Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.8, No.7, 2017

An Investigation of the Socioeconomic Determinants of Obesity in Nigeria

Chika Ukaegbu
Department of Economics, University of Nigeria, Nsukka

Hyacinth Ementa Ichoku
Centre for Demographic and Allied Research, University Of Nigeria, Nsukka

Abstract
The ongoing demographic and epidemiologic transitions in Nigeria are some of the possible reasons why the prevalence of obesity is increasing in Nigeria. The economic impact of obesity in Nigeria may result to a decrease in productivity. It is based on this premise that this study investigates the socioeconomic determinants of obesity in Nigeria. The simultaneous equation model was used to analyse the study with a cross sectional data sourced from the Demographic and Health Survey 2013. A dummy variable was created to represent the regions in Nigeria. It was discovered that region has a greater impact on body mass index as it varies significantly across regions. Based on the findings it was recommended among others that sensitization programmes should be encouraged by the government at all levels to educate the people on the need for a proper diet and maintenance of a healthy life style.
Keywords: Demographic, Epidemiologic transitions, Obesity, Body mass index (B.M.I) Productivity, Socioeconomic determinants, Nigeria.

Introduction

Obesity is an excessive or abnormal fat accumulation that may impair health if drastic actions are not taken. (Ellulu, Abed, Rahmat, Ranneh & Ali;(2014). It is a deadly non communicable disease which is gaining increasing importance globally and emanates as a result of excessive food intake containing fats, sugar dense meals and a reduction in physical activities. Also, obesity occurs as a result of an imbalance between energy intake and energy output leading to the accumulation of fats in the body (Thiam, Samba,& Lwanga;(2006). The World Health Organisation (WHO, 2014) states that Obesity is an abnormal or excessive fat accumulation that may impair health which occurs in individuals with body mass index (BMI) greater than 25 kilogram per metre square (kg/m^2) for overweight individuals and a body mass index greater than 30 kilogram per metre square (kg/m^2) for obese individuals. They went further to state that these cut-off points provide a bench mark for individuals assessment.

The prevalence of obesity has greatly affected the Nigerian economy as there are no adequate measures taken in creating awareness and reorientation programmes by health based action group in collaboration with the government to educate consumers on proper food intake and health maintenance thereby leading to a decrease in output per capital (Ekpenyong & Akpan 2013). Also, uneducated households belonging to the low socioeconomic class are not well informed, unable to understand nutritional labels and make decisions on their diet, thereby making unhealthy product choices.

Obesity has been interpreted by many individuals especially the female folk as a sign of affluence in Nigeria; this has also led to a higher prevalence of obesity in women compared to the men in Nigeria. A study carried out by Ojofeitimi, Adeyeye, Fadiora, Kuteyi, Faborode, Adegbenro, Bakare, Setiloane, & Towobola, (2007) on the awareness of obesity and its health hazard among women in a university community found out that in spite of the higher level of education acquired by their respondents in a university community in the south western part of Nigeria, it is absurd to note that many of the respondents believed that being obese is a sign of good health, prestige and wealth. Oladapo, Falase, Salako, Sodiq, Soyinka, & Adedapo,(2010) in their findings on high prevalence of obesity in rural south western Nigeria argued that the prevalence of obesity increases with age while research carried out by Adediran, Okpara, Adeniyi, & Jimoh,(2012) on the same study found no relationship between age and obesity. Hughes, Frontera, Roubenoff, Evan, & Singh (2002) went further to state that an individual getting old is associated with changes in body composition resulting in increased body mass index.

