the number of overweight persons will reach 1.3 billion [5]. In Iran 34% of women and 10% of men have abdominal obesity. In Xinjiang Province in China the prevalence of obesity and overweight are 26.5% and 36.5% respectively with female dominance [6]. In Cote D'Ivoire 50.8% of adults have abdominal obesity [7] while the most recent South African Demographic Health Survey (SADHS 2016) estimated the prevalence of overweight/obesity among South Africans to be 68% and 31% for women and men respectively [8]. A study conducted by Lartey et al (2019) observed increasing prevalence of overweight/ obesity among Ghanaians [9]. Nearly 27% and 35% of non-pregnant Ghanaian women are overweight and obese respectively [10].

Body mass index (BMI); calculated as weight/height squared (kg/m^2), is a common and accepted measure for overweight and obesity although it may not be a true measure of adiposity [9]. According to WHO, obesity is defined as a BMI $\geq$ 30 kg/m^2, and overweight as a BMI of 25–30 kg/m^2 [10]. Risk factors for obesity and overweight are very diverse. Several studies have identified age, sex, educational level, alcohol consumption, tobacco smoking, consumption of high fat diet, multiparity and ownership of certain home appliances (television, telephone and refrigerators) as risk factors of overweight/obesity [6,10,11]. Middle-age presents significant risk for abnormally high BMI among people of varied sociodemographic backgrounds. In Iran, nearly 80% of middle-aged women are overweight/obese [12]. Chowdhury et al. (2018) observed a five-fold increase in trend of overweight/obesity among Bangladeshi women between 1999 and 2014 with the steepest rise among 35-44 years [13]. Among males the prevalence peaks around middle age (45-54 years) while in women the age group 50-70 has the highest prevalence [6,10].

Obesity is an independent risk factor for both cardiovascular disease and death [14]. Fat is redistributed from subcutaneous to abdominal depots and liver, muscles and other ectopic sites resulting in lipotoxicity and organ failure [15]. Previous studies have established that 5%–10% reduction in weight is associated with improvement in health and quality of life [16]. The aim of this study is to describe the age-related risk of overweight/obesity among Ghanaians using data from the WHO Study

on global AGEing and adult health (SAGE) Wave 2 collected in Ghana in the year 2014/2015.

2. MATERIALS AND METHODS

2.1 Introduction to SAGE

SAGE is a longitudinal multi-country study that provides ageing data to complement existing sources to inform policy and programmes [17]. The SAGE Wave-2 data was collected in 2014-2015 as a follow up to Wave-1 in six countries including Ghana [18]. It was collected from two target populations: a large sample of persons aged 50 years and older which is the focus of the study and a smaller comparative sample of persons aged 18-49 years. Respondents who were lost to follow-up in each country were replaced to maintain the sample sizes [18]. In Ghana, data collection was a collaboration between WHO and the Division of Behavioural and Social Research at the United States National Institute on Ageing with support from University of Ghana and the Ministry of Health (MOH) [17].

Respondents were interviewed with regard to household characteristics; sociodemographic and work history; perceived health status; risk factors and preventive health behaviours; chronic conditions and health service coverage; healthcare utilization; subjective wellbeing and quality of life; and social cohesion. Anthropometric measurements including blood pressure, weight and height were also carried out [17,18].

2.2 Data Extraction and Handling

Primary study variables were extracted onto Microsoft Excel 14.0 spreadsheet. Secondary variables were generated to facilitate data analysis.

