

BMJ Open Media use and excess body weight among women in Nigeria: a cross-sectional study

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ABSTRACT

Objectives To investigate the (1) time trends in body mass index (BMI) and (2) relationship between media use and body weight status among adult women in Nigeria. We hypothesise that higher frequency of media use is associated with higher likelihood of being overweight and obesity among adult women.

Study design Cross-sectional.

Setting Urban and rural settings in Nigeria.

Participants Adult non-pregnant women aged between 15 and 49 years.

Methods Data were derived from Nigeria Demographic and Health Surveys conducted in 2003, 2008 and 2013. The outcome variable was excess body weight (overweight and obesity), and main explanatory variables were frequency of reading newspaper, listening to radio and television (TV) viewing. Datasets were merged to perform pooled analysis, and were analysed using bivariate and multivariable regression techniques.

Results Of the 69 401 participants, 16.2% had a BMI of 25.0–29.9 kg/m² (95% CI 15.8 to 16.6) and 6.6% had >30 kg/m² (95% CI 6.3 to 6.9). Between 2003 and 2013, the prevalence of overweight women increased by 4.1%, and that of obesity by 2.2%. Overall, radio was the most popular media followed by TV and newspaper. Respectively, 15.6% and 11.7% of the women reported using radio and TV almost every day and 30.6% and 25.1% at least once a week. In multivariable analysis, watching TV almost every day and at least once a week were associated with, respectively, 1.6 and 1.2 times higher odds of being overweight, and 2.7 and 1.5 times higher odds of being obese compared with those who never used radio. Similarly, significant associations were observed for newspaper and radio use as well.

Conclusion The prevalence of overweight and obesity is noticeably high among Nigerian women and has been increasing steadily over the past decade. A statistically significant association exists between BMI and the use of newspaper, radio and TV. Further studies are required to develop a better understanding of the mechanisms that underlie this relationship.

INTRODUCTION

Excess accumulation of body fat leading to overweight and obesity has been proposed to be an outcome of the complex interaction between various environmental, genetic and lifestyle behavioural factors.^{1–4} Although it

Strengths and limitations of this study

- This is first population-based study to demonstrate the association between media use with overweight and obesity among adult women in a low/middle-income country.
- Sample size was quite large and surveys were nationally representative which contributed to higher generalisability of the estimates.
- Although anthropometric measurements were performed in accordance with WHO guidelines, that of media use status was self-reported and hence subject to reporting bias.
- Cross-sectional data preclude establishing any temporal relationship between the exposure and outcome variables.

is predominantly in the industrialised countries where overweight/obesity first took an epidemic shape, and was believed to be a phenomenon indicative of affluence by many, the countries in the Global South are increasingly proving to be fertile grounds for this epidemic as well.^{5–6} This is particularly concerning for the healthcare stakeholders in countries like Nigeria that are already encumbered with a host of malnutrition, infection and parasitic diseases, for example, TB (Tuberculosis), HIV, malaria, and therefore lacking the capacity to mobilise resources to effectively tackle this rapidly expanding health epidemic. Growing evidence suggests that on top of the long-standing burden of undernutrition,^{7–9} Nigeria is also facing a growing epidemic of overnutrition,^{10–12} a phenomenon referred to as a dual burden of malnutrition.¹³

Worldwide, the emerging obesity trend is attributable to a great extent to the increasing exposure to so-called obesogenic environments, for example, such as increasing availability and consumption of convenience and fast foods, better transportation system and lower scope for physical activity, to which globalisation has been reported to be a significant contributor.^{14–15} Although conflicting



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opinion exists, it is assumable that Nigeria's active participation in international trade has been a major driver to the demographic and dietary transitions accompanied by significant alterations in various aspects of lifestyle, among which shifting to more sedentary modes of recreation (television (TV) viewing, listening radio) is a noteworthy one. This is an important in the context of overweight/obesity as spending longer hours before TV and radio can translate to increased caloric intake and decreased energy expenditure.^{16 17} Other possible mechanisms behind this association include exposure to food advertisement, sleep deprivation and lower engagement in outdoor physical activity (PA).^{16 18}

The importance of promoting physically active lifestyle has been underscored by previous researchers especially among women as evidence abounds on the lower participation in PA among women than men. An international study comprising 76 countries reported that the crude worldwide prevalence of physical inactivity was considerably higher among women (23.7% vs 18.9%).¹⁹ Adoption of a sedentary lifestyle can lead to deprivation of the numerous physical and psychosocial health benefits offered by physically active life, and can led to adverse consequences such as high adiposity and associated chronic conditions including heart diseases, CVD (Cardiovascular diseases), certain types of cancers, type 2 diabetes, psychological disorders.²⁰ There is a growing volume of epidemiological studies that have demonstrated a positive link between time spent on sedentary activities such as playing video games and TV viewing (screening time) with higher than normal body mass index (BMI) among children,^{18 21–23} adolescents. However, little is known about the use of media use as an indicator of sedentary behaviour and BMI and adult women in low-income and middle-income countries. In this study, we, therefore, attempted to address this gap by drawing data from nationally surveys namely Nigeria Demographic and Health Survey (NDHS). For this purpose, we selected information on women's sociodemographic and anthropometric status and media use behaviour. Survey methods and description of variables are mentioned in the following sections.

