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## Chapter

# Factors Associated with Overweight and Obesity among Women Aged 15-49 Years in Zimbabwe: Evidence from the 2005/6, 2010/11 and 2015 Zimbabwe Demographic and Health Survey

*Kudzaishe Mangombe, Naomi Wekwete, Amos Milanzi, Ronald Musizvingoza and Charles Lwanga*

## Abstract

Overweight and obesity have increasingly become a health concern globally and, in particular, developing countries such as Zimbabwe. Obesity is associated with an increased risk of non-communicable diseases such as diabetes and cardiovascular diseases. Previous studies in the country have controlled for other factors, but none have examined the relationship between household assets ownership and body mass index. This study examines the association between demographic, socioeconomic factors and household assets ownership and obesity among Zimbabwean women of reproductive age over the 10-year period from 2005 to 2015 based on three Demographic and Health Surveys. The analytical sample consisted of non-pregnant women aged 15–49 years who were *dejure* household residents. Logistic regression models were used to examine the association between background variables and Body Mass Index. Women in urban areas, with higher education, working and from richer households are more likely to be at risk of overweight and obesity. However, possession of household assets such as television, radio and telephone were not associated with overweight/obesity, except for the television in 2010/11. Thus, there is need for constant awareness programmes on healthy eating food, and physical activity especially among older women and those working.

**Keywords:** obesity, overweight, household assets, trends, Zimbabwe

## 1. Introduction

Obesity has become a public health problem that has shifted from being a problem in rich countries to one that is found across all income levels. Worldwide obesity has nearly tripled and it is estimated that 4.7 million people died

prematurely in 2017 due to obesity-related causes [1]. The number of premature deaths due to obesity-related causes is projected to increase to 5.5 million in 2025 [2]. Sub-Saharan Africa has the lowest prevalence of obesity in comparison to other regions of the world [3]. However, the prevalence of obesity and overweight is projected to increase in the next two decades [4] and Southern Africa is disproportional affected [5]. In response to this, World Health Organisation (WHO) came out with “Global action plan on physical activity 2018–2030: more active people for a healthier world” which is aimed at providing effective and feasible policy actions to increase physical activity globally [6]. In Zimbabwe, the prevalence of overweight and obesity increased substantially over the decade from 25% in 2005 to 36.6% in 2015 [7]. Obesity is likely to lead to death, high blood pressure/hypertension, high cholesterol coronary, diabetes, cardiovascular diseases (CVDs), hypertension, coronary heart disease, and stroke [6].

Evidence from several research studies indicated that socio-economic background factors increased the likelihood for individuals to end up being obesity. The emerging prevalence of overweight and obesity in Africa has been largely attributed to the rising level of urbanisation in the region and its attendant global nutrition transition [8]. Urbanisation in Africa is increasing rapidly and African countries are projected to have 50% urbanisation by 2020 [9]. These risk factors of obesity are similar to those found in several studies across the world as accounting for the increasing overweight and obesity epidemic in developing countries and the stall in the phenomenon in developed countries [10, 11]. Literature is showing differences in overweight and obesity to the disadvantage of those in urban settings [5]. These rural–urban disparities could be explained by the differences in lifestyle such as time spent watching television, mechanisation of occupation and dietary pattern in Africa [5, 12, 13]. Studies elsewhere have confirmed that women who were informally employed and listened to the radio were less likely to be overweight or obese compared to those who were unemployed and did not listen to the radio, respectively [14].

Research had shown socioeconomic differences in overweight and obesity by the level of education and wealth to the detriment of those with lower socio-economic status in most countries across Africa similar to those found in other previous studies [15]. Studies have argued that cultural norms that favour fatter body size contribute significantly to the socio-economic status differences in overweight and obesity in developing countries, particularly in Africa [16]. Women of higher socioeconomic status have the resources and knowledge of the importance of physical activity and healthy diet but they also face several socio-cultural barriers that may prevent them from putting those into use [17]. With specific reference to those with no education, research had shown that the odds of being overweight/obese significantly increased with the level of education [18].