Table 1. Definition of secondary variables, SAGE Wave-2, Ghana; 2014/2015

| No	Variable	Definition
1	Age group	Age in years categorized as: • <40 – Young adult • 40-59 – Middle-aged • >59 – Old adult
2	Marital status	• Currently married – Married • Never married/Separated/Divorced/Widowed – Single • Cohabiting – Cohabiting
3	Highest educational achievement	• College/Pre-university/Postgraduate completed– Tertiary • High School completed – Secondary • Primary/Junior High School completed – Secondary • Less than Primary completed – Illiterate
4	Fruit consumption	Number of servings eaten in a day • 0 – None • ≥ 1 – Adequate
5	Vegetable consumption	Number of servings eaten in a day • 0 – None • 1 ≥ - Adequate
6	Bottles of alcohol per week	• ≤ 1 – Occasional drinker • > 1 – Regular drinker
7	Activity	Exercises actively or walk or use bicycle • No – Does not exercise • Yes – Exercises
8	Body Mass Index (BMI)	• 18.5-24.9 – Normal • > 24.9 – Overweight/Obese (Abnormal)
9	Subjective wellbeing	• Moderate/Bad/Very bad – Suboptimal • Good/Very good – Optimal
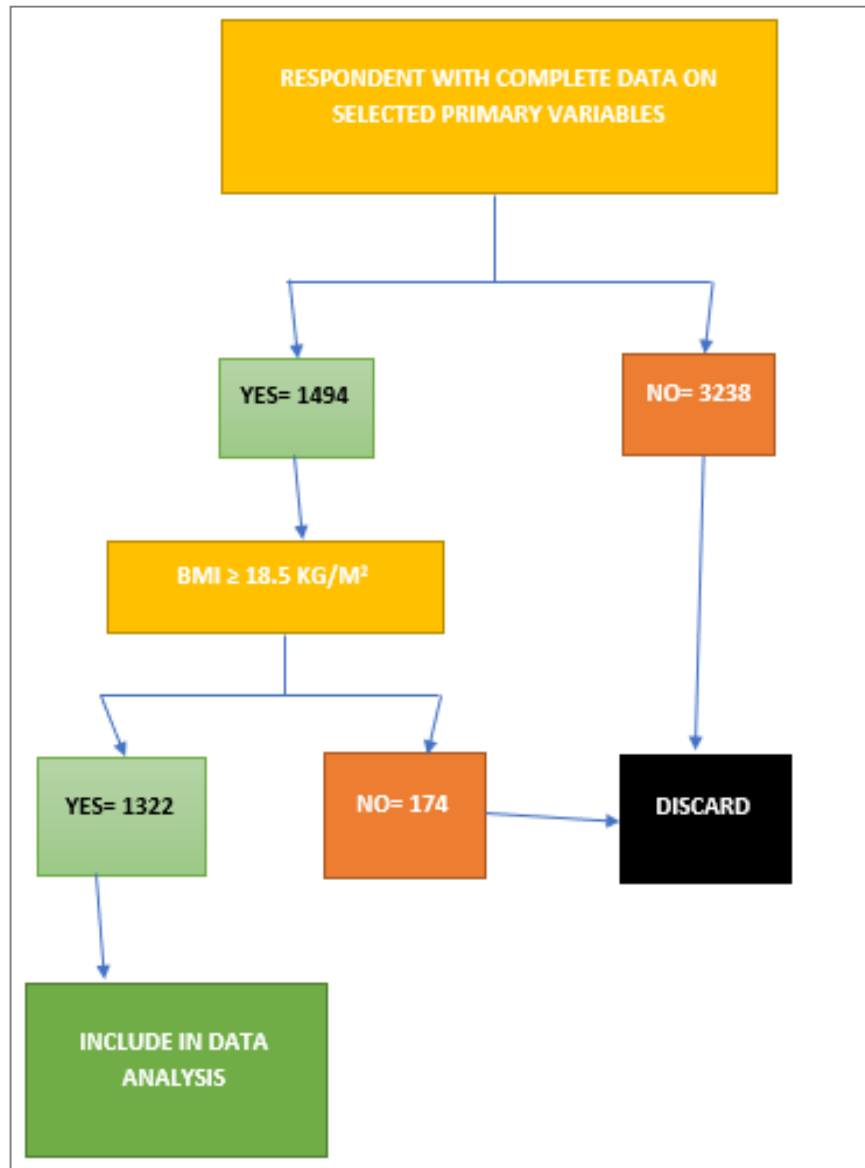
Fig. 1. Criteria for data inclusion, SAGE Wave-2, Ghana; 2014/2015