METHODS

Study setting and data source

Data used in this study came from the DHSs carried out among in Nigeria. NDHSs are implemented by the National Population Commission with the financial and technical assistance by Inner city fund (ICF) International provisioned through the USAID (United States Agency for International Development) -funded Monitoring and Evaluation to Assess and Use Results Demographic and Health Surveys (MEASURE DHS) programme. DHSs are nationally representative that collect information on a wide range of public health-related topics such as anthropometric, demographic, socioeconomic, family planning and domestic violence

to name a few. The survey covered men and women aged between 15 and 49 years and under 5 children residing in non-institutional settings (eg, settings excluding hospitals, prisons, military residences). For sampling, a three-stage stratified cluster design was employed which was based on a list enumeration areas (EAs) from the 2006 Population Census of the Federal Republic of Nigeria. EAs are systematically selected units from the localities, which constitute the local government areas (LGAs). LGAs are subdivisions of each of the 36 administrative states (including the Federal Capital Territory called Abuja) and classified under six developmental zones in the country. EAs were used to form the survey clusters called primary sampling units. A more detailed version of the survey was published elsewhere.²⁴

All participants gave prior written agreement to take part in the survey. The data are put in public domain in anonymised form which are distributed to registered users on their website. DHS does not issue any additional approvals.

Variable selection

Outcome variable: The outcome variable was BMI which is defined as the weight in kilograms divided by the height in metres squared (kg/m^2). BMI serves as a simple and inexpensive method of measuring body weight status for adult population. As defined by WHO, respondents were categorised as being normal weight if $\text{BMI}=18.5\text{--}24.9\text{ kg}/\text{m}^2$ overweight if $25\text{--}29.9\text{ kg}/\text{m}^2$, and obese if $\text{BMI}\geq 30\text{ kg}/\text{m}^2$.

The explanatory variables of main interest were frequency of: (1) reading newspaper, (2) listening to radio and (3) TV watching. As the exact durations (hours or minutes/day) were not available, the frequencies per week were used as a proxy measure and were categorised as: (1) not at all, (2) <once a week, (3) at least once a week and (4) almost every day. These were based on self-report data from participants.

We conducted a literature review on PubMed to facilitate the selection of potential confounders. Based on the review and availability on the datasets, the covariates were considered for inclusion in the study—Year: 2003, 2008, 2013, Age: 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49; Region North Central, Northeast, Northwest, Southeast, South-South, Southwest; Setting: Urban, Rural; Marital status: Never married, Married; Educational attainment: No education, Primary Secondary, Higher; Religious affiliation: Christian, Islam, Other; Employment status: Unemployed, Employed; Wealth index: Poorest, Poorer, Middle, Richer, Richest; Parity: 0, 1–2, >2. Instead of individual incomes, DHSs measure wealth quintiles of the households which are calculated based on the assigned factor scores for possessions of durable goods, for example, TV, refrigerator. The scores are then categorised into quintiles such that lowest quintile represent the poorest and the highest scores represent the richest households.^{17 25}

Data analysis

Data were analysed using SPSS V.24. Exclusion criteria were being currently pregnant and non-availability of anthropometric information. Before analysis, the data were checked for outliers and multicollinearity issues. Then the variables were recoded to suit the design of the study. DHSs employ cluster sampling techniques which has disadvantages such as similarity of sample characteristics across the clusters, as well as inflated SEs. In order to adjust for the cluster effects, the dataset was converted to a plan file accounting for the primary sampling units, sample strata and weight. This allowed complex sample analysis which is recommended for DHS data. After preparing the plan file, descriptive analyses were carried out to calculate the prevalence rates of overweight and obesity. χ^2 bivariate tests were performed to examine the significance of differences between overweight and obesity across all the confounding variables. The variables that showed significance at $p \leq 0.25$ were entered to the regression model. Multinomial logistic regression was used to measure the association between media use and BMI by assigning 'normal weight' as the reference category. Two models were run: one is unadjusted and other is adjusted for the confounding variables. All tests were two tailed and were considered significant at the level of 5%.

RESULTS

In total 69 401 currently non-pregnant women were included in the analysis with the highest number of participants from the 2013 survey. Mean age of the participants was 29.86 (SD 8.6). Table 1 shows that a greater proportion of women was from the youngest age group, living in the Northwest region, rural origin, married, had no formal education, follower of Christian faith, was employment, lived in richer households (fourth wealth quantile) and had more than two children.

Table 2 shows the trend in the prevalence of overweight and obesity by media use frequencies across years. It is clear that the prevalence of overweight and obesity has increased for using radio of any frequency (eg, 20.8% in 2003 vs 54.2% in 2013 for those using more than once a week); whereas for newspaper (eg, 18.2% in 2003 vs 19.3% in 2013 for those using more than once a week) and TV (eg, 15.4% in 2003 vs 57.9% in 2013 for those using more than once a week); the prevalence increased when used at least once a week and less than once a week.