In Nigeria, more than one in every five women was reported to be obese or overweight (University of Warwick, 2014). The level of obesity in Nigeria is capable of reducing the level of productivity as people with high body mass index tend to experience fatigue resulting to a decrease in productivity. To buttress this claim Popkin,(2006) and Adamu, Makusidi, Liman, Isah, Jega & Chijioke (2014) argued that Nigeria is witnessing an ongoing demographic and epidemiologic transition such as rural to urban migration, changes in life style and socioeconomic factors such as income and culture could be some of the possible reasons why the prevalence of obesity is increasing as Nigerians preference for western diet, social and economic factors has led to a

proportionate increase of fast foods and bolus meals (semolina, wheat, etc) intake. Report from Akarolo & Anthony (2012) states that changes in carbohydrate food such as imported rice, pounded yam, wheat and semolina (bolus meals) is now the major carbohydrate food eaten by most urbanized Nigerians, and is more consumed on weekdays rather than on weekend celebration and parties as was the custom four decades ago with most individuals eating three servings per meal. Such transition has been triggered by the availability of fast food restaurants whose major service is packed chicken and rice meals.

The ratio of independent individuals in the labour force have been identified as the group of individuals with the highest fast-food patronage as a result of work pressure, the easy mode of preparation and reduced time required for preparation not considering the effect on their health and income as consumption of such meals decreases the income and productivity of individuals seeking health care service thus having adverse effect on the Nigerian economy (Akarolo & Anthony (2012).

Obesity in Nigeria has also been attributed to the low socioeconomic status of citizens. Chukwunonye et al. (2013) carried out a research on the association between socioeconomic status and obesity in south eastern Nigeria, findings from the study shows that the prevalence of obesity has a direct relationship with income and that individuals with higher socioeconomic status (the rich) are less susceptible to being obese because they have greater abilities of affording rich nutritional intake than the poor. Similarly, a study carried out by the North Carolina Institute of Medicine (NCIM, 2009) found that individuals with higher income, higher level of education on average have better health outcomes because they are well informed on the access to health care facilities which is more accessible with monetary resources, they reside in a healthy safe environment, afford quality education, have access to purchase healthy foods, fruits and vegetables and afford time and resource to partake in physical activity through recreational facilities. Also, findings from Benjamin,(2012), Pickett, Kelly, Brunner, Lobstein, & Wilkinson (2005), Wilkinson, & Pickett,(2009) on the effects of income inequality on BMI and obesity states that income inequality is an economic factor whose contribution to general health and mortality has caused a great increase to the prevalence of obesity.

The role of socio cultural beliefs have also led to the prevalence of obesity among the female gender in Nigeria as obesity is likened to physical attractiveness, strength, fertility and prestige (Adienbo, Hart, & Oyeyemi, (2012), (Powdermaker,1997). Caballero (2007) states that the socio-cultural practice of fattening rooms among the Kalabari people of Ijaw in the Niger delta region of Nigeria known as “Iria” has increased obesity prevalence as women in the pre marital age group are confined to a secluded area for the period of 2-3 months, fed with elaborate meals rich in starch and carbohydrates to enable them grow fat and are also restricted from partaking in domestic activities. Similarly, according to Phillip, (2013), this practice also exists amongst the Ibibio people of Akwa Ibom state, the efiks of Cross River state, the Ogonis and the Ikwerres of Rivers state with variations in their ceremonies. Findings from Adienbo et al. (2012) shows that diet and socio-cultural life styles influences obesity.

METHODOLOGY

To explore the relationship between BMI and Wealth Index as reported in the Demographic and Health Survey 2013 for Nigeria, the current study will employ a simultaneous equation model as a result of endogeneity . The modeling strategies draw on Stern (1989) in Cai (2012). The first equation describes the determination of obesity (BMI)

$$BMI = \alpha_0 + \alpha_1 WI + \alpha_2 OCC + \alpha_3 GENDER + \alpha_4 REG + \alpha_5 FWTV + \mu_1 ------(1)$$

$$WI = \beta_0 + \beta_1 BMI + \beta_2 OCC + \beta_3 GENDER + \beta_4 FWTV + \beta_5 EDA + \mu_2 ------(2)$$

where:

BMI = Body Mass Index (Obesity)
WI = Wealth Index
OCC = Occupation
EDA= Educational attainment
REG= Region
FWTV = Frequency of Watching Television
Gender
μ_i = disturbance term

Due to possible problem of endogenity of the WI index variable, Educational Attainment will be used as an instrument for wealth index.