Studies have revealed a significant association between overweight/obesity and age [14, 19, 20]. Studies have shown the likelihood of obesity and overweight to be high among older women and the possible reason for this finding maybe that old age is likely to be characterised by high physical inactivity as well as the consumption of more energy-dense foods, which may result in overweight and obesity [14]. Another possible explanation for this could be that, as people grow, the composition of their body changes, which results in an increase in fat mass and a decline in fat-free mass [19, 20]. Overweight and obesity vary greatly between men and women, with women across the globe disproportionately affected [21]. Generally, women with higher parities have been found to have higher retention of gestational weight gain and consequently the onset of overweight and obesity [16, 22]. The real impact of parity and associated reproductive factors could, however, be modest and intertwined in a complex pattern with socio-cultural, demographic and socio-economic factors, as well as other risk factors [22].

Researches have shown an association between religious affiliation and obesity and overweight. This finding can be explained in the context of a study by Kahan (2015) in 38 countries that found high rates of physical inactivity among Muslim women, as well as Benjamin and Donnelly (2013) who conducted a study on barriers and facilitators influencing the physical activity of Arabic adults [23, 24]. Married women are more susceptible to being overweight or obese, thus marital status is a strong predictor of obesity [25]. Hormonal contraception use has been found to increase the risk of obesity and injected depot medroxyprogesterone acetate also increased weight [26, 27].

The rapidly changing role of women in African societies, with their increasing involvement in the labour force, especially in urban areas contribute to the dramatic changes in dietary patterns and food supply occurring in these settings [28]. In addition, in these settings, a direct relationship between socioeconomic status and obesity has been observed, since higher socioeconomic groups are more likely to buy extra food and achieve their desire to look healthy and strong [29]. Therefore, this paper aim to investigate the problem of obesity and included household assets as part of the background variables.

## 2. Methods

### 2.1 Source of data

This paper utilises pooled data from 3 consecutive Zimbabwe Demographic and Health Surveys (ZDHS) from the following years; 2005/6, 2010/11 and 2015. The ZDHS is a nationally representative sample survey of women aged 15–49 years, which is conducted every five years. Permission to use the data sets was sought from Measure DHS. The data collected covers: individual and household level socio-demographic; health and sexual activity; maternal and child health; mortality; fertility; family planning; and nutrition.

### 2.2 Study participants and sample size

The sample sizes of the interviewed women aged 15–49 were selected based on a master sampling plan, which was provided by the Central Statistics Office (1988–2005) and Zimbabwe National Statistics Agency (ZIMSTAT) (2010–2015). A two-stage cluster sampling process was used. Firstly, enumeration areas were selected from a list of clusters obtained from the master sampling plan provided by ZIMSTAT, followed by a selection of households from each cluster. All women aged 15–49 years were selected from each selected household and interviewed. Informed consent was obtained from the respondents before being interviewed. The analysis was limited to currently non-pregnant women aged 15–49 years who were *dejure* household members: survey year 2005/6,  $n = 7,798$ ; 2010/11,  $n = 7,612$ ; and 2015,  $n = 8,552$ ). All data sets from the three surveys were weighted.

## 3. Variables

### 3.1 Dependent variable

Overweight and obesity was the outcome variable and the measurement of obesity is based on the Quetelet Index, also known as body mass index (BMI). BMI is weight divided by height squared ( $\text{kg/m}^2$ ). The biomarkers took the weight and



height measurements during the face-to-face interviews. The study adopted the widely accepted definition of overweight and obesity as a BMI of  $\geq 25.0 \text{ kg/m}^2$  and  $30 \text{ kg/m}^2$ , respectively. Overweight and obesity were combined as one category to ensure enough cases for the analysis. We use a binary variable to classify respondents whose BMI was  $\geq 25.0 \text{ kg/m}^2$  as overweight and obesity and coded “1” while those below  $25.0 \text{ kg/m}^2$  were classified otherwise and coded “0”.

### 3.2 Independent variables

The independent variables used in this study were categorised into two groups: demographic factors and socioeconomic status (SES). The demographic factors were: age (15–19, 20–24, 25–29, 30–34, 35–39, 40–49); parity (<2, 2–3, 4–5, 6+); marital status (never in a union, currently in a union, and formerly in a union); religion (Roman Catholic, Protestant, Pentecostal and others). SES was measured using six indicators: wealth (poorest, poorer, middle, richer and richest); the level of education (no education and primary were collapsed for easy analysis), secondary, higher education); employment status (unemployed and employed); place of residence (rural or urban); region or province all (ten Zimbabwean provinces were included); and household assets (radio, television and telephone).