Changing prevalence of media use and overweight/obesity

Table 1 also indicates that 16.2% of the women had a BMI of 25–29.9 kg/m² (95% CI 15.8 to 16.6) and 6.6% had >30 kg/m² (95% CI 6.3 to 6.9). Between 2003 and 2013, the prevalence of overweight women increased by 4.1% (13.5% in 2003 vs 17.6% in 2013), and that of obesity by 2.25% (5.6% in 2003 and 7.8% in 2013). The prevalence of overweight was higher among those in the age group of 25–29 years (18%), from North Central region

(19.3%), rural residents (51.5%), married (73.7%), had a secondary level education (37.7%), were followers of Christianity (61.1%), were employed (71.8%), lived in the richest households (fifth wealth quantile) (33.5%) and were mothers of more than two children (60.7%). Participants who were obese had similar characteristics except for the prevalence being higher among those in the highest group, residents of Southwest region, of urban origin.

Media use status and their association with body weight measures were shown in figures 1 and 2, respectively. A considerably large percentage of women reported not using TV, radio and newspaper at all. Among those who used, radio was the most popular media followed by TV and newspaper. The results also showed a positive association between body weight status with the use of all three types of media. In general, the percentages overweight and obesity increased with the increasing use of all three media.

Multivariable regression analysis

Results of multivariable regression analysis showed a strong association between overweight and obesity with the use of newspaper, radio and TV (table 3). In the adjusted model, those reported reading newspaper almost every day and at least once a week had, respectively, 1.6 and 1.4 times higher odds of being overweight, and 1.7 and 1.9 times higher odds of being obese compared with those reported nor reading at all. Similarly, for radio users, those reported listening almost every day and at least once a week had, respectively, 1.3 and 1.14 times higher odds of being overweight, and 2 and 1.4 times higher odds of being obese compared with those who never uses radio. The association appeared to be even stronger for TV watching as those who watched almost every day and at least once a week had, respectively, 1.6 and 1.2 times higher odds of being overweight, and 2.7 and 1.5 times higher odds of being obese compared with those who never used TV.

DISCUSSION

Rising prevalences of overweight and obesity along with low levels of physical activity represent major public health concerns in both the industrialised and newly industrialising countries. The overweight/obesity scenario is particularly problematic for countries like Nigeria due to the simultaneous and widespread prevalence of undernutrition in the population,^{26 27} which warrant the need for evidences on this growing, epidemic especially from a behavioural health perspective. The present study, we have shown the trend in the prevalence of overweight/obesity among adult non-pregnant women in Nigeria, as well as investigated whether or not media use, increases the likelihood of having higher than normal body weight among the participants. Results showed that the prevalence of obesity was considerably high with significant

Table 1 Characteristics of the sample population (NDHS 2003–2013)