Using the (m-1) (m-1) matrix determinant= β_1 in equation 1 and α_4 in equation 2 are identified.

From the above, we shall generate the reduced form equation of simultaneous equation model for identification purpose. This means that equations, (1) and (2) have their dependent variables existing as explanatory variables in each equations, solving for the reduced form equation, we have;

$$BMI = \alpha_0 + \alpha_1 WI + \alpha_2 OCC + \alpha_3 GENDER + \alpha_4 REG + \alpha_5 FWTV + \mu_1 ------(3)$$

$$WI = \beta_0 + \beta_1 BMI + \beta_2 OCC + \beta_3 GENDER + \beta_4 FWTV + \beta_5 EDA + \mu_2 ------(4)$$

Where equations (3) and (4) are econometric transformations of equation (1) and (2). One can easily see that by the order condition both equations are Just-identified and the rank condition are also identified. (The order condition of identifiability requires that the number of predetermined variables excluded from the equation must not be less than the number of endogenous variables included in that equation less 1, that is: $K - k = m-1$, where K is the number of predetermined variables in the model, k is the number or predetermined variables in a given equation and m is the total number of endogenous variables in a given equation.) (Gujarati & porter, 2009)

To determine the reduced equation for BMI implies substituting equation (4) into (3);

$$BMI = \alpha_0 + \alpha_1(\beta_0 + \beta_1 BMI + \beta_2 OCC + \beta_3 GENDER + \beta_4 FWTV + \beta_5 EDA + \mu_1) + \alpha_2 OCC + \alpha_3 GENDER + \alpha_4 REG + \alpha_5 FWTV + \mu_i ----------(5)$$

$$BMI = \alpha_0 + \alpha_1\beta_0 + \alpha_1\beta_1 BMI + \alpha_1\beta_2 OCC + \alpha_1\beta_3 GENDER + \alpha_1\beta_4 FWTV + \alpha_1\beta_5 EDA + \alpha_1\mu_1 + \alpha_2 OCC + \alpha_3 GENDER + \alpha_4 REG + \alpha_5 FWTV + \mu_2 ----------(6)$$

Collecting like term gives

$$BMI - \alpha_1\beta_1 BMI = \alpha_0 + \alpha_1\beta_0 + \alpha_1\beta_2 OCC + \alpha_1\beta_3 GENDER + \alpha_1\beta_4 FWTV + \alpha_1\beta_5 EDA + \alpha_2 OCC + \alpha_3 GENDER + \alpha_4 REG + \alpha_5 FWTV + \alpha_1\mu_1 + \mu_2 ---------- \quad (7)$$

Simplifying gives

$$BMI(1 - \alpha_1\beta_1) = (\alpha_0 + \alpha_1\beta_0) + (\alpha_1\beta_2 + \alpha_2)OCC + (\alpha_1\beta_3 + \alpha_3)GENDER + (\alpha_1\beta_4 + \alpha_5) FWTV + \alpha_1\beta_5 EDA + \alpha_4 REG + (\alpha_1\mu_1 + \mu_2) ---------- \quad (8)$$

Divide through by $(1 - \alpha_1\beta_1)$

$$BMI = \frac{\alpha_0 + \alpha_1\beta_0}{1 - \alpha_1\beta_1} + \left[\frac{\alpha_1\beta_2 + \alpha_2}{1 - \alpha_1\beta_1}\right] OCC + \left[\frac{\alpha_1\beta_3 + \alpha_3}{1 - \alpha_1\beta_1}\right] GENDER + \left[\frac{\alpha_1\beta 4 + \alpha_5}{1 - \alpha_1\beta_1}\right] FWTV + \left[\frac{\alpha_1\beta_5}{1 - \alpha_1\beta_1}\right] EDA + \left[\frac{\alpha_4}{1 - \alpha_1\beta_1}\right] REG + \left[\frac{\alpha_1\mu_1 + \mu_2}{1 - \alpha_1\beta_1}\right] ------(9)$$

