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Social Epidemiology of Adverse Nutritional Status Outcomes among Women in Nigeria: NDHS, 2008

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Abstract: Adverse nutritional status has been a major challenge to the health of individuals. Poor nutritional status in terms of overweight and underweight predisposes human beings to opportunistic infections and therefore can make the realization of Millennium Development Goals unfeasible. Nigeria Demographic and Health Survey, 2008 data on women aged 15-49 was used. Two indicators of adverse nutritional status were measured; those with Body Mass Index (BMI) less than 18.5 kg/m^2, an indication of underweight and those with BMI greater than or equal to 25 kg/m^2 an indication of overweight. Chi-square and logistic regression were used for the analysis. The results showed that slightly more than one in ten (11.5%) and one in four (24.0%) were undernourished and overweight respectively. Differentials existed across subgroup of women in terms of adverse nutrition. Socio-demographic variables such as age, region, residence, education, wealth index, number of living children, marital status, occupation are significantly associated with overweight and underweight ($p<0.001$). The risk of overweight is significantly higher among urban women than their rural counterparts ($p<0.05$) and increases consistently with increasing wealth index and levels of education. Other risk factors of overweight are marriage, monogamy, being a professional or managers. Undernourishment risks show opposite patterns as that of overweight. Women who work at home are approximately twice more likely to be underweight than those who work away from home ($p<0.001$). Physical health education and adequate dietary intake will go a long way at reducing and increasing body mass for overweight and underweight women respectively.

Key words: Epidemiology, malnutrition, overweight, underweight, multi-Level, Nigeria

INTRODUCTION

At the Millennium Summit of the United Nations in September 2000, there was an official obligation to trim down global deprivation, including poverty, hunger, poor health and abuses of human rights. That commitment was translated into a series of Millennium Development Goals (MDGs). One of the MDGs on poverty and hunger uses nutritional status as an indicator of progress towards the target of meeting the themes by 2015. The formal recognition of nutritional status as a key indicator of poverty and hunger is an imperative primary step in recognizing that research on nutritional outcomes has a key role to play in international development.

The study of the influence of socio-demographic factors on the health conditions of people has always been a subject of curiosity to public health practitioners. In the last decade, epidemiologists and the social scientists have been trying to recognize and document the wide spectrum of health determinants, from a micro level where individual biological factors operate, to a macro level that expresses social conditions in which populations live. This endeavor has given birth to social epidemiology (Epidemiological Bulletin, 2002).

Social epidemiology is the study of how society and different forms of socioeconomic variables influence the health and well-being of individuals and populations. In particular, it studies the frequency, distribution and social determinants of the states of health in a population. Thus, social