### 3.3 Data analysis

We used frequency distributions to describe and summarise the characteristics of the respondents across all three survey years under study. In addition, the bivariate relationship between the background characteristics and the dependent variable were examined using the Chi-square test of independence. In the last part, three binary logistic regression models were fitted to examine the associations between the independent variables and the outcome variable.

## 4. Findings

About a quarter (25.2%) of the women were either overweight or obese in 2015, 31.3% in 2010 and 34.9% in 2015 (**Table 1**). The majority of women sampled were from rural areas, 59.8% in 2005, 61.7% in 2010 and 61.9% in 2015. More than two-thirds of women came from households that had wealth between middle and richest, 66.4% in 2005, 65.8% in 2010 and 65.8% in 2015. At least sixty percent of women had at least secondary education, 63.3% in 2005, 59.6% in 2010 and 72.8%. Most respondents were aged between 15 and 34 years, 74.5% in 2005, 72.1% in 2010 and 51% in 2015. The majority of women had parity <2, 46.9% in 2005, 44.1% in 2010, 41.2 in 2015. The most common religion was Apostolic sect, 29.2% in 2005, 37.4% in 2010 and 41.4% in 2020. More than half of women were currently in a union, 54.6% in 2005, 59.5% in 2010 and 59.5% in 2015. In terms of employment, most women were not working, 62.4% in 2005, 62.2% in 2010 and 57.9% in 2015. The highest proportions of women were from Harare province, 17% in 2005, 18.4% in 2010 and 17.8% in 2015. The least proportion of women was from Matebeleland South province, 5.0% in 2005, 5.2% in 2010 and 4.2% in 2015. Close to half of the women reported that their household owned a radio (55.2% in 2005, 41.3% in 2010 and 55.6% in 2015). Around 40% of women reported that their household owned a television set (39.2% in 2005, 43.2% in 2010 and 44.3% in 2015). Ownership of a telephone was low, 11.4% in 2005, 4.9% in 2010 and 3.9% in 2015.

Variables	2005/06(%)	2010/11(%)	2015(%)
<b>Place of Residence</b>			
Urban	3,136 (40.2)	2911(38.3)	3,260(38.1)
Rural	4661(59.8)	4,700(61.7)	5,292 (61.9)
<b>Household wealth</b>			
Poorest	1,340 (17.2)	1288(16.9)	1,468 (17.2)
Poorer	1,271 (16.3)	1,320(17.4)	1,452(17.0)
Middle	1,345 (17.2)	1382(18.2)	1,536(18.0)
Richer	1765 (22.6)	1,697 (22.3)	1,945(22.7)
Richest	2077(26.6)	1922(25.3)	2,151(25.1)
<b>Level of Education</b>			
No Education/Primary	2869(36.8)	2310 (30.4)	2,328(27.2)
Secondary	4690(60.2)	4933 (54.8)	5,603(65.5)
Higher	238(3.1)	368(4.8)	620(7.3)
<b>Age</b>			
15–19	1880 (24.1)	1638(21.5)	1,912 (2.3)
20–24	1605 (20.6)	1452 (19.1)	1,381 (16.5)
25–29	1249(16.0)	1,317(17.3)	1,381 (16.5)
30–34	1,073 (13.8)	1084(14.2)	1,345(15.7)
35–39	769(9.9)	874(11.5)	1095(12.8)
40–44	652(8.4)	673(8.9)	907(10.6)
45–49	570(7.3)	574(7.5)	528(6.2)
<b>Parity</b>			
<2	3654 (46.9)	3353(44.1)	3,524 (41.2)
2–3	2288(29.3)	2550(33.5)	2,977 (34.8)
4–5	1118(14.4)	1158(15.2)	1,508 (17.6)
6+	738(9.5)	551 (7.2)	543 (6.4)
<b>Religion</b>			
Roman Catholic	793 (10.2)	653(8.6)	575 (6.7)
Protestant	2042 (26.2)	1290 (17.0)	1,390 (16.3)
Pentecostal	1384 (17.8)	1643 (21.6)	2,138 (25.0)
Apostolic sect	2278 (29.2)	2,844(37.4)	3,542 (41.4)
Others	1300(16.7)	1181 (15.2)	906 (10.6)
<b>Marital Status</b>			
Never in Union	2253 (28.9)	1964(25.8)	2,278(26.6)
Currently in Union	4260 (54.6)	4523(59.5)	5,089(59.5)
Formerly in Union	1285 (16.5)	1121 (14.7)	1,186(13.9)
<b>Employment status</b>			
Working	2942 (37.8)	2875 (37.8)	3,598(42.1)
Not Working	4841(62.4)	4737(62.2)	4,954(57.9)