If we allow the following;

$$\pi_{10} = \left[\frac{\alpha_{0+}\alpha_1\beta_0}{1 - \alpha_1\beta_1}\right], \pi_{11} = \left[\frac{\alpha_1\beta_2 + \alpha_2}{1 - \alpha_1\beta_1}\right], \pi_{12} = \left[\frac{\alpha_1\beta_3 + \alpha_3}{1 - \alpha_1\beta_1}\right],$$

$$\pi_{13} = \left[\frac{\alpha_1\beta_4 + \alpha_5}{1 - \alpha_1\beta_1}\right], \pi_{14} = \left[\frac{\alpha_1\beta_5}{1 - \alpha_1\beta_1}\right] \quad \pi_{15} = \left[\frac{\alpha_4}{1 - \alpha_1\beta_1}\right], \quad v_{10} = \left[\frac{\alpha_1\mu_1 + \mu_2}{1 - \alpha_1\beta_1}\right]$$

The reduced form equation for BMI gives:

$$BMI = \pi_{10} + \pi_{11} OCC + \pi_{12} GENDER + \pi_{13} FWTV + \pi_{14} EDA + \pi_{15} REG + V_{10} - (10)$$

Where π_{11}, π_{12}, π_{13}, π_{14} and π_{15} are the least square estimators. Equation 10 will be used to capture objective 1.

Results

This depicts the result of the socioeconomic determinants of obesity in Nigeria.

OLS – Ordinary Least Square

IV – Instrumental Variables

IV (robust) – This is used to check for the presence of heteroscedasticity in a model

GMM – Generalized Methods of Moments.

Dependent Variable : BMI = Body Mass Index				
VARIABLE	OLS	IV	IV(Robust)	GMM
WI	72.79 11.6 (0.00)	149.23 29.39 (0.00)	149.23 28.08 (0.00)	166.47 27.71 (0.00)
OCC				
Pro/ Tech/ Mag	181.91 112.70 (0.10)	145.31 113.59 (0.20)	145.31 48.53 (0.00)	141.66 49.03 (0.00)
Clerical	94.86 155.89 (0.54)	71.26 156.32 (0.64)	71.26 63.76 (0.26)	66.69 64.49 (0.30)
Sales	207.78 111.22	206.48 111.37	206.48 49.11	207.08 49.13

	(0.06)	(0.06)	(0.00)	(0.00)
Aselfemp	107.21 116.64 (0.35)	177.13 119.38 (0.13)	177.13 60.63 (0.00)	193.77 60.65 (0.00)
Agricemp	128.89 110.45 (0.24)	179.54 112.03 (0.10)	179.54 47.59 (0.00)	182.87 48.04 (0.00)
Housemaid/domestic	-255.03 673.97 (0.70)	-289.63 674.99 (0.66)	-289.63 213.26 (0.17)	-302.05 218.96 (0.16)
Services	184.69 116.86 (0.11)	169.96 117.13 (0.14)	169.96 56.04 (0.00)	168.18 56.51 (0.00)
skilled manual	149.40 111.00 (0.17)	144.31 111.16 (0.19)	144.30 45.90 (0.00)	145.12 46.08 (0.00)
Unskilled manual	26.81 118.66 (0.82)	47.29 119.04 (0.69)	47.29 47. 95 (0.32)	46.25 48.44 (0.34)
Other	253.46 398.90 (0.52)	215.86 399.66 (0.58)	215.86 58.49 (0.00)	208.13 56.99 (0.00)
GENDER				
Female	-59.909003 81.392182 (0.46)	-47.02505 81.629648 (0.56)	-47.02505 66.270538 (0.47)	-37.10 65.94 (0.57)
REG				
NOTE	50.49 35.91 (0.16)	106.57 41.05 (0.00)	106.57 38.54 (0.00)	104.34 38.55 (0.00)
NOTW	-82.44 33.07 (0.01)	-29.50 38.03 (0.43)	-29.50 35.10 (0.40)	-17.20 34.34 (0.61)
SOE	127.13 49.16 (0.01)	111.22 49.55 (0.02)	111.22 52.09 (0.03)	96.63 49.92 (0.05)
SOS	104.68 40.36 (0.01)	90.90 40.70 (0.02)	90.90 37.55 (0.01)	91.45 37.05 (0.01)
SOW	-46.02 39.23 (0.24)	-79.54 41.03 (0.05)	-79.55 30.05 (0.00)	-92.26 29.78 (0.00)
FWTV				
Less than once a week	-38.89 31.93 (0.22)	-111.16 40.91 (0.00)	-111.16 38.48 (0.00)	-133.84 37.69 (0.00)
Atleast once a week	2.44 32.97 (0.94)	-91.16 46.72 (0.05)	-91.16 42.07 (0.03)	-113.17 41.38 (0.00)
Constant	2066.48 117.06 (0.00)	117.06 139.20 (0.00)	1853.85 91.93 (0.00)	1810.52 91.33 (0.00)