	n=69–401	%	BMI (% to 95% CI)			P values
			Normal 77.2% (76.6 to 77.7)	Overweight 16.2% (15.8 to 16.6)	Obese 6.6% (6.3 to 6.9)	
Year						<0.001
2003	6606	9.5	80.9 (79.4 to 82.3)	13.5 (12.4 to 14.7)	5.6 (5.0 to 6.4)	
2008	28901	41.6	79.2 (78.3 to 80.1)	15.3 (14.6 to 16.0)	5.5 (5.1 to 5.9)	
2013	33894	48.8	74.7 (73.8 to 75.4)	17.6 (17.0 to 18.2)	7.8 (7.3 to 8.2)	
Age						<0.001
15–19	14612	21.1	25.5 (24.3 to 26.0)	6.9 (6.4 to 7.5)	3.5 (2.9 to 4.2)	
20–24	11973	17.3	19.2 (18.8 to 19.6)	12.6 (11.9 to 13.3)	6.3 (5.5 to 7.2)	
25–29	11931	17.2	17.5 (17.1 to 17.9)	18.0 (17.2 to 18.8)	14.6 (13.4 to 15.8)	
30–34	9069	13.1	11.9 (11.6 to 12.2)	16.4 (15.6 to 17.2)	17.8 (16.6 to 19.2)	
35–39	8213	11.8	10.0 (9.7 to 10.3)	16.7 (15.9 to 17.5)	22.0 (20.5 to 23.4)	
40–44	6808	9.8	8.0 (7.7 to 8.3)	14.9 (14.2 to 15.7)	17.1 (15.9 to 18.4)	
45–49	6795	9.8	7.9 (7.6 to 8.2)	14.5 (13.8 to 15.3)	18.8 (17.5 to 20.2)	
Region						<0.001
NorthCentral	12222	17.6	17.0 (16.2 to 17.80)	19.3 (18.0 to 20.7)	19.4 (17.5 to 21.4)	
Northeast	11976	17.3	18.4 (17.3 to 19.50)	12.5 (11.2 to 13.9)	10.7 (9.2 to 12.4)	
Northwest	15464	22.3	24.6 (23.4 to 25.70)	16.1 (14.8 to 17.5)	11.5 (9.8 to 13.4)	
Southeast	8265	11.9	11.4 (10.7 to 12.10)	14.2 (13.1 to 15.4)	15.0 (13.4 to 16.7)	
South-South	10551	15.2	14.0 (13.3 to 14.80)	19.2 (17.9 to 20.5)	20.2 (18.3 to 22.2)	
Southwest	10923	15.7	14.6 (13.9 to 15.40)	18.7 (17.5 to 20.0)	23.3 (21.4 to 25.3)	
Setting						<0.001
Urban	25847	37.2	34 (32.6 to 35.3)	48.5 (46.7 to 50.3)	60.5 (58.1 to 62.9)	
Rural	43554	62.8	66 (64.7 to 67.4)	51.5 (49.7 to 53.3)	39.5 (37.1 to 41.9)	
Marital status						<0.001
Never married	23827	34.3	37.3 (36.4 to 38.2)	26.3 (25.2 to 27.5)	22.3 (20.7 to 23.9)	
Married	45574	65.7	62.7 (61.8 to 63.6)	73.7 (72.5 to 74.8)	77.7 (76.1 to 79.3)	
Educational attainment						<0.001
No education	25018	36.0	38.8 (37.5 to 40.1)	25.9 (24.5 to 27.4)	17.8 (16.2 to 19.6)	
Primary	13302	19.2	18.4 (17.7 to 19.0)	21 (20 to 22)	21.3 (19.9 to 22.8)	
Secondary	24905	35.9	36.0 (35.0 to 37.0)	37.7 (36.4 to 39.0)	38.2 (36.4 to 40.0)	
Higher	6176	8.9	6.8 (6.3 to 7.2)	15.4 (14.3 to 16.5)	22.6 (20.8 to 24.6)	
Religious affiliation						<0.001
Christian	35393	51.0	48 (46.4 to 49.6)	61.1 (59.3 to 62.9)	65.3 (63.1 to 67.5)	
Islam	29822	43.0	45.3 (43.8 to 46.8)	34.2 (32.5 to 36.0)	30.6 (28.5 to 32.8)	
Other	4186	6.0	6.7 (6.1 to 7.5)	4.6 (4.0 to 5.3)	4.1 (3.3 to 5.0)	
Employment status						<0.001
Unemployed	27835	40.1	44.4 (43.5 to 45.2)	28.2 (27.1 to 29.4)	21.2 (19.7 to 22.7)	
Employed	41566	59.9	55.6 (54.8 to 56.5)	71.8 (70.6 to 72.9)	78.8 (77.3 to 80.3)	
Wealth index						<0.001
Poorest	12794	18.4	21 (19.8 to 22.3)	8.9 (8.0 to 9.9)	4.7 (3.7 to 5.80)	
Poorer	13355	19.2	20.9 (20 to 21.8)	13.6 (12.6 to 14.7)	7.3 (6.3 to 8.4)	
Middle	13981	20.1	20.9 (20 to 21.8)	18.4 (17.3 to 19.5)	14.8 (13.5 to 16.2)	
Richer	14715	21.2	20.2 (19.3 to 21.1)	25.6 (24.4 to 26.9)	25.4 (23.8 to 27.2)	
Richest	14556	21.0	17 (16.1 to 17.9)	33.5 (31.8 to 35.3)	47.7 (45.4 to 50.1)	

Continued

Table 1 Continued

	n=69–401	%	BMI (% to 95% CI)			P values
			Normal 77.2% (76.6 to 77.7)	Overweight 16.2% (15.8 to 16.6)	Obese 6.6% (6.3 to 6.9)	
Total children ever born						<0.001
0	21 237	30.6	34.6 (33.8 to 35.3)	20.0 (19.1 to 21)	13.8 (12.7 to 15.1)	
1–2	14 041	20.2	20.6 (20.2 to 21.1)	19.3 (18.4 to 20.1)	19.6 (18.3 to 21.0)	
>2	34 123	49.2	44.8 (44.1 to 45.5)	60.7 (59.5 to 61.9)	66.6 (64.9 to 68.2)	

BMI, body mass index; NDHS, Nigeria Demographic and Health survey.

disparities observed across the sociodemographic and socioeconomic groups.

Overall, little less than a quarter of the women were either overweight or obese. Between 2003 and 2013, the prevalence of overweight/obesity has increased from 20.1% to 25.4%. In other words, the combined prevalence among the women has increased from 1 in 5 in 2003 to over 1 in 4 in 2013. Putting these findings in contrast with those from other countries in the region, this prevalence is higher than that in Ethiopia (14.9%),²⁸ but lower than in Ghana (49.3%).²⁹ A multicountry study among women of same age range (15–49 years) in Africa reported a combined prevalence of overweight and obesity to be 22.6%, which indicates that the prevalence of women with higher than normal BMI in Nigeria is slightly higher than that of African country average.³⁰

The prevalences of overweight and obesity were higher among women aged between 25 and 39 years compared with those below and above this range. This finding is contrary to expectation since older women are less likely to be physically active and higher likelihood of gaining weight. Women in the North Central region had higher

percentages of being overweight, although the rates were somewhat similar across six regions. The prevalences of obesity, on the other hand, were notably higher in the South-South and Southwest regions. This difference might be accounted for by the better socioeconomic development in the Southern region compared with the Northern region. Rising income and living standards are increasingly being shown to be associated with higher rates of overweight and obesity and non-communicable chronic diseases in low/middle-income countries.^{17 31} This is further supported by the present findings that the rate of both overweight and obesity were higher among women who were employed, lived in households of higher wealth quintiles and had a secondary level education.