Variables	2005/06(%)	2010/11(%)	2015(%)
<b>Province of Residence</b>			
Manicaland	912(11.7)	1007(13.2)	1,069(12.5)
Mashonaland central	707(9.1)	731(9.6)	738 (8.6)
Mashonaland east	624(8.0)	699(9.2)	839 (8.7)
Mashonaland west	721(9.3)	878 (11.5)	997 (11.7)
Matabeleland north	474 (6.1)	377 (5.0)	405 (4.7)
Matabeleland south	393(5.0)	398(5.2)	357 (4.2)
Midlands	1,031(13.2)	937(12.3)	1,073 (12.6)
Masvingo	970(12.4)	741 (9.7)	1,036(12.1)
Harare	1322 (17.0)	1340(18.4)	1,525 (17.8)
Bulawayo	643(8.2)	443 (5.8)	513(6.00)
<b>household has: radio</b>			
No	3494 (44.8)	4,464 (58.7)	4,773 (55.8)
Yes	4300 (55.2)	3,148(41.3)	3,7789(44.1)
<b>household has: television</b>			
No	4740 (60.8)	4,319 (56.7)	4,767(55.7)
Yes	3052 (39.2)	3,293 (43.2)	3,785(44.3)
<b>household has: telephone</b>			
No	6906 (88.6)	7,240 (95.1)	8,218 (96.1)
Yes	887 (11.4)	372(4.9)	334(3.9)
<b>Total, n</b>	<b>7798(100)</b>	<b>7,612 (100)</b>	<b>8,552(100)</b>

**Table 1.**  
*Percentage distribution of the characteristics of women in Zimbabwe, 2005–2015.*

The results show that there has been an increasing trend in the percentage of women in Zimbabwe who were either overweight or obese from 2005/06 (25.2%) to 2015 (34.9%) (See **Table 2**).

The results of the bivariate analysis reveal a significant association between background variables and overweight/obesity (**Table 2**). Women from urban areas were more likely to be overweight or obese (35.8 in 2005, 40.3% in 2010 and 46.7% in 2015) compared to those from rural areas (18% in 2005/06, 25.4% in 2010/11 and 27.7% in 2015) ( $p = 0.000$ ). Similarly, urban provinces such as Harare and Bulawayo were more likely to have women who were obese and overweight compared to women in rural provinces ( $p = 0.000$ ). Women from richest households were at higher risk of overweight/obesity over the period, 39.1% in 2005, 42.5% in 2010 and 50% in 2015 compared to women from the poorest households (13.6, 17.4 and 18.7%, respectively) ( $p = 0.000$ ). Similarly, the level of education was associated with the prevalence of overweight/obesity ( $p = 0.000$ ). Women with higher education were more likely to be obese/overweight (57.4% in 2005, 48% in 2010 and 57% in 2015) compared to women with primary or no education (22.6%, 29.5% and 28.2%, respectively) ( $p = 0.000$ ). Obesity/overweight increased with parity, for 2005/06 and 2010/11, the highest prevalence of overweight/obesity was among women with 4–5 children while for 2015, the highest prevalence was among women