Estimated by the Author using Stata 13. Probability value in parenthesis at 5%

The result for the first objective presented above showed that the socio economic determinants of obesity are wealth index, occupation, gender and frequency of watching television. The table showed a comparison among OLS estimate, IV estimate and GMM estimate, while the OLS estimate shows that an increase in wealth index by one unit, increases body mass index by 72.8 percent holding other factors constant. This same positive relationship was discovered in both the IV estimate and the GMM estimates except that while

the IV estimate indicated 149.23 percent increase in body mass index for a unit increase in wealth index, the GMM estimate showed 166.47 percent increase in body mass index for a unit increase in wealth index. However, it must be noted that the GMM result may be plausible due to the potential presence of heteroscedasticity in the model. The interpretation of these results will focus on GMM

Also, the result of the GMM on table above equally showed an individual who worked in a professional/technical/ managerial position is most likely to have a body mass index that is 141.66 percent higher than an individual who is not working. The probability value of 0.004 which is less than the maximum significance probability value of 0.05 showed that the result is significant. This showed that an individual who worked in a professional/ technical/ managerial position will significantly have a high body mass index than an individual who is not working. Likewise, it is shown that a clerical officer will likely have a predicted body mass index that is 66.69 percent higher than a person who is not working, however, this difference is not statistically significant, since it has a probability value of 0.30.

More so, a sales person will significantly have a body mass index that is 207 percent higher than one who is not working; this is significant with a probability value of 0.000. Similarly, an individual who is in agricultural self employment will likely have a body mass index that is 193.8 percent higher than one who is not working. While an individual who is in agricultural employment will significantly have a body mass index that is 182.87 percent higher than one who is not working. However, housemaids and domestic workers have an insignificant body mass index that is 302.1 less than one who is not working.

Then again, the result indicated that those who work in service industries have on average body mass index that is 168.18 percent significantly higher than those who are not working holding every other factor constant. Also, a skilled manual worker equally has a body mass index that is 145.1 percent significantly higher than one who is not working. Where as, an unskilled manual worker has a body mass index that is 46.26 percent insignificantly higher than a non worker. Finally, those who are in other paid employment not listed were likely to have body mass index that is 208.13 percent higher than those who are not working.

For the variable Gender, the result indicated that being a female reduces the body mass index by 37.1 than being a male. However, this result is not statistically significant since the probability value of 0.574 is greater than the maximum significance probability value of 0.05

Going further, for the Frequency of Watching Television variable, the result indicated that those who watch television less than once a week will likely have body mass index that is 133.8 points less than those who do not watch TV at all, while those who watch television for at least once a week will likely have a body mass index that is 113.18 percent less than those who do not watch television at all and this difference which is statistically significant. However, these results do not meet apriori expectation.

