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Small-area variations in overweight and obesity in an urban area of Nigeria: The role of fast food outlets

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Abstract. Overweight and obesity are two related health issues of epidemic proportions. In Nigeria, these health conditions have been emerging only recently. The extant literature shows inter-city variations in the prevalence of overweight and obesity in Nigeria. However, they say little about intra-city variations of these health problems in Nigerian urban centres. Thus, the focus of the study was to determine the small-area variations in the prevalence of overweight and obesity in an urban area of Nigeria and its association with socio-economic, environmental, dietary and lifestyle risk factors. With the aid of a questionnaire, information on the demographic, socio-economic, lifestyle, household and neighbourhood characteristics of respondents was obtained from respondents. Overweight and obesity were computed based on the self-reported height and weight of respondents, using the Body Mass Index (BMI) formula. A simple linear regression model was estimated to determine the individual and collective effects of risk factors. Findings showed that there were noticeable spatial variations in the prevalence of overweight and obesity which result from the varying contextual and compositional characteristics among the political wards of the Ibadan North LGA. Physical proximity to fast food outlets was the only significant factor driving the spatial pattern of obesity ($b = 0.645$; $R^2 = 0.416$). The paper suggests that government and health officials should formulate area-specific obesity prevention and control plans to curb this growing epidemic in Nigeria.

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1. Introduction

Obesity and overweight are two related health issues today gaining worldwide attention. They both describe a condition in which the human body has excess fat. Overweight, on one hand, is defined as a body mass index (BMI) of at least 25 kg/m². Obesity, on the other hand, describes a condition in which a person's body mass index is greater or equal to 30kg/m² (WHO, 2015). These two chronic conditions have been labelled the epidemic of the 21st century (Pego-Fernandes et al., 2011). Statistics show that at least 2.8 million die globally each year due to overweight or obesity while in 2014, over 600 million people were reported obese (WHO, 2015). Overweight/obesity are critical risk factors of non-communicable diseases such as diabetes, cardiovascular diseases, cancer, musculoskeletal disorders (International Diabetes Federation, 2007; WHO, 2015), obstructive sleep apnoea, osteoarthritis (Adienbo et al., 2012; Kearns et al., 2014), and psychological trauma (Chinedu, Emiloju, 2014), lower back pain, chronic bronchitis, raised cholesterol and hypertension (Kearns et al., 2014; Doku, Neupane, 2015).

Previous studies have revealed that the twin health issues are multifactorial conditions, i.e. they are produced by a wide array of factors which can be broadly classified into two categories: non-modifiable risk factors comprising genetic disposition, and modifiable risk factors, such as low fruits and vegetable consumption, alcohol and soft drink intake, fast food consumption, physical inactivity, housing tenure, neighbourhood walkability and socioeconomic status (Mosbasheri et al., 2005; Suter, 2005; Fraser et al., 2010; Michimi, Wimberly, 2010; Douglas et al., 2011; Harvard School of Public Health, 2012; Garcia et al., 2012; Glazier et al., 2014; WHO, 2015; Lakes, Burkhart, 2016).

Initially restricted to wealthy countries, overweight/obesity is now an issue of concern in low and middle income countries, and particularly the urban settings (WHO, 2015), thus making it a health concern not only in the developed countries, but also in the developing countries. Moreso, noticeable variations in the prevalence of overweight and obesity between urban and rural areas have been observed. The differential is explained by lifestyle pattern and nutrition. Urban dwellers generally adopt the Western lifestyle of diets such as fast food consumption which is often perceived as a hallmark of affluence (Olutayo, Akanle, 2009; Neupane et al., 2016), while rural dwellers not only consume fresh produce, but engage in physically active jobs such as non-mechanized farming, artisanal mining, lumbering, etc. (Ekpeyong, Akpan, 2013; Neupane et al., 2016).

Though a number of studies on overweight/obesity in the western world exist (Fraser et al., 2010; Ellaway et al., 2012; Michimi, Wimberly, 2015; Lakes, Burkhart, 2016), the focus of research is gradually shifting to the developing countries because the analysis from one context to another differs on account of cultural and environmental factors. Thus, research is needed on causes beyond the individual (Hanibuci et al., 2011).

Overweight and obesity are present in Africa probably due to the diffusion of Western lifestyle and urbanisation (Ziraba et al., 2009; Doku, Neupane, 2015; Neupane et al., 2016). In the words of Doku et al. (2015: 7), "many African countries have experienced rapid economic growth and development over the past one and half decades. This rapid growth has led to urban lifestyles including changes in food consumption pattern such as refined foods due to globalization of the food market". In addition, more and more people are leaving rural areas for cities in search of better opportunities. The rising level of urbanisation "comes along with sed-

entary lifestyles...motorized culture, availability of refined foods, physical inactivity related recreations such as cinema houses and video games..." (Neupane et al., 2016: 7).

In Nigeria, overweight/obesity is an emerging health concern (Akarolo-Anthony et al., 2014). Findings from the 2010 WHO survey in the country showed that the prevalence of obesity was 3% and 8.1% for men and women, respectively, while overweight was 26.7% and 37% for men and women, respectively (Ono et al., 2012; cited in Akarolo-Anthony et al., 2014). In a recent study conducted by Kandala and Stranges (2014), the authors found wide variations in the geographical distribution of overweight and obesity prevalence in Nigeria: ranging from 10.5% in Yobe state to 50.2% in Lagos, the most urbanized state in the country. Furthermore, the level of urbanisation was found to be the only one determinant of combined overweight and obesity prevalence.