Variables	2005/06(%)		2010/11(%)		2015(%)	
Prevalence of Obesity						
Obese/Overweight	1963(25.2)		2,383(31.3)		2,984(34.9)	
Normal	5,835(74.8)		5,229(68.7)		5,568(65.1)	
Place of Residence						
Urban	1121 (35.8)	0.00	1189 (40.3)	0.00	1521 (46.7)	0.00
Rural	842 (18.0)		1194 (25.4)		1527 (27.7)	
Household wealth						
Poorest	182(13.6)	0.00	224(17.4)	0.00	279 (18.7)	0.00
Poorer	194 (15.3)		314(23.8)		355(24.5)	
Middle	251(18.7)		394(28.5)		472 (30.7)	
Richer	524(29.7)		635 (37.4)		802 (41.2)	
Richest	812 (39.1)		817(42.5)		1076 (50.0)	
Level of Education						
No Education/Primary	647 (22.6)	0.00	681 (29.5)	0.00	656(28.2)	0.00
Secondary	1179 (25.1)		1525 (30.9)		1972 (35.2)	
Higher	137 (57.4)		177(48.1)		356(57.4)	
Age						
15–19	214 (11.4)	0.00	200 (12.2)	0.00	251 (13.1)	0.00
20–24	293 (18.3)		305 (21.0)		331(24.0)	
25–29	322 (25.8)		432 (32.8)		481(34.8)	
30–34	334 (31.2)		430 (39.7)		621(46.2)	
35–39	302(39.3)		389 (43.8)		529(48.2)	
40–44	270(41.4)		336 (49.9)		491(54.1)	
45–49	229 (40.1)		297 (51.7)		281(53.2)	
Parity						
<2	635 (17.4)	0.00	705 (21.0)	0.00	806(22.9)	0.00
2–3	688(30.1)		930 (36.5)		1272 (42.7)	
4–5	389(34.7)		511 (44.2)		659(43.7)	
6+	251(34.1)		237 (43.0)		248 (45.7)	
Religion						
Roman Catholic	254 (32.0)	0.00	258 (39.4)	0.00	226(39.4)	0.00
Protestant	643 (31.5)		496(38.5)		556(40.7)	
Pentecostal	388 (28.0)		565(34.4)		849 (39.7)	
Apostolic sect	431(18.9)		741(26.1)		1037 (29.3)	
Others	248(19.1)		324(27.4)		307(33.8)	
Marital Status						
Never in Union	342(15.2)	0.00	328 (16.7)	0.00	420(18.4)	0.00
Currently in Union	1248 (29.3)		1648(36.4)		2075 (40.8)	
Formerly in Union	374 (29.1)		407(36.3)		489(41.3)	



Variables	2005/06(%)		2010/11(%)		2015(%)	
Employment status						
Working	932(31.7)	0.00	1270 (26.8)	0.00	1608 (44.7)	0.00
Not Working	1031 (21.3)		1313 (38.7)		1377 (27.8)	
Province of Residence						
Manicaland	258(28.3)	0.00	231(31.9)	0.00	330 (30.9)	0.00
Mashonaland central	89(12.6)		165 (22.6)		216(29.2)	
Mashonaland east	135(21.6)		200(28.7)		278(33.1)	
Mashonaland west	164 (22.7)		253 (28.8)		310(31.6)	
Matabeleland north	78 (16.6)		88 (23.3)		116 (28.6)	
Matabeleland south	98 (25.0)		102(25.6)		100(27.9)	
Midlands	227 (22.0)		278(29.7)		342(31.9)	
Masvingo	192(19.8)		214 (28.9)		320 (31.0)	
Harare	491 (37.1)		601 (43.0)		736 (48.2)	
Bulawayo	231 (35.9)		160 (36.2)		237 (46.2)	
Household has: radio						
No	631 (18.0)	0.00	1285 (28.8)	0.00	1614 (33.8)	0.05
Yes	1332 (31.0)		1098 (34.9)		1370 (36.3)	
Household has: television						
No	878 (18.5)	0.00	1064 (24.6)	0.00	1310 (27.5)	0.00
Yes	1085(35.5)		1320 (40.1)		1675 (44.2)	
Household has: telephone						
No	1589 (23.0)	0.00	2218 (30.6)	0.00	2831 (34.5)	0.00
Yes	374 (42.0)		165 (44.3)		154 (46.0)	
Overall	1963(25.2)		2,383(31.3)		2985 (34.9)	

**Table 2.**  
*Prevalence of overweight and obesity by background variables.*

with 6+ children ( $p = 0.000$ ). Women currently in a union or formerly in the union were more likely to be overweight or obese compared to women who have never been in union ( $p = 0.000$ ). For 2005/06 and 2015, women who were working were at higher risk of overweight/obesity (31.7% in 2005 and 44.7% in 2015) compared to women not working (21.3% and 27.8%, respectively)  $p = 0.000$ ). For 2010/11, women who were not working were more likely to be overweight or obese (38.7%) than those not working (26.8%) ( $p = 0.000$ ) in 2010.