Discussion of findings

Studies relating to the socioeconomic determinants of obesity revealed that wealth index had a significant effect on body mass index. This result agreed with apriori expectations and equally agreed with the findings of Chukwunoye, et al (2013). This has helped to confirm that wealth index is a socioeconomic determinant of obesity. By extension the wealthy in the society will likely have high body mass index. The result also indicated that one's occupation has a way of determining the individuals body mass index as can be indicated by the differences with the various occupations listed with those who do not work at all. Where the results were statistically significant except the result for those in clerical, housemaid and unskilled manual occupation. This may be because individuals who engage in these three occupations are usually poorly paid. On the other hand, the result of Gender, does not agree with that of Abubakari et al, (2008), Iloh, et al (2001); Chinedu et al (2014) and Onyechi et al (2008) who all found a higher prevalence of obesity existing among women. While results from the regression analysis found a higher prevalence of obesity among men.

The result of frequency in watching television does not agree with the apriori expectation of this study. Those who watch television ought to have higher body mass index than those who do not watch television at all. However, the result showed the reverse.

Conclusion

This study carried out an empirical investigation of socioeconomic determinants of obesity in Nigeria. This study was carried out because of the alarming increase in the rate of obesity in Nigeria and the economic impact of the increased rate of obesity. The study reviewed a lot of literatures both theoretical and empirical and from there major socioeconomic factors of obesity were identified which include income (wealth index as a proxy to income), occupation, gender, region and frequency of watching television. As a result of endogeneity in the wealth index, educational attainment was used as an instrument for wealth index, therefore, instrumental variable estimation was the method of estimation. From the result of the analysis in this study and the summary of findings, the study concludes that wealth index, occupation, region and frequency of watching televisions are major socioeconomic determinant of obesity in Nigeria. Also, wealth index had a significant effect on body mass

index; region had a greater impact on body mass index as it varies significantly across regions.

References

Abubakari, A. R., Lauder, W., Agyemang, C., Jones, M., Kirk, A., & Bhopal, R. S. (2008). Prevalence and time trends in obesity among adult West African populations: A meta analysis. *Obese Review*, *9*(4), 297-311.

Adamu, H., Makusidi, A. M., Liman, H. M., Isah, M. D., Jega, M. R., & Chijioke, A. (2014). Prevalence of obesity, diabetes type 2 and hypertension among a sampled population from Sokoto metropolis-Nigeria. *British Journal of Medicine and Medical Research*, *4*(10), 2065-2080.

Adediran, O. S., Okpara, I. C., Adeniyi, O. S., & Jimoh, A. K. (2012). Obesity prevalence and its associated factors in an urban and rural area of Abuja, Nigeria. *Global Advanced Research Journal of Medical Science*, *1*(8), 237-241.

Adienbo, O. M., Hart, V. O., & Oyeyemi, W. A. (2012). High prevalence of obesity among indigenous residents of a Nigerian ethnic group: The Kalabaris in the Niger Delta region of South-South Nigeria. *Greener Journal Medical Science*, *2*, 152-156.

Akarolo & Anthony, S. N. (2012). Pattern of dietary carbohydrate intake among urbanized adult Nigerians. *International Journal of Food and Science Nutrition*, 1-8.

Benjamin, V. (2012). The effects of income inequality on BMI and obesity: Evidence from BRFSS. *Papers on Economics and Evolution*, 1-20.

Cai, L. (2012). The relationship between health and labor force participation: Evidence from panel data simultaneous equation model. Institute of Applied, Economic and Social Research.

Callabero, B. (2007). The global epidemic of obesity: An overview. *Journal of Epidemiology Review, 29*, 1-5.

Chinedu, S. N., & Emiloju, O. C. (2014). Underweight, overweight and obesity amongst young adults in Ota, Nigeria. *Journal of Public Health and Epidemiology*, *6*, 235-238.