By 2015, nearly half of Nigerians lived in urban centres (Population Reference Bureau, 2015). The ever-increasing level of urbanisation in Nigeria is largely influenced by the rural-urban drift. Therefore, urban centres become 'bloated' with numerous problems such as overcrowding, poor housing, urban poverty, unemployment, crime. Besides, they have witnessed high levels of female participation in the labour force, which not only signifies a shift in family roles but also in dietary patterns (from highly nutritious home-made meals to food-away-from-home meals) (Fast Foods in Nigeria, 2010; Ekpeyong, Akpan, 2013). In addition, "most families in the urban areas have limited space to exercise due to congestion and overcrowding in their residential areas. Most tasks at home, at offices and factories and other points are mostly performed using machines and less man power exertions" (Ekpeyong, Akpan, 2013: 151).

Given this background, epidemiological studies have not only noted the high levels of, but also variations in overweight/obesity prevalence among residents of urban centres in Nigeria. For instance, the prevalence rate of overweight and obesity ranges from 38/26 percent in Abuja (Akarolo-Anthony et al., 2014), to 29/9 percent in Lagos (Akinpelu et al., 2009), 17.4/8.7 percent in Ibadan (Olatunbosun et al., 2011), and 53.21/21 percent in Katsina (Wahab

et al., 2011). These city differences, expectedly, are the outcome of the varying levels of urbanisation and economic development. Despite these observations on inter-city differentials in overweight/obesity, little is known about intra-city variations. It is possible that overweight/obesity could vary within a city because internal structures are spatially heterogeneous in terms of context and composition. Given this gap, this paper seeks to analyse small-area variations in overweight/obesity prevalence in an urban area of Nigeria, and identify factors behind the observed variations.

To this end, the Ibadan North local government area (LGA) was selected for this study, being one of the five LGAs in Ibadan, the capital of the state of Oyo. The LGA is bounded by six LGAs: Ido, Ibadan South East and Ibadan South West in the west, Ibadan North East, Lagelu in the east, and Akinyele in the north. With its administrative headquarters at Agodi Gate, it comprises twelve political wards (Table 1). Though mainly occupied by the Yorubas (one of the three major ethnic groups; besides the Hausa/Fulani and the Igbos), it enjoys a mix of local and foreign cultures such as the Hausa/Fulani, Igbos, Edos, Igbiras, Urbohos, Nupes, Ijaws, Indians, the Lebanese, etc. With a population of 306,795 (NPC, 2006), it has the highest level of urbanisation (85%) in the state (Olaniyan, 2015). It also enjoys the presence of prominent educational institutions such as the Polytechnic and the University of Ibadan, and the Oyo State Government Secretariat. This administrative area is characterised by a diversity of residential density areas. Like the whole city itself, it has a dual structure: a poorly-planned traditional region and a relatively well-laid-out modern sector (Ayeni, 1994).

This study is an empirical contribution to the growing research on the local geographies of overweight and obesity. Besides identifying the key drivers of obesogenic environment, the study sees an opportunity to significantly reduce the prevalence of a preventable epidemic. Last but not the least, the findings of this research will serve as material for the design of local obesity prevention efforts because understanding the local drivers of an obesogenic environment is crucial to the prevention and control of the overweight/obesity epidemic.

Table 1. Political wards in Ibadan North Local Government Area

Ward	Neighbourhood
1	Beere, Kannike, Agbadagbadu, Oke Are, Ode-Oye
2	Adeoyo, Inalende, Oniyanrin, Oloro Oke
3	Adeoyo, Yemetu, Oke Aremo, Isale Alfa
4	Itutaba, Idiomo, Oje, Igosan, Kube, Abenla, Aluwo, Total Garden, NTA area
5	Bashorun, Oluwo, Ashi, Akingbola, Ikolaba, Gate
6	Sabo
7	Oke Aremo, Coca Cola, Oremeji
8	Sango, Ijokodo
9	Mokola, Ago-Tapa, Premier Hotel
10	Bodija, Secretariat, Awolowo, Obasa, Sanusi
11	Samonda, Polytechnic, University of Ibadan
12	Agbowo, Bodija Market, Oju Irin, Barika, Isopatako, Lagos-Ibadan expressway

Source: Adegboye (2014)

2. Data and methods

Primary data were obtained through a survey questionnaire. A structured questionnaire was designed to elicit information on the demographic, socio-economic, lifestyle, household and neighbourhood characteristics of respondents. The study population was the adult population. The questionnaire was divided into three sections: the first section obtained information on sex, age, occupation, educational

status, religion, ethnicity, and marital status, height and weight; the second section was on household and neighbourhood characteristics such as vehicle ownership, housing tenure (tenants), availability of sidewalks, proximity of fast food outlets, availability of physical fitness and recreational centres; the last section consisted of questions on lifestyle patterns, particularly physical activity, cigarette smoking, alcohol intake and soft drink consumption. The operational variables are set in Table 2.