Household asset ownership was associated with the prevalence of overweight/obesity. Women from households with radios were more likely to be overweight/obese (31% in 2005/06, 34.9% in 2010/11) compared to women from households without a radio had prevalence of (18.0% in 2005, and 28.8% in 2010) ( $p = 0.00$ ). Women from households with television were more likely to be overweight or obese (35.5% in 2005, 40.1% in 2010 and 44.2% in 2015) compared to women from households without a television (18.5%, 26.6% and 27.5%, respectively) ( $p = 0.000$ ). Women from households which owned a telephone had the highest prevalence of overweight/obesity, 42.0% in 2005, 44.3% in 2010 and 46.0% in 2015

Variables	2005 aOR(95% CI)	2010 aOR(95% CI)	2015 aOR(95% CI)
<b>Place of Residence</b>			
Urban (ref)			
Rural	0.95 (0.72-1.22)	0.80(0.64-0.99)**	1.11 (0 .87-1.42)
<b>Household wealth</b>			
Poorest(ref)			
Poorer	1.18 (0.93- 1.49)	1.58(1.28- 1.95)***	1.46(1.17-1.81)***
Middle	1.44(1.12-1.84)**	1.95 (1.56-2.47)***	1.95(1.58-2.41)***
Richer	2.35(1.70-3.20)***	2.38 (1.82-3.10)***	3.06 (2.32-4.05)***
Richest	3.06 (2.06-4.56)***	3.92(2.11-4.04)***	4.56 (3.20-6.51)***
<b>Level of Education</b>			
No Education/Primary(ref)			
Secondary	1.05( 0.89-1.25)	1.08 (0.92-1.27)	1.17 (1.01-1.35)**
Higher	1.89(1.37-2.60)***	1.19(0.89-1.60)	1.32 (1.01- 1.72)**
<b>Age</b>			
15–19(ref)			
20–24	1.37 (1.06-1.75)**	1.44 (1.12-1.84)**	1.42(1.12- 1.80)**
25–29	1.96(1.48- 2.59)***	2.41 (1.87-3.12)***	2.25(1.69-3.00)***
30–34	2.44 (1.82-3.28)***	2.99 (2.29- 3.92)***	3.38(2.53-4.50)***
35–39	3.24(2.41-4.36)***	3.58 (2.65- 4.84)***	3.70(2.71-5.05)***
40-44	3.69(2.73- 5.00)***	4.43 (3.21-6.11)***	4.75 (3.50-6.46)***
45-49	4.16 (3.94-6.88)***	5.04(3.61-7.03)***	4.74(3.31-6.78)***
<b>Parity</b>			
<2 (ref)			
2–3	1.25 (1.04-1.51)**	1.18 (0.97-1.44)	1.19(0.99- 1.43)*
4–5	1.49(1.15- 1.92)**	1.60 (1.26- 2.07)***	1.22(0.96- 1.56)*
6+	1.50(1.11-2.03)**	1.56(1.16-2.09)**	1.58 (1.17- 2.15)**
<b>Religion</b>			
Roman Catholic(ref)			
Protestant	1.00 (0.82-1.22)	0.97 (0.76-1.24)	1.07 (0.82-1.37)
Pentecostal	0.85 (0.69-1.06)	0.85(0.67-1.08)	1.00 (0.79-1.27)
Apostolic sect	0.75 (0.61-0.92)**	0.68 (0.54-0.86)***	0.87 (0.67-1.14)
Others	0.67(0.54-0.85)**	0.71(0.55-0.931)**	1.02(0.78-1.33)
<b>Marital Status</b>			
Never in Union(ref)			
Currently in Union	1.44 (1.14-1.83)**	1.68 (1.32-2.14)***	1.65(1.36-2.01)***
Formerly in Union	1.13(0.86-1.49)***	1.35(1.02-1.79)**	1.39(1.10- 1.75)**
<b>Employment status</b>			
Not Working(ref)			
Working	1.23 (1.06- 1.44)**	1.04(0.91-1.19)	1.15 (1.00-1.31)**