Of notice, prevalence of childhood obesity, a well-known predictor of adult obesity, is also on the rise in Africa. In 2010, the prevalence of childhood obesity was estimated to be 8.5% (95% CI 7.4% to 9.5%), which is projected to reach 12.7% (95% CI 10.6% to 14.8%) in 2020.³² For Nigeria, current estimates of childhood overweight/obesity are not available at national level, however, at subnational level the prevalence of overweight was

Table 2 Trend in the prevalence of overweight and obesity by media use

Frequency	Newspaper		Radio		Television		
	Over weight	Obesity	Over weight	Obesity	Over weight	Obesity	
2	Almost every day	3.6	6.8	19.9	14.8	44.6	29.0
0	At least once a week	12.5	16.6	16.7	14.9	10.1	15.1
0	Less than once a week	14.7	18.2	22.3	20.8	16.9	15.4
3	Never	69.2	58.4	41.0	49.4	28.4	40.5
P values		<0.001		<0.001		0.028	
2	Almost every day	5.1	6.1	24.4	18.7	37.0	26.2
0	At least once a week	12.6	13.9	16.2	15.8	12.8	13.0
0	Less than once a week	14.1	17.0	23.9	23.2	20.4	21.0
8	Never	68.2	63.1	35.5	42.3	31.3	42.2
P values		<0.001		<0.001		0.004	
2	Almost every day	0.6	0.4	23.8	19.2	28.3	19.3
0	At least once a week	13.3	18.5	28.3	26.4	23.1	22.4
1	Less than once a week	16.6	19.3	47.6	54.2	48.0	57.9
3	Never	69.5	61.8	0.3	0.3	0.5	0.4
P values		<0.001		<0.001		<0.001	

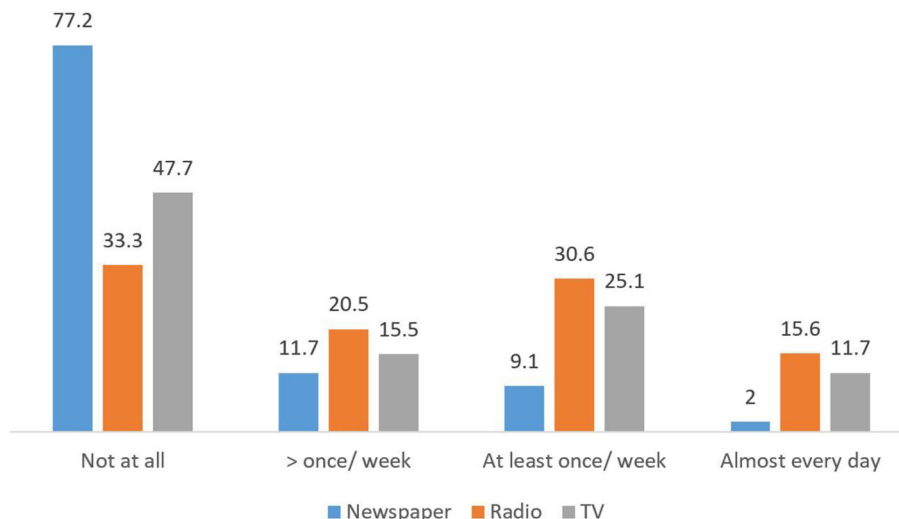


Figure 1 Percentages of different types of media use by frequency (2003–2013). Figure 1 shows that a greater proportion of the participants reported not using television (TV), radio and newspaper at all. Radio was the most popular media followed by TV and newspaper. Respectively, 15.6% and 11.7% of the women reported using radio and TV almost every day and 30.6% and 25.1% at least once a week.

reported to be higher among girls than boys.³³ Higher prevalences of overweight (27.2% vs 16.7%) and obesity (20.6% vs 8.0%) were estimated for urban than rural dwellers. Researches evidence from Ghana suggested that women were significantly more likely to have higher rates of unhealthy BMI than men.²⁹ This evidence implies that the burden of overweight/obesity is likely to increase in near future, and may disproportionately affect the female population in Nigeria as well. Attention should therefore be given to tackle the situation of unhealthy BMI among women specially to break the intergeneration cycle of overweight/obesity and the associated complications.