Table 2. Operationalisation of risk factors

Risk factor	Operational variable	Response category
Housing tenure	Percent of respondents who are tenants	Tenant/Owner-Occupier
Vehicle Ownership	Percent of respondents who indicated they owned at least one vehicle	Yes/No
Physical fitness centre	Percent of respondents who reported they had a physical fitness centre in their neighbourhood	Yes/No
Recreational Centre	Percent of respondents who reported they had a recreational centre in their neighbourhood	Yes/No
Side walks	Percent of respondents who indicated their neighbourhood had side walks	Yes/No
Proximity to fast food outlet	Percent of respondents who reported there was a nearby fast food outlet.	Yes/No
Fast food consumption	Percent of respondents who consume fast food	Yes/No
Soft drink consumption	Percent of respondents who consume soft drinks	Yes/No
Alcohol consumption	Percent of respondents who consume alcohol	Yes/No
Physical activity	Percent of respondents who engage in any form of physical activity	Yes/No
Fruit/Vegetable consumption	Percent of respondents who consume fruit and vegetables regularly	Yes/No

Source: Field survey, 2014

A total of 240 copies of the questionnaire were distributed in the twelve political wards of the Ibadan North LGA. However, 234 forms were returned (a response rate of 97.5 percent). The systematic sampling technique was adopted in the administration of the questionnaire. In each ward, one neighbourhood was purposively selected so as to capture the socio-economic variability in the LGA. Copies of the questionnaire were distributed to houses along the major street in each neighbourhood at a regular interval of three. At each house, persons of at least 18 years of age were given the questionnaire to fill in. Informed consent was received from respondents before questionnaire administration.

Overweight/obesity was calculated based on the self-reported height and weight of respondents. BMI, a popular measure of overweight/obesity, is calculated as the person's weight divided by the square of the height of the same person in units of kg/m^2 . Using WHO (1995)'s criteria, BMI is classified into four categories. For this study, persons with a BMI of 25–29.9 (overweight) and those with a BMI of at least 30 (obesity) were subjected to analysis.

The Pearson Product Moment Correlation technique was used to determine the nature and power of the relationship between overweight/obesity (Y) and the risk factors ($X_1 \dots X_n$). Subsequently, the linear regression model ascertained the individual and joint effect of socio-economic, environmental, behavioural and lifestyle factors on overweight/obesity prevalence. A statistical analysis was performed using SPSS version 17, while choropleth maps, highlighting the spatial variations in overweight and obesity, were produced with the help of the ArcGIS 10 software.

3. Results

The characteristics of the study sample are presented in Table 3. The study sample mostly consisted of women (56.8%), people within the 18–27 age group (45.7%) and business owners (46.2%). In addition, the respondents, to a large degree, were Yoruba (78.2%), had tertiary education background (50.9%) and were single (53.7%).

Table 3. Respondents' characteristics

Variable	Frequency (N = 234)
Sex	Male: 99 (42.3%) Female: 133 (56.8%) No response: 2 (0.9%)
Age	No Response: 2(0.9%) 18–27: 107(45.7%) 28–37: 68(29.1%) 38–47: 26(11.1%) 48–57: 14(6%) 58 and above: 17(7.3%)
Occupation	No Response: 4(1.7%) Student: 84(35.9%) Business: 108(46.2%) Civil Service: 13(5.6%) Unemployed: 3(1.3%) Others: 22(9.4%)
Ethnicity	Yoruba: 183(78.2%) Ibo: 25(10.7%) Hausa: 10(4.3%) Others: 16(6.8%)
Educational Status	No Response: 9(3.8%) No formal Education: 5(2.1%) Primary Education: 25(10.7%) Secondary Education: 76(32.5%) Tertiary Education: 119(50.9%)
Marital Status	No Response: 4(1.7%) Single: 115(49.1%) Married: 110(47.0%) Divorced/Separated/Widowed: 5(2.1%)

Source: Field survey (2014)

3.1. Spatial pattern of overweight/obesity

The prevalence rate of overweight and obesity among the respondents in the Ibadan North LGA was 20.9% and 5.6%, respectively. The spatial pattern of overweight indicated wards 1 (30%), 9 (30%), and 10 (29.4%) had the highest percentage of overweight individuals, whereas ward 6 had the lowest percentage (5%) (see Fig. 1). The spatial distribution of obesity is displayed in Fig. 2. The prevalence of obesity was high in wards 2 (10%), 3 (15%), 6 (10%), and 11 (11.1%) while wards 5 and 7 had the lowest prevalence of obesity (0%).