2.2.1 Primary variables

Sociodemographic variables including age, sex, location (rural/urban), highest educational achievement, marital status and anthropometric measurements (weight and height) were extracted. Participants' responses to questions on number of servings of fruits consumed in a day; number of servings of vegetables consumed in a day; consumption of drinks containing alcohol and number of bottles per day in the preceding seven days; walk or use of bicycle for at least ten minutes continually to get to and from places; actively exercising for at least ten minutes once in a week; and self-rating of health (subjective wellbeing) were also included in the study data.

2.2.2 Secondary variables

Secondary variables were generated through grouping, recategorization and combination of primary variables. For example, "age" was categorized using the scale <40; 40-59; and >59. Table 1 displays definitions of secondary variables.

2.3 Data Analysis

Fig. 1 sets out criteria for data inclusion. Respondents with complete data for the primary variables and BMI of at least 18.5kg/m^2 were included in the study. Data was exported into Epi info statistical software (Epi info 7 version 7.2.2.16; www.cdc.gov/epiinfo) for analysis. The outcome variable was BMI and predictor variables included age, sex, marital status, education and location, fruit, vegetable and alcohol consumption, and activity. Descriptive statistics (mean, median, standard deviation, range, first and third quartiles) were calculated for age and BMI. Frequency and percentage distribution of characteristics were computed with cross tabulations to compare BMI of respondents dichotomized as "normal" and "abnormal". Associations between respondents' characteristics (predictors) and BMI were evaluated with chi square(χ^2) and odds ratio (OR) while relationship between BMI and subjective wellbeing was evaluated with χ^2. Logistic regression was conducted at 95% confidence level to determine predictors of overweight/obesity among respondents.

3. RESULTS AND DISCUSSION

Data of 1496 respondents were extracted. Of this, 1322 (88.4%) with BMI of at least 18.5kg/m^2 were included in data analysis. Five hundred and twenty (39.3%) of the respondents were overweight/obese and nearly half (46.62%) were middle-aged adults. The average BMI of respondents was 24.8 kg/m^2 with a standard deviation (SD) of 4.6 kg/m^2. The lowest was 18.5 kg/m^2 while the highest was 40.5 kg/m^2. Twenty-five per cent (first quartile, Q_1) of respondents had BMI up to 21.3 kg/m^2 and half of them (median) were below or equal to 23.6 kg/m^2. Seventy-five per cent (third quartile, Q_3) were below or equal to 27.3 kg/m^2. The mean age of respondents was 57.0 years (SD=17.0; median=23.6; Q_1=49.0; Q_3=69.0; range=18.0-110.0). Four hundred and three (30.48%) of the respondents rated wellbeing as suboptimal of which 231 (57.32%) had normal BMI.

Majority (63.84%) were females and more than half (54.24%) were below 59 years. Nearly 55% were married, as in Table 2. Less than one-tenth (5.37%) were educated up to tertiary level and about three-fifth (56.20%) lived in communities classified as rural. Almost two-thirds (66.94%) engaged in a type of physical activity continuously for at least ten minutes and more

than 85% drunk alcoholic beverages occasionally. Only 9.83% and 0.61% respectively did not consumed fruits and vegetables routinely as part of diet.

Being middle-aged (OR=1.73; CI: 1.35-2.21); living in an urban community (OR=2.01; CI: 1.61-2.52); being a female (OR=2.69; CI: 2.1-3.44); not engaging in regular physical activity (OR=1.49; CI: 1.18-1.88); and being an occasional drinker of alcoholic beverage (OR=1.58; CI: 1,12-2.22) were significantly associated with overweight/obesity (Table 3).