Regarding media use, the proportion of the participants not using TV, radio and newspaper was surprisingly high. Of interest, radio was the most popular media as

about two-thirds of the participants reported listening to it, followed by TV (53.3%) and newspaper (32.8%) regardless of the frequency of use. These findings were further confirmed by those of the regression analysis and were well in line with the study hypothesis that the use of these three media was positively and significantly related to overweight and obesity among Nigerian women. The general underlying mechanism behind this association is that longer and more frequent use of social media/sedentary modes of recreation translates to higher exposure to food advertisement, overeating, longer resting periods, reduced energy expenditure and subsequent gain in body weight. Similar conclusions were drawn by review studies among children,²⁹ adolescents.^{34–36} However, the comparisons between these interpretations should be done with caution due to the

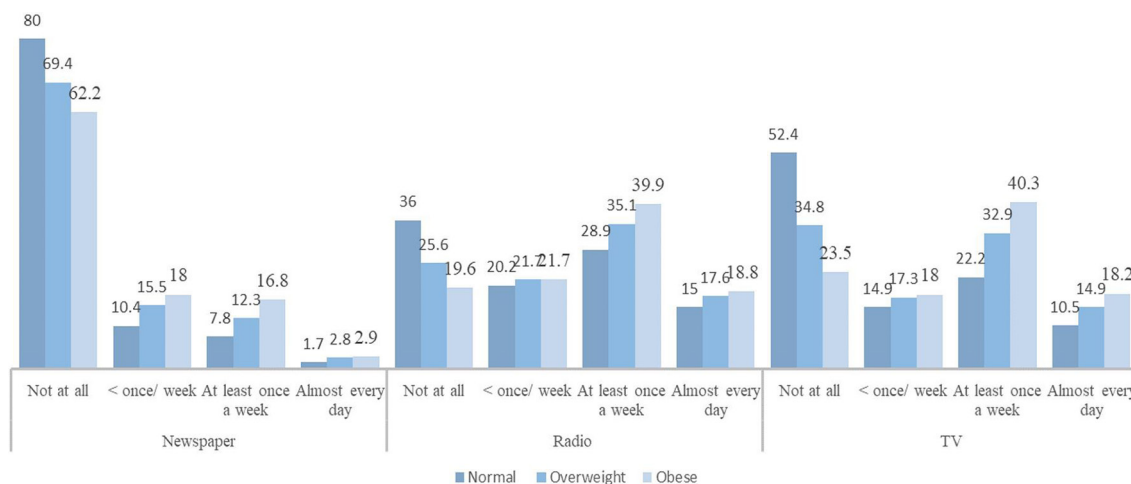


Figure 2 Overall, prevalence of overweight and obesity stratified by type of media use (2003–2013). Figure 2 shows a positive relationship between overweight and obesity with the use of all three types of media. Overall, the percentages overweight and obesity were higher than normal weight for the use of all three media of any frequency. For instance, the percentages of normal weight, overweight obesity among television (TV) users were, respectively, 18.2%, 14.9% and 10.5% for using almost every day, and respectively, 40.3%, 32.9%, 22.2% for using at least once a week.

Table 3 Association between media use and body weight status among adult non-pregnancy women in Nigeria (2003–2013)

	Model 1 (OR, 95% CI)		Model 2 (OR, 95% CI)	
	Overweight	Obese	Overweight	Obese
Newspaper (never)	1	1	1	1
Almost every day	1.889 (1.66 to 2.15)	2.182 (1.81 to 2.63)	1.639 (1.435 to 1.87)	1.738 (1.435 to 2.105)
At least once/week	1.813 (1.698 to 1.936)	2.777 (2.546 to 3.029)	1.394 (1.302 to 1.493)	1.862 (1.7 to 2.039)
<Once/week	1.709 (1.611 to 1.813)	2.215 (2.037 to 2.407)	1.309 (1.23 to 1.393)	1.474 (1.35 to 1.609)
Radio (never)	1	1	1	1
Almost every day	1.389 (1.243 to 1.551)	2.297 (2.082 to 2.535)	1.303 (1.151 to 1.474)	1.965 (1.76 to 2.194)
At least once/week	1.064 (0.953 to 1.188)	1.166 (1.058 to 1.285)	1.142 (1.011 to 1.291)	1.386 (1.243 to 1.546)
<Once/week	0.938 (0.85 to 1.035)	0.948 (0.833 to 1.159)	1.037 (0.927 to 1.16)	1.147 (1.038 to 1.267)
Television (never)	1	1	1	1
Almost every day	1.807 (1.622 to 2.014)	3.844 (3.491 to 4.232)	1.599 (1.412 to 1.811)	2.718 (2.432 to 3.037)
At least once/week	1.174 (1.044 to 1.321)	1.427 (1.287 to 1.583)	1.198 (1.053 to 1.363)	1.467 (1.309 to 1.645)
<Once/week	0.997 (0.901 to 1.103)	0.949 (0.868 to 1.037)	1.064 (0.948 to 1.195)	1.077 (0.972 to 1.194)

Model 1=univariate, model 2=adjusted for the confounders described in table 1.

Nagelkerke R² for models 1 and 2 was ,respectively, 0.28 and 0.47, indicating that adjusted model accounted for about 47% of the variability in the dependent variable.

differences in the methodological approach, for example, types and duration of social media use as well as the age and sex of study participants.