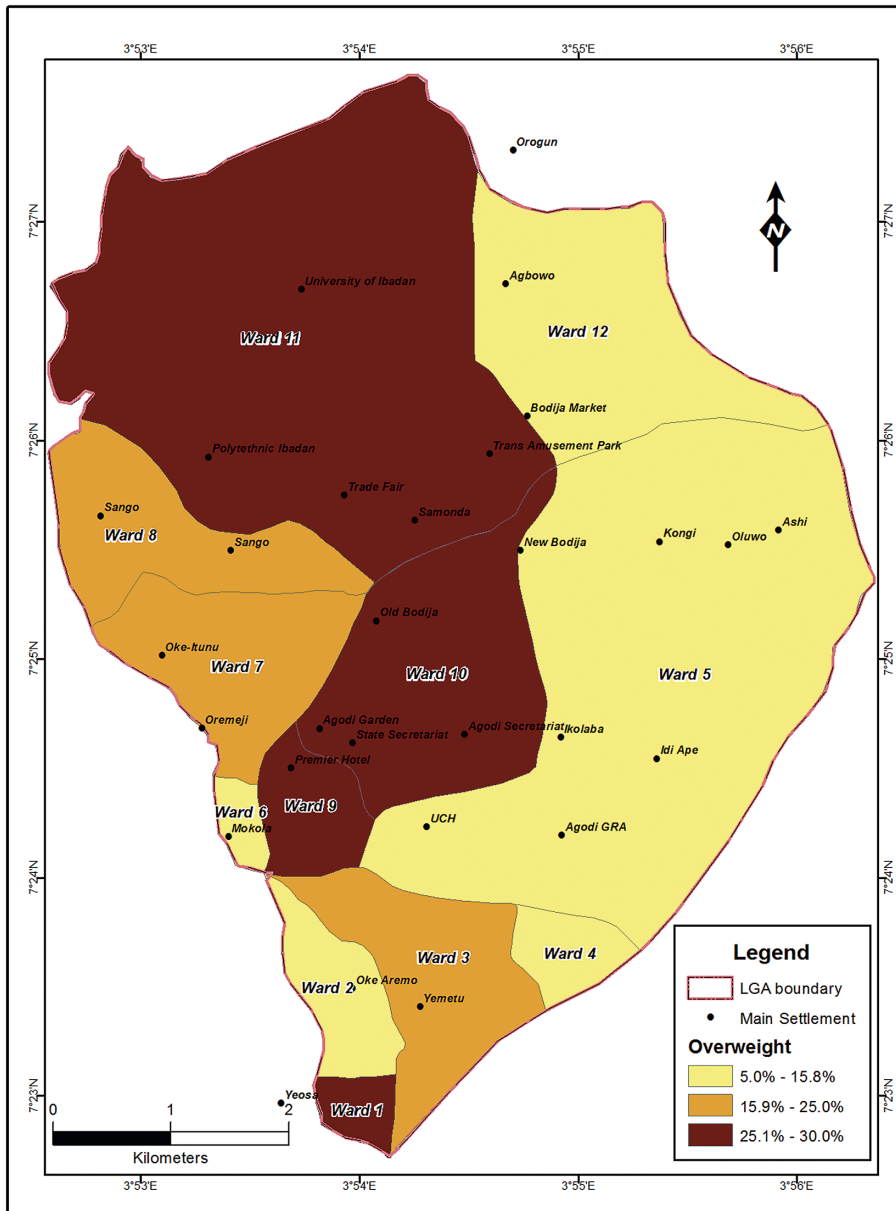


Fig. 1. Spatial pattern of overweight in the Ibadan North LGA

Source: Field survey, 2014

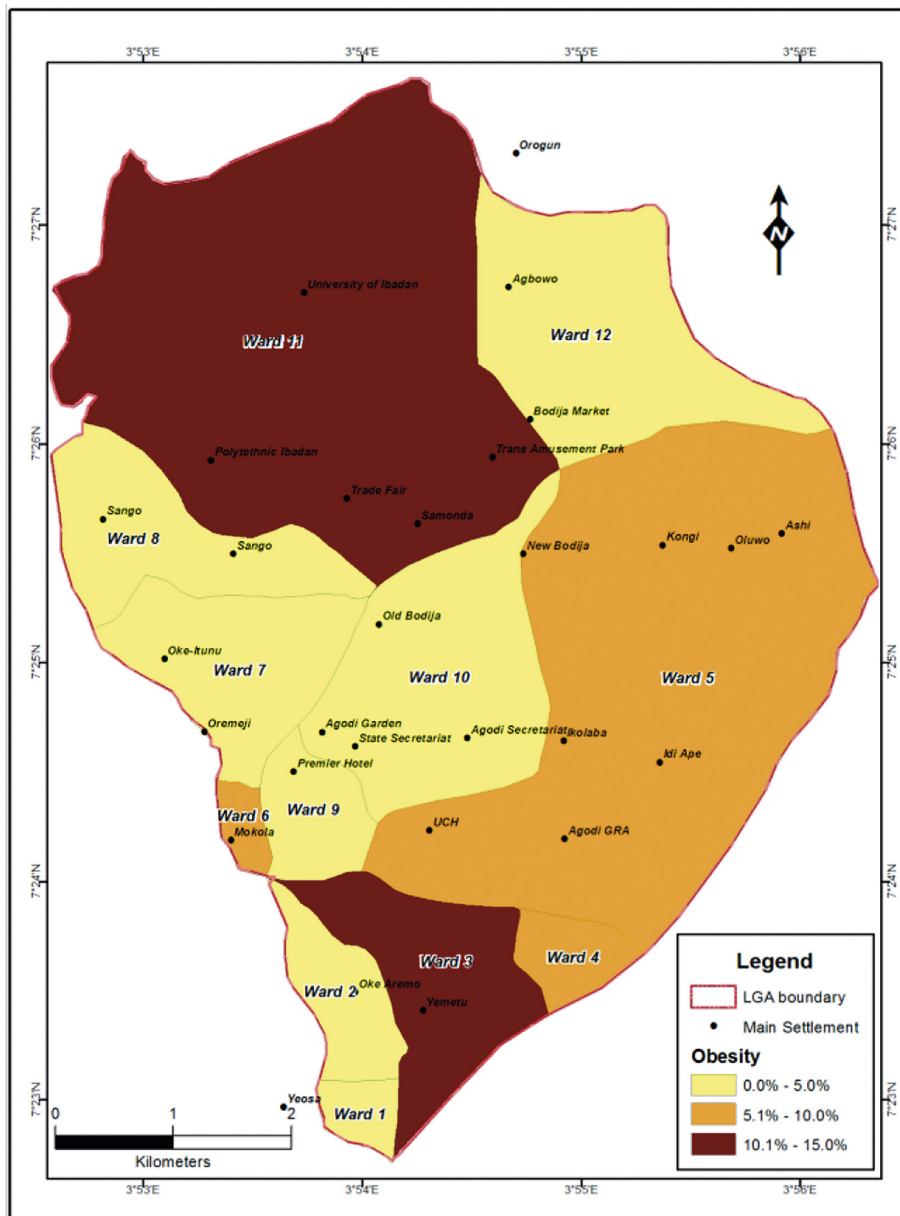


Fig. 2. Spatial distribution of obesity in the Ibadan North LGA

Source: Field survey, 2014

3.2. Spatial distribution of risk factors

The spatial distribution of risk factors among the study respondents in the twelve wards is set out in Table 4. Substantial variations were discerned in all the variables except fast food consumption, smoking, and soft drink consumption. Among the political wards, clear spatial patterns were found for sidewalks (from 0% in ward 2 to 85% in ward 6), proximity to fast food outlets (from 20% in ward 1 to 95% in ward 2), vehicle ownership (from 5% in

ward 12 to 70.6% in ward 10), housing tenure (from 15% in ward 1 to 66.7% in ward 11), and physical activity level (from 29.4% in ward 10 to 85% in ward 5), proximity to recreational centres (from 10% in ward 8 to 61.1% in ward 11), fruit and vegetable consumption (from 52.9% in ward 10 to 100% in wards 1 and 2) and alcohol consumption (from 5% in ward 3 to 35% in wards 5 and 12). The level of fast food consumption was at its highest in wards 3 (85%) and 6 (85%). The prevalence of soft drinks consumption was high in wards 3 (100%) and 5 (100%). Finally, smoking prevalence was very high in ward 11 (16.7%).

Table 4. Spatial distribution of risk factors

Ward	Housing Tenure	Vehicle Ownership	Physical Fitness Centre	Recreational Centre	Sidewalks	Proximity to Fast Food Outlet	Fast Food Consumption	Soft Drink Consumption	Smoking	Alcohol Consumption	Physical activity	Fruit and Vegetable Consumption
1	15%	15%	55%	45%	50%	20%	60%	80%	5%	20%	75%	100%
2	30%	20%	20%	45%	0%	95%	75%	95%	5%	15%	75%	100%
3	20%	20%	25%	50%	85%	80%	85%	100%	0%	5%	50%	90%
4	63.2%	47.4%	26.3%	15.8%	52.6%	42.1%	73.7%	94.7%	0%	15.8%	73.3%	89.5%
5	30%	50%	45%	40%	35%	50%	75%	100%	5%	35%	85%	70%