Variables	2005 aOR(95% CI)	2010 aOR(95% CI)	2015 aOR(95% CI)
<b>Province of Residence</b>			
Manicaland(ref)			
Mashonaland Central	0.44 (0.27-0.70)**	0.64(0.50-0.85)***	1.03(0.79-1.34)
Mashonaland East	0.66(0.50-0.87)**	0.84 (0.60-1.18)	0.97(0.75-1.24)
Mashonaland West	0.66 (0.51- 0.86)**	0.83 (0.68-1.01)	0.85(0.66-1.10)
Matabeleland North	0.69 (0.52-0.93)**	0.85 ( 0.63-1.12)	1.10 (0.82- 1.44)
Matabeleland South	1.00 (0.75-1.31)	0.94 (0.74-1.20)	0.90 ( 0.68-1.19)
Midlands	0.64 (0.51-0.81)***	0.92 (0.72-1.18)	0.96 (0.72-1.28)
Masvingo	0.89(0.67- 1.20)	1.05(0.84-1.31)	1.00 (0.78-1.30)
Harare	0.97(0.74-1.26)	1.02 (0.80-1.31)	1.16 (0.89-1.52)
Bulawayo	0.85(0.66-1.10)	0.78 (0.59-1.05)	1.12 (0.85- 1.42)
<b>household has: radio</b>			
No			
Yes	1.09(0.92-1.30)	1.02(0.89-1.15)	1.00 (0.88-1.14)
<b>household has: television</b>			
No			
Yes	1.08(0.90-1.29)	1.25 (1.05-1.47)**	1.07(0.89-1.29)
<b>household has: telephone</b>			
No			
Yes	1.38(1.12-1.69)	1.20 (0.92-1.58)	0.91 (0.65-1.29)
Notes: aOR, adjusted odds ratio.			
* $p < 0.1$			
** $p < 0.05$			
*** $p < 0.001$			

**Table 3.**  
Odds ratio estimates for overweight /obesity women aged 15-49 years from 2005-2015 in Zimbabwe.

compared to women with households without a telephone (23%, 30.6% and 34.5%, respectively) ( $p = 0.000$ ).

**Table 3** shows the results of the multiple regression, indicating variables that are statistically significant after controlling for other factors. Women from rural areas were less likely to be overweight/obese compared to those from urban areas only in 2010 ( $aOR = 0.80$ ,  $p < 0.05$ ). Household wealth was associated with being overweight/obese, with women from richest households were three times ( $aOR = 3.06$ ), four times ( $aOR = 3.92$ ) and five times ( $aOR = 4.56$ ) more likely to be overweight/obese compared to those from poorest households in 2005, 2010 and 2015, respectively ( $p < 0.001$ ). In 2005/06, women with higher education had a significantly higher likelihood of being overweight/obese compared to those with no/primary education (1.89 times higher,  $p < 0.001$ ), while in 2015, women with secondary and higher education were 1.17 and 1.32 more likely to be overweight/obese, respectively than those with primary or no education ( $p < 0.05$ ). Older women aged 45–49 years had increased odds of overweight/obesity compared to the young women aged 15–19 years, four times ( $aOR = 3.06$ ) in 2005, five times ( $aOR = 5.04$ ) in 2010 and five times ( $aOR = 4.74$ ) in 2015 ( $p < 0.001$ ). Parity also increased the likelihood of overweight/obesity, women with parity of 6+ had more than 50%

higher chances of being overweight/obese compared to those with parity of  $<2$  in three periods, 2005, 2010 and 2015 ( $p < 0.05$ ). Women currently in union were more likely to be overweight/obese compared to those never in union, 44% higher chances in 2005 ( $p < 0.05$ ), 68% higher chance in 2010 ( $p < 0.001$ ) and 65% higher chance in 2015 ( $p < 0.001$ ) (**Table 3**).

Working increased odds of overweight/obesity compared to those not working, aOR = 1.23 in 2005, and aOR = 1.15 in 2015 ( $p < 0.05$ ). Household ownership of radio and telephone did not show a statistically significant association with women's chances of being overweight or obese. Household ownership of television showed a significant increased likelihood of overweight/obesity in 2010 only (aOR = 1.25) ( $p < 0.05$ ) with no significant likelihood in 2005 and 2015.