Similar to most other countries in sub-Saharan Africa, health policy-making in Nigeria has traditionally been focused on infection and undernutrition related health issues. However, recent findings indicate that a rapid dietary and epidemiological transition might well be under way, and is shifting the disease burden from undernutrition to overnutrition among both children and adult population.³⁷ Tackling the burden of overweight/obesity may pose particular challenges mainly because undernutrition is still prevalent or at least was a prevalent reality not long ago.³⁸ This evidence implies that in certain cultures in Africa, fat or roundedness among women is considered as a sign of wealth whereas thinness is regarded as consequences of impoverishment.³² Strategic price setting to improve the affordability and consumption of healthy foods and discouraging that of energy-dense but nutrient-poor diets can contribute to maintaining healthy body weight among the population in the long-run.

Although in the present analysis it was not possible to adjust for the confounding effects of food advertisement and duration of resting time, the pathways through which these factors lead to unhealthy body weight were previously demonstrated on children and adolescents.³⁹ From this perspective, it is suggestible that national nutritional planners take into consideration controlling the obesogenic behaviours, for example, consumption of unhealthy diet and abstaining from physical activity, as well as the underlying forces that trigger these behaviours such as social media use.⁴⁰ A strong monitoring and research strategy will be required to reduce the dissemination of and exposure to food advertisement among the target population, and should be accompanied by a

well-defined guideline for physical exercise to maintain a balanced energy intake and expenditure.

As far as we are concerned, this was the first population-based study to assess the relationship between media use and BMI status among adult non-pregnant women in an African country. Our sample size was considerably large to ensure robustness of the estimates and improving the external validity of the findings. Data were of high quality and offer the benefit easy comparability with other DHS-based findings. Nonetheless, we have several important limitations to declare. First, DHSs use BMI to assess excess body weight and do not include measures of central adiposity (eg, waist circumference). Measures of central adiposity is preferred over BMI by many researchers as it serves as better indicator of metabolic complications. Second, as the study was based on secondary data, we had no control over the availability and measurement of the variables. So, it is possible that the analysis was not adjusted for some strong confounders which in the context of our study can be exposure to food advertisement and participation in physical activity. Moreover, the cross-sectional nature of the data prevents establishing any causal relationship between media use and BMI. It is possible that participants who were obese had less scope for physical activity and as a consequence spent higher sedentary time. Therefore, the present study emphasises the need for further studies by including the relevant confounders, more direct measures of sedentary behaviour and broader type of media to better track the association between these two.

CONCLUSION

Based on the analysis of data from NDHS, this study concludes that the prevalence of women living with overweight/obesity is considerably high and the rate has been

increasing slowly but steadily during the past decade. Findings also indicated a statistically significant association between BMI status with the use of newspaper, radio and TV. Media use may exert its role on excessive weight gain through incorrect dietary behaviour, unbalanced caloric intake and reduced energy expenditure. However, these associations need to be confirmed by more in-depth and longitudinal studies. While media use serves an important mode of recreation and health communication, proper guidelines should be created for the population to minimise the associated negative influences.

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Data sharing statement All data used in this study are available through the DHS website on registration (<https://dhsprogram.com/data/available-datasets.cfm>).