6	60%	25%	55%	60%	85%	85%	85%	95%	20%	20%	75%	90%
7	30%	15%	25%	45%	75%	45%	75%	90%	0%	15%	75%	90%
8	45%	35%	40%	10%	20%	40%	70%	85%	10%	15%	65%	90%
9	50%	25%	35%	40%	55%	45%	60%	80%	0%	5%	60%	70%
10	29.4%	70.6%	47.1%	52.9%	47.1%	58.8%	82.4%	94.1%	5.9%	29.4%	29.4%	52.9%
11	66.7%	44.4%	50%	61.1%	66.7%	55.6%	77.8%	100%	16.7%	27.8%	38.9%	72.2%
12	25%	5%	40%	25%	55%	35%	60%	90%	10%	35%	60%	90%

Source: Field survey, 2014

Following the description of the spatial distribution of overweight/obesity and its determinants, one wonders whether the spatial distribution of these

risk factors explains the spatial distribution of overweight and obesity. The results of the correlational analysis are presented in Table 5.

Table 5. Results of correlational analysis

	Risk factor	Overweight	Obesity
1	Housing tenure	0.175	0.156
2	Vehicle ownership	0.186	-0.097
3	Proximity to physical fitness centre	0.088	-0.063
4	Proximity to recreational centre	0.036	0.406
5	Sidewalks	0.062	0.235

6	Proximity to fast food outlet	-0.513	0.645*
7	Fast food consumption	-0.347	0.458
8	Soft drink consumption	-0.482	0.379
9	Alcohol consumption	-0.174	-0.339
10	Physical activity	-0.496	-0.448
11	Fruit and vegetable consumption	-0.363	0.169

Note: * significant at 0.05

Source: Field survey

As indicated, there were no significant correlations between overweight and risk factors. Contrary to expectations, overweight had a negative association with predisposing factors such as proximity to fast food joints, fast food, alcohol and soft drink consumption. With respect to obesity, all the var-

iables have no significant relationship except for proximity to fast food outlets ($r = 0.645$; $p < 0.05$). Thus, the result suggests a positive association between obesity and proximity to fast food outlets (Fig. 3). The interpretation is that obesity prevalence is closely associated in wards with fast food outlets.