At the multivariate level middle-aged adults were nearly twice as likely to be overweight/obese compared with old adults (AOR=1.62; CI: 1.25-2.10) and the risk was higher for middle-aged females (AOR=2.38; CI: 1.84-3.09). Other factors including living in an urban community (AOR=1.79; CI: 1.42-2.26); and not engaging in regular physical activity (AOR=1.34; CI: 1.04-1.71) were also significantly associated with overweight/obesity. There was no significant relationship between overweight/obesity and subjective wellbeing (p=.01).

Obesity is caused by a complex interaction between the environment, genetic predisposition, and human behaviour. The high prevalence of overweight/obesity (nearly 40%) among respondents is consistent with findings of other studies which suggest rates of 30-50% [6,10,12]. The study found that being middle-aged; living in an urban community; not having regular physical activity and being a female were significant risk factors for overweight/obesity.

The high prevalence of overweight/obesity among middle-aged Ghanaians could be can be attributed to physiological changes associated with advancing age which leads to increased formation of adipose tissue with maximal deposition occurring in middle-age and declining thereafter [19]. With increasing age people become often less active, which also contributes to reduced total energy expenditure and a consequent effect on energy balance [20]. In addition, in much older adults, the low caloric intake coupled with increased death rate of senescent cells lead to decrease adiposity compared with the middle-aged.

Furthermore, manifestation of significant risk (of overweight/obesity) in middle-age may be an attestation of poor lifestyle exhibited in early life

especially young adulthood. In the Ghanaian context, being overweight is seen to be aesthetic and a sign of affluence. There is thus a sociocultural positive drive and tacit approval of the society for people to gain more weight as a sign of wellbeing. Context-specific public engagement and education is thus imperative in the quest to reduce the burden and risk of obesity among the adult population in Ghana.

Urbanization is associated with changes in diet and food availability, use of mechanized transport and increased tendency for sedentary lifestyle [9]. Consumption of fibre-rich stables have given way to exotic energy-dense food and beverages loaded with sugar, fat and salt [13]. Although consumption of fruits and vegetables helps control weight gain, the study found no association with overweight/obesity and this is

finding is in keeping with the observation of Duda et al. [10].

Infrastructural development in urban areas have taken over leisure and games parks resulting in inadequate safe places for physical activities. Possession of televisions, telephones and refrigerators is also associated with obesity [10]. Proliferation of viewer-catching drama series and computer games is turning many into screen "addicts" at the expense of physical activity. Such sedentary activities are often associated with consumption of high quantities of snacks and beverages leading to accumulation of excess calories [13]. There is no active and sustainable implementation of concise national policies on exercise and health promotion strategies targeting overweight/obesity as issues of public health concern.

Table 2. Respondents' characteristics, SAGE Wave-2, Ghana; 2014/2015

Variable	Normal BMI n (%)	Abnormal BMI n (%)	Total N (%)	P-value
Age group				
40-59	253 (53.38)	221 (46.62)	474 (35.86)	.00
> 59	402 (66.45)	203 (33.55)	605 (45.76)	
< 40	147 (60.49)	96 (39.51)	243 (18.38)	
Sex				
Male	358 (74.90)	120 (25.10)	478 (36.16)	.00
Female	444 (52.61)	400 (47.39)	844 (63.84)	
Marital status				
Married	447 (61.07)	285 (38.93)	732 (55.37)	.87
Cohabiting	10 (55.56)	8 (44.44)	18 (1.36)	
Single	345 (60.31)	227 (39.69)	572 (43.27)	
Education				
None	190 (60.13)	126 (39.87)	316 (23.90)	.87
Basic	415 (61.30)	262 (38.70)	677 (51.21)	
Secondary	152 (58.91)	106 (41.09)	258 (19.52)	
Tertiary	45 (63.38)	26 (36.62)	71 (5.37)	
Location				
Rural	505 (67.97)	238 (32.03)	743 (56.20)	.00
Urban	297 (51.30)	282 (48.70)	579 (43.80)	
Physical activity				
Yes	565 (63.84)	320(36.16)	885 (66.94)	.00
No	237 (54.23)	200 (45.77)	437 (33.06)	
Alcohol consumption				
Regular drinker	124 (69.66)	54 (30.34)	178 (13.46)	.01
Occasional drinker	678 (59.27)	466 (40.73)	1144 (86.54)	
Fruit consumption				
Yes	724 (60.74)	468 (39.26)	1192 (90.17)	.87
No	78 (60.00)	52 (40.00)	130 (9.83)	
Vegetable consumption				
Yes	797 (60.65)	517 (39.35)	1314 (99.39)	.92
No	5 (62.50)	3 (37.50)	8 (0.61)	