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REFERENCES

- Hernandez LM, Blazer DG. *Genetic, environmental, and personality determinants of health risk behaviors*. USA: National Academies Press (US), 2006. (accessed 23 Nov 2017).
- Qi L, Cho YA. Gene-environment interaction and obesity. *Nutr Rev* 2008;66:684–94.
- Shuldiner AR, Genes O. Obesity genes and gene-environment-behavior interactions: recommendations for a way forward. *Obesity* 2008;16 Suppl 3(Suppl 3):S79–S81.
- van Vliet-Ostapchouk JV, Snieder H, Lagou V. Gene-lifestyle interactions in obesity. *Curr Nutr Rep* 2012;1:184–96.
- Bishwajit G. Household wealth status and overweight and obesity among adult women in Bangladesh and Nepal. *Obes Sci Pract* 2017;3:185–92.
- Herrera RV G. The global south has free trade to thank for its obesity and diabetes epidemic-Ramón Vera Herrera. *The Guardian* <http://www.theguardian.com/commentisfree/2015/apr/06/global-south-has-free-trade-to-thank-obesity-diabetes-epidemic> (accessed 23 Nov 2017).
- Igbedioh SO. Undernutrition in Nigeria: dimension, causes and remedies for alleviation in a changing socio-economic environment. *Nutr Health* 1993;9:1–14.
- Adelekan DA. Childhood nutrition and malnutrition in Nigeria. *Nutrition* 2003;19:179–81.
- Ubesie A, Ibeziakor N. High burden of protein-energy malnutrition in Nigeria: beyond the health care setting. *Ann Med Health Sci Res* 2012;2:66–9.
- Iloh G, Amadi A, Nwankwo B. Obesity in adult Nigerians: a study of its prevalence and common primary co-morbidities in a semi-urban Mission General Hospital in South-Eastern Nigeria. *Nigerian Journal of Medicine* 2010;19:459–66.
- Chukwuonye II, Chuku A, John C, et al. Prevalence of overweight and obesity in adult Nigerians - a systematic review. *Diabetes Metab Syndr Obes* 2013;6:43–7.
- Senbanjo IO, Adejuyigbe EA. Prevalence of overweight and obesity in Nigerian preschool children. *Nutr Health* 2007;18:391–9.
- Bishwajit G. Nutrition transition in South Asia: the emergence of non-communicable chronic diseases. *F1000Res* 2015;4.
- Huneault L, Mathieu ME, Tremblay A. Globalization and modernization: an obesogenic combination. *Obes Rev* 2011;12:e64–72.
- Pirgon Ö, Aslan N. The role of urbanization in childhood obesity. *J Clin Res Pediatr Endocrinol* 2015;7:163–7.
- Maher C, Olds TS, Eisenmann JC, et al. Screen time is more strongly associated than physical activity with overweight and obesity in 9- to 16-year-old Australians. *Acta Paediatr* 2012;101:1170–4.
- Ghose B. Frequency of TV viewing and prevalence of overweight and obesity among adult women in Bangladesh: a cross-sectional study. *BMJ Open* 2017;7:e014399.
- Rey-López JP, Vicente-Rodríguez G, Biosca M, et al. Sedentary behaviour and obesity development in children and adolescents. *Nutr Metab Cardiovasc Dis* 2008;18:242–51.
- Dumith SC, Hallal PC, Reis RS, et al. Worldwide prevalence of physical inactivity and its association with human development index in 76 countries. *Prev Med* 2011;53(1-2):24–8.
- Agyemang C, Boatemaa S, Frempong GA, et al. Obesity in Sub-Saharan Africa. In: Ahima RS, ed. *Metabolic syndrome*. 13: Springer International Publishing, 2015.
- Fulton JE, Wang X, Yore MM, et al. computer use, and BMI among U.S. children and adolescents. *J Phys Act Health* 2009;6(Suppl 1):S28–35.
- Dennison BA, Erb TA, Jenkins PL. Television viewing and television in bedroom associated with overweight risk among low-income preschool children. *Pediatrics* 2002;109:1028–35.
- Kautiainen S, Koivusilta L, Lintonen T, et al. Use of information and communication technology and prevalence of overweight and obesity among adolescents. *Int J Obes* 2005;29:925–33.
- NPC/Nigeria NPC International ICF. Nigeria demographic and health survey 2013. 2014. <http://dhsprogram.com/publications/publication-fr293-dhs-final-reports.cfm> (accessed 21 Nov 2017).
- Ghose B, Feng D, Tang S, et al. Women's decision-making autonomy and utilisation of maternal healthcare services: results from the Bangladesh Demographic and Health Survey. *BMJ Open* 2017;7:e017142.
- Kandala NB, Stranges S. Geographic variation of overweight and obesity among women in Nigeria: a case for nutritional transition in sub-Saharan Africa. *PLoS One* 2014;9.
- Tzioumis E, Kay MC, Bentley ME, et al. Prevalence and trends in the childhood dual burden of malnutrition in low- and middle-income countries, 1990–2012. *Public Health Nutr* 2016;19:1375–88.
- Abraha S, Shiferaw S, Ahmed KY. Overweight and obesity and its socio-demographic correlates among urban Ethiopian women: evidence from the 2011 EDHS. *BMC Public Health* 2016;16:636.
- Ofori-Asenso R, Agyeman AA, Laar A, et al. Overweight and obesity epidemic in Ghana—a systematic review and meta-analysis. *BMC Public Health* 2016;16:1239.
- Neupane S, Prakash KC, Doku DT. Overweight and obesity among women: analysis of demographic and health survey data from 32 Sub-Saharan African Countries. *BMC Public Health* 2016;16:30.
- Bhurosy T, Jeewon R. Overweight and obesity epidemic in developing countries: a problem with diet, physical activity, or socioeconomic status? *Sci World J* 2014;2014:1–7.
- de Onis M, Blössner M, Borghi E. Global prevalence and trends of overweight and obesity among preschool children. *Am J Clin Nutr* 2010;92:1257–64.
- Musa DI, Toriola AL, Monyeke MA, et al. Prevalence of childhood and adolescent overweight and obesity in Benue State, Nigeria. *Trop Med Int Health* 2012;17:1369–75.
- Morris AM, Katzman DK. The impact of the media on eating disorders in children and adolescents. *Paediatr Child Health* 2003;8:287–9.
- Schneider M, Dunton GF, Cooper DM. Media use and obesity in adolescent females. *Obesity* 2007;15:2328–35.
- Strasburger VC. Council on Communications and Media. Children, adolescents, obesity, and the media. *Pediatrics* 2011;128:201–8.
- Oyewole OE, Atinmo T. Nutrition transition and chronic diseases in Nigeria. *Proc Nutr Soc* 2015;74:460–5.
- Senbanjo IO, Olayiwola IO, Afolabi WA, et al. Maternal and child under-nutrition in rural and urban communities of Lagos state, Nigeria: the relationship and risk factors. *BMC Res Notes* 2013;6:286.
- Stein D, Weinberger-Litman SL, Latzer Y. Psychosocial perspectives and the issue of prevention in childhood obesity. *Front Public Health* 2014;2.
- Dixon HG, Scully ML, Wakefield MA, et al. The effects of television advertisements for junk food versus nutritious food on children's food attitudes and preferences. *Soc Sci Med* 2007;65:1311–23.