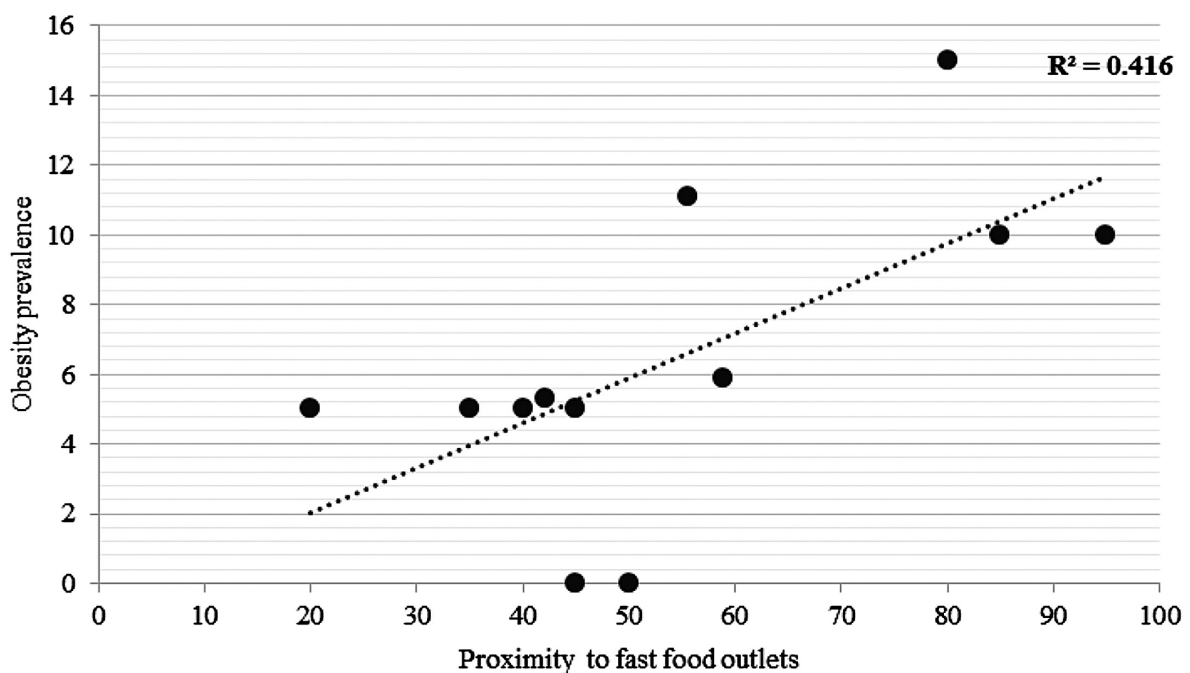


Fig. 3. Relationship between obesity and proximity to fast food outlets

Source: Field survey, 2014

To explore the effect of proximity to fast food outlets on the spatial pattern of obesity, a simple linear regression model was estimated. A regression model could not be built for overweight due to obvious reasons. The regression model for obesity explained nearly 42 percent of the spatial variation in obesity prevalence (Fig. 3) with F value of 7.125 at p value of 0.024.

4. Discussion

The primary objective of the study was to determine the small area variations in the prevalence of overweight and obesity in a Nigerian urban area, and identify their environmental, dietary and lifestyle correlates. The prevalence rate for overweight

and obesity was 20.9% and 5.6%, respectively. Comparatively speaking, overweight and obesity rates in the Ibadan North LGA are lower than those observed in Abuja, Lagos, and Katsina (Akinpelu et al., 2009; Wahab et al., 2011; Akaralo-Anthony et al., 2014). In comparison to an earlier study on Ibadan (Olatunbosun et al., 2011), overweight was higher whereas obesity was lower than what was reported.

There are stark disparities in the prevalence of overweight and obesity among the political wards of the Ibadan North LGA. Overweight recorded very high levels in wards 1, 9 and 10. Ward 1 falls within the poorly planned traditional sector of the city. Its high prevalence could be due to local lifestyle patterns of its residents. Based on personal observations, this area is largely occupied by the city's indigenous population. They have little or no formal education. Given their limited educational background, they may view increased body weight as a status symbol. A probable explanation for the high overweight prevalence in wards 9 and 10 is the large concentration of fast food outlets in the areas. These two wards enjoy a mix of domestic and foreign fast food brands. Surprisingly, the results of the regression analysis refuted these claims.

Similarly, wards 3 and 11 recorded high obesity prevalence. Like ward 1, ward 3 lies within the traditional zone. Its inhabitants probably have a sedentary lifestyle or unhealthy dietary patterns which predispose them to obesity. Another likely explanation could be the presence of a poor neighbourhood/pedestrian design: no pedestrian sidewalks, chaotic street patterns, narrow and winding roads (Filani, 1994; Faniran, 1994). From observations again, many dwell in closely packed houses with little or no space for ventilation, recreation and physical activity. This is generally a reflection of the poor physical planning in many Nigerian cities.

As in wards 9 and 10, the proliferation of fast food restaurants especially within and around the tertiary education institutions in ward 11 could be a possible explanation. Young people, particularly students of institutions of higher learning, are more likely to eat out than at home because of their dislike for cooking or poor culinary skills (Al-Otaibi et al., 2015). Evidence has shown that youths who frequently consume energy dense foods are either overweight or obese (Onyiriwka et al., 2013; Ogunniyi et al., 2015). These facts could account for this observation.