Chukwunonye, Abali, Ikechi, Onyeonoro, Okechwkwu, Madukwe, Chukwuebuka, & Ogah (2013). Socioeconomic status and obesity in Abia state, south east Nigeria. *Journal of Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 6,* 371-378.

Demographic and Health Survey 2013.

Ekpenyong, C. E., & Akpan, E. E. (2013). Urbanization drift and obesity epidemic in sub-Saharan Africa: A review of the situation in Nigeria. *European Journal of Sustainable Development, 24,* 65-79.

Ellulu, M., Abed, Y., Rahmat, A., & Ali, F. (2014). Epidemiology of obesity in developing countries: Challenges and prevention. *Herbert Open Access Journal.*

Gujarati, D. & Porter (2009). *Basic econometrics* (5th ed.) New York: McGraw Hill press.

Hughes, V. A., Frontera, W. R., Roubenoff, R., Evan, W. J., & Singh, M. A. (2002). Longitudinal changes in body composition in older men and women: role of body weight change and physical activity. *American Journal of Clinical Nutrition , 76*, 473-481.

Iloh, G. U., Amadi, A. N., Nwankwo, B. O., & Ugwu, V. C. (2001). Obesity in adult Nigerians: A study of its pattern and common primary co-morbidities in a rural mission general hospital in Imo state, south-eastern Nigeria. *Nigerian Journal of Clinical Practice*, *14*, 212-218.

North Carolina institute of medicine task force on prevention (2009). Prevention for the health of North Carolina: Prevention action plan. Morrisville, NC: North Carolina institute of medicine.

Ojofeitimi, E. O., Adeyeye, A. O., Fadiora, A. O., Kuteyi, A. O., Faborode, T. G., Adegbenro, C. A., Bakare, O. E., Setiloane, K., &Towobola, K. S. (2007). Awareness of obesity and its health hazars among women in a university community. *Pakistan Journal of Nutrition*, 6(5), 502-505.

Oladapo, O. O., Falase, A. O., Salako, L., Sodiq, O., Soyinka, K., & Adedapo, K. (2010). Prevalence of cardio metabolic risk factor among a rural Yoruba South-Western Nigerian population: A population based survey. *Cardiovascular Journal of Africa*, *21*, 26-31.

Onyechi, U. A., & Okolo, A. C. (2008). Prevalence of obesity among undergraduate students living in halls of residence, University of Nigeria, Nsukka campus, Enugu state. *Animal Research International, 5(*3), 928-931.

Philip, U. E. (2013). Nigerian "fattening rooms" reinventing the total woman.

Pickett, K. E., Kelly, S., Brunner, E., Lobstein, T., & Wilkinson, R. G. (2005). Wider income gaps, wider waistbands? An ecological study of obesity and income inequality. *Journal of Epidemiology and Community Health*, 59, 670-674.

Popkin, B. M. (2006). Global nutrition dynamics: the world is shifting rapidly towards a diet linked with non-communicable disease. *American Journal of Clinical Nutrition,* 84, 289-298.

Powdermaker, H. (1997). An anthropological approach to the problem of obesity in food and culture: A reader edition. C. Counihan and P. Esterik. New York: Routledge, 206

Stern, S. (1989): Measuring the effect of Disability on Labour Force Participation. *The Journal of Human*

resources, 24(3):361-395.

Thiam, I., Samba, K., & Lwanga, D. (2006). *Diet related chronic disease in West Africa region.* Switzerland: SCN.

University of Warwick (2014).”influence of westernization spells danger for public health in Nigeria.” *Science daily*.

Wilkinson, R., & Pickett, K. (2009). *The spirit level: Why equality is better for everyone*. London: Penguin.

World Health Organization (WHO, 2014). *Obesity and overweight fact sheet* (No. 311). WHO. Available at www.who.int/mediacentre/factsheets/fs/311/en/.