Table 3. Estimated odds ratio for overweight or obesity, SAGE Wave-2, Ghana; 2014/2015

Characteristic	OR	95%CI	p-value	AOR	95%CI	P-value
Age						
>59 (ref)	1.0			1.0		
40-59	1.73	1.35-2.21	0.000	1.62	1.25-2.10	.00
<40	1.29	0.95-1.76	0.101	1.89	0.86-1.64	.29
Location (ref)						
Rural	1.0			1.0		
Urban	2.01	1.61-2.52	0.00	1.79	1.42-2.26	.00
Sex						
Male (ref)	1.0			1.0		
Female	2.69	2.10-3.44	0.00	2.38	1.84-3.09	.00
Physical activity						
Yes (ref)	1.0			1.0		
No	1.49	1.18-1.88	0.00	1.34	1.04-1.71	.02
Alcohol consumption						
Regular drinker (ref)	1.0			1.0		
Occasional drinker	1.58	1.12-2.22	0.00	1.08	0.75-1.56	.67

The association of female sex with overweight or obesity is in tandem with findings of other studies conducted globally [6,21,22]. Hormone-driven deposition of fat in the buttocks, hips, breast and abdomen occurs throughout the reproductive ages and predisposes women to overweight/obesity. Women with more than five deliveries and those more than 34 years have added risk for overweight/obesity [10]. Among people of West African extraction, the sex difference in the prevalence of obesity (central adiposity) is partly attributable to the presence of a gene which confers protection in males [23].

Although overweight/obesity are independent risk factors for cardiovascular diseases and deaths [14], the study found no association with subjective wellbeing. This may be due to response bias arising from self-rating of wellbeing. As stated earlier, overweight/obesity are seen as signs of good living and those affected may reluctantly admit to poor wellbeing especially when they have no symptoms or physical signs of ill-health. Again, it could also be due to interviewer bias resulting from how the question was posed or interpreted by data collectors.

A limitation of the study is the cross-sectional nature of the data used for analysis. Causality could therefore not be determined. In addition, only respondents with complete data were used in the analysis with a potential risk of selection bias. However, the SAGE Wave 2 overall was a nation-wide representative survey.

4. CONCLUSION

Middle-aged adult males and females are relatively more overweight/obesity compared to other age groups of the adult Ghanaian population. The increasing prevalence of overweight/obesity in the Ghanaian adult population has implications for cardiovascular and metabolic diseases including type II diabetes mellitus. Context-specific public engagement and education by the Ministry of Health/ Ghana Health Service is thus imperative in the quest to reduce the burden and risk of obesity among the adult population in Ghana.

National level policy changes to control influx of sugary beverages and other unhealthy foods in the Ghanaian market should be pursued. In addition, a deliberate national effort to promote healthy local staples for national programmes by agencies such as Ministry of Gender and Social Protection, Ministry of Education/ Ghana Education Service (i.e. School Feeding Programme for both basic and senior high schools) and Local Government Ministry and Departments as well as the National Youth Authority is essential.

ETHICAL APPROVAL AND CONSENT

Administrative approval was given by MOH, Ghana and ethical clearance was by WHO's Ethical Review Board (Protocol ID: RPC149).

Written informed consent, confidentiality and anonymity were observed throughout the study.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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