In sum, the observed spatial variations in prevalence are similar to Lakes and Burkhart's (2016) study on intra-urban variations in childhood overweight and obesity in the city of Berlin, Germany, where the highest share was in the inner city while the suburban areas had lower numbers of reported overweight and obesity.

Similar to overweight and obesity, clear spatial patterns manifested in the distribution of the risk factors. In an attempt to account for the intra-urban variations in overweight and obesity prevalence, linear regression models were employed. As earlier stressed in the preceding section, a regression model was estimated for obesity only. From the results of the analysis, it was found that only physical proximity to fast food outlets was significant in explaining the spatial pattern of obesity. This, to a very large extent, confirms the earlier assertion about the contribution of fast food outlets to the nutritional problem.

The positive association between obesity and fast food outlets points out the fact that generally speaking, the more fast food centres are available in neighbourhoods, the more fast food is consumed. Thus, the physical proximity to fast food outlets generally stimulates relatively high fast food consumption among its nearby consumers. This view is confirmed by a preliminary correlation analysis, based on the study's data set, which shows a strong and positive relationship between fast food consumption and proximity to fast food outlets ($r = 0.73$; $p = 0.007$). This agrees with the proposition in Richardson et al. (2011) that individuals living in neighbourhoods with many fast food joints frequently consume fast food.

In Nigeria, fast food brands are very common in urban centres where "life is fast as home and work are disaggregated and people are compelled to sacrifice some traditional activities usually shared, one of which is eating together at home" (Olutayo, Akanle, 2009: 210). Consequently, urban residents generally resort to the consumption of fast food products. In the words of Schroder et al. (2007: 1274), these products "are often characterised by their high content of fat and sugars, high palatability, large portion size and high energy density". Some of the fast food items on Nigerian menu lists include: "meat pies, fish pies, doughnuts, hot dogs, chicken of all sorts, fried rice, jollof rice, fish rolls, salads, pizzas

and soft drinks...” (Olutayo, Akanle, 2009: 208) and local dishes.

Fast foods of foreign origin are considered to be more attractive than local delicacies because they are not easily prepared at home (Olutayo, Akanle, 2009). Despite the fact that they are relatively expensive, they are mainly consumed by the youth and middle income earners on a regular basis, and low income earners at festive and special occasions. In addition, eating at these places gives them a sense of pride: they feel they have moved up the social ladder (Olutayo, Akanle, 2009).

Given the symbolic significance and consumer preferences for fast foods, the frequent consumption of fast food items has led to the increase in the incidence and prevalence of overweight and obesity. In addition, the city of Ibadan, in the last few decades, has witnessed a phenomenal growth in the fast food industry (Osayomi, 2017): over 35 fast food joints, as of 2013, were found in the city (Adegun, 2013), comprising public canteens (popularly known as *bukas*), cafeterias, restaurants, hawkers, street vendors (Olutayo, Akanle, 2009; Oggunniyi et al., 2013).

Clearly, the local food environment is a major driver of the obesity epidemic in Ibadan. Though dietary habits and behavioural patterns are proximal factors, the role of the environment in which residents live cannot be ignored because they shape these factors (Pearson et al., 2014).

A number of studies support the result that fast food is a major contributor of obesogenic environments. It is consistent with findings of the neighbourhood-based studies of obesity in Portland, Oregon, United States of America (Li et al., 2008, 2009a, 2009b). Common to these Portland studies is the emphasis on the strong association between fast food outlet distribution and BMI. Curie et al. (2009) observed that the increase in the supply of fast food restaurants within a short distance from residence increased the odds of being obese among ninth grade school children, African American pregnant mothers, and mothers with lower educational backgrounds.

Furthermore, Davis and Carpenter (2009) determined the effect of geographic proximity of fast food joints to schools, and revealed that students with fast food restaurants near their schools ate less fruit and vegetables and became more overweight than those whose schools were further away from

fast food restaurants. According to Ellaway et al. (2012), an average of 35 fast food outlets is within a ten-minute walk of Scottish secondary schools, presenting a variety of food options for students to choose from. Polsky et al. (2016) stressed that greater exposure to fast food restaurants is associated with unhealthy food purchases, poorer diets and higher weight status.

The major contribution of the local food environment receives further support from Cetateanu and Jones's (2014) study of childhood overweight and obesity in which they found that fast food outlets in the immediate environment of school children sold low cost and attractive energy dense meals. Similarly, Spence et al. (2009) found that the availability of different types of food retailers around individual homes in California, USA was positively related to body weight status of residents. Among Japanese older adults, a positive relationship was noticed between their BMI status and access to fast food outlets (Hanibuchi et al., 2011). On the other hand, it contradicts the findings of Richardson et al. (2011) that no relationship was observed between fast food availability and fast food consumption.

5. Limitations of the study

This study has a number of limitations. The Ibadan North LGA might not be representative of Nigerian urban areas because of differences in cultural, demographic and geographical backgrounds. Thus, results may not be generalizable. Secondly, overweight and obesity were computed based on self-reported height and weight of respondents. Sometimes, these pieces of information are under- or over reported. Furthermore, the BMI formula, though cheap and easy to compute, has its limitations. The main one is that it does not recognize differences among fat, muscle and bone mass. It therefore follows that a muscular person with a similar BMI index may be classified as obese (Burkhauser, Cawley, 2008; Daniels, 2009; Khor et al., 2009), which could be entirely misleading. Third, it was difficult to establish causality among variables as it is common with cross-sectional studies such as ours. Fourth, the role of genetics is also worth highlighting. Obesity has strong genetic connections (Li et al., 2009; Ogun-

bode et al., 2011). As far as this study was concerned, the effect of genetic susceptibility could not be determined because it was hard to measure and subject to quantitative analysis.