## 5. Discussion

The aim of the study was to examine factors associated with overweight and obesity among women aged 15–49 years in Zimbabwe. Our study found that rural women were less likely to be overweight and obese than urban women. Similar findings were also reported by Neupane, Prakash and Doku 2015 who found obesity to be more prevalent in urban setups [5]. Neupane et al. [5] attributed this disparity to differences in lifestyle, dietary pattern and type of occupation. Women in rural areas tend to be involved in activities that call for their energy use such as farming, collecting firewood and fetching water and thus use up lots of calories. The study findings also reveal that women from richer households had higher odds of overweight and obesity than women from the poorest households. Similar findings were reported by Neupane et al. [5]. We found higher education and working status to be constantly associated with overweight/obesity in 2005 and 2015 and not in 2010/11. Studies elsewhere concur with current findings [18]. This could be related to the fact that these highly educated women are more likely to be working and more likely to come from richer households, and thus use energy saving devices at home to execute their daily domestic chores or can afford to employ domestic workers. In addition, some women tend to afford eating western food outlets at work which are perceived to be 'junk' and fatty food. However, the period 2010/11 has no statistically significant relationships as the period comes immediately after the economic challenges that occurred in 2008, spilling the effects into this period, such that education and working were overridden by other factors, thus diluting the relationship of these factors with overweight/obesity. Ownership of household assets was not associated with overweight or obesity except for television in 2010/11. This is contrary to other studies which found asset ownership such as radio and telephone to be associated with obesity. It is not surprising that a sedentary lifestyle has been observed to closely relate to time spent watching television as a leisure activity [13, 18]. Subsequently, reduced energy expenditure because of this leisure activity is closely associated with overweight and obesity.

Age was a constant predictor of overweight and obesity in all three surveys. With increasing age, women tend to be at higher odds ratios of becoming overweight and obese. Elsewhere in similar settings, the prevalence of overweight and obesity was also reported to be higher among older women [14, 19, 20]. Other studies associate obesity in old age to be characterised by high physical inactivity as well as the consumption of more energy-dense foods, which may result in overweight and obesity [14]. The current study found parity to be significantly associated with overweight/obesity. Similarly, several studies found multiparous women had the highest odds of being obese [7, 14] as well associated with the onset of higher retention of gestational weight gain [16, 22]. Marital status also emerged as a

key factor in influencing overweight/obesity as women who were in a union or had been in a union had higher odds of overweight and obesity. Similar studies have found married women are more susceptible to being overweight or obese [25]. This could be due to childbearing as married women tend to have children, as the tradition implies marriage with childbearing and thus as parity increases in marriage, so the risk of overweight/obesity.

## **6. Limitations**

The study used cross-sectional data and reported factors associated with which might not imply a causative relationship. Consequently, results are restricted to how individuals were responding at one moment in time rather than over a period of time. Second, sampling procedures rely on archival data that may contain counting, collection, and recording errors. As a result, selection and recall biases may perhaps have been introduced during data collection. Third, the explanatory variables included in the study were limited to the ones collected as part of the demographic and health survey. The Zimbabwe Demographic Health Surveys lack key variables which can be used as proxy to lifestyle behaviours such as diet preferences and physical exercises. The majority of the variables in our study were either biological (age, sex, parity) or socioeconomic (education, marital status, wealth, employment status and education). It is difficult to interpret our results in the absence of key factors such as type of food consumed and level of exercise.

## **7. Conclusion**

The study has shown that demographic and socio-economic variables are more likely to be associated with overweight and obesity. Women in urban areas, with higher education, working and from richer households are more likely to be at risk of overweight and obese. Also, older women and those currently in a union or had been in union are more likely to be overweight/obese. However, possession of household assets such as television, radio and telephone were not associated with overweight/obesity, except for the television in 2010/11. This calls for interventions that address the socio-economic factors. Thus, there is need for constant awareness programmes on healthy eating food, and physical activity especially among older women and those working.



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### Author details

Kudzaishe Mangombe<sup>1\*</sup>, Naomi Wekwete<sup>1</sup>, Amos Milanzi<sup>1</sup>, Ronald Musizvingoza<sup>2</sup> and Charles Lwanga<sup>3</sup>

1 Center for Population Studies, University of Zimbabwe, Zimbabwe

2 Independent Researcher

3 School of Statistics and Planning, Makerere University, Uganda

\*Address all correspondence to: [kudzimangobee@gmail.com](mailto:kudzimangobee@gmail.com)

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