Fifth, the study underestimated the role of public perception of obesity which to a considerable degree accounts for its prevalence and incidence. The Nigerian society in general favours large body size because it symbolizes strong economic wellbeing. We live in an environment “where fatness has been considered as a symbol of sexual beauty and social standing” (Kandala, Stranges, 2014: 5). In fact, “being fat is often misconstrued as a sign of wealthy living” (Doku, Neupane, 2015: 8). On the other hand, thinness of the body in Nigeria has negative connotations. It oftentimes suggests poor health, chronic poverty, and psychosocial stress. This view is also shared by South Africa where thinness is socially undesirable; a thin person is “viewed as unhealthy and one who suffers from disease such as HIV/AIDS, TB and cancer...someone who is experiencing lots of physical or emotional stress” (Okop et al., 2016: 6). In fact, according to South African customs, women are expected to be overweight because it confers social status (Okop et al., 2016).

Proverbial expressions in some Nigerian ethnic groups glorify large body size. For instance, there is a saying among the Yorubas which goes thus: “*Agba ti ko yo’kun, ahun looni*” (It is only a miser that would refuse to grow fat). In the public sphere, there are symbolic words for obesity such as *Orobo* (Obese) and *Lepa* (Skinny). In the words of Liadi (2013: 155) “*Orobo* is a Yoruba word symbolizing fatness ... and used to represent a beautiful girl who is fat.” In a similar vein, it is equally important to note that obesity is culturally acceptable among some ethnic groups in Nigeria such as the Efiks, Annangs and Igbos. Common to these three groups is the fattening room practice. It is a tradition which prepares girls of marriageable age for matrimony. In the course of preparation, they are secluded in a room where they are fed with fattening meals. Unfortunately, this practice increases the prevalence of obesity and gestational diabetes among women of these cultural groups (Oe, 2009).

All these issues interestingly contrast with the weight discrimination and stigmatization of overweight/obese persons in other parts of the world. These anti-obesity behaviours are frequently ex-

perienced in work places (Giel et al., 2010; Puhl, King, 2013), in health care settings (Die Pierre et al., 2012), and on the pages of national tabloid newspapers (Flint et al., 2016) for the following reasons: poor job performance, physical unattractiveness, poor motivation, lack of appropriate seized medical equipment for obese patients, inadequate accommodation in public transport modes, among others (Giel, 2010; De Pierre et al., 2012; Puhl, King, 2012; Flint et al., 2015). The consequences of weight discrimination and stigmatization on overweight/obese persons include psychological distress, low self-esteem, poor body image and suicidal behaviour (Latner et al., 2005; Dave, Rashad, 2009; De Pierre, Puhl, 2012).

Nevertheless, the major accomplishment of this study is twofold. Firstly, the study uncovered intra-urban differentials in obesity prevalence, which had been glossed over at large geographical scales. Secondly, the study, from the Nigerian perspective, has further validated the contribution of the fast food industry to the growing overweight/obesity epidemic worldwide.

6. Conclusion

Obesity and overweight is on the increase in urban areas of Nigeria (Akarolo-Anthony et al., 2014; Kandala, Stranges, 2014). As earlier stated, this twin epidemic is largely preventable (WHO, 2015). Therefore, “the priority should be policies to reverse the obesogenic nature of these environments” (Swinburn et al., 2011 in Raine, 2012: 36). Thus, the study suggests that government and health agencies should devise area-specific, culturally appropriate, low-cost obesity prevention and control plans in mostly affected areas, which could comprise all or any of the following: First, health promotion campaigns should actively promote the indoor and outdoor consumption of fresh and healthy meals with low sugar, salt and fat content. Second, public health authorities should ensure that strict conformity to nutrient standards is met at fast food outlets. Third, neighbourhoods could organize weekly body exercise programmes for their residents preferably on weekends, perhaps after a week of sedentary activity, just as Ogunbode et al. (2011: 33) rightly point-

ed out: “regular aerobic exercises...help to reduce weight and improve health”. Fourth, local government authorities should encourage the adoption of low-cost green and healthy transport options, such as bicycling, and the creation of sufficient and safe pedestrian spaces. Fifth, local urban planning boards should adopt zoning policies similar to those of Western countries where local guidelines exist on the licensing and siting of fast food outlets (Ellaway et al., 2012). Sixth, green spaces could be created or sustained, as the case may be, to promote physical activity, as it has been proven that the availability of green spaces has facilitated healthy body weight status (Pearson et al., 2014). The adoption of these policy options for control and prevention will not only reduce overweight/obesity prevalence but also result in better health outcomes.

The paper has contributed to the body of knowledge on overweight and obesity by highlighting the small-area variations within the urban areas of Nigeria. In addition, it has further confirmed that the local food environment is a key driver of the obesity epidemic in Nigeria. Ultimately, the study hopes that the already-stated recommendations will not only be implemented, but also inhibit the growth of the twin epidemic in urban areas in particular, and in Nigeria in general.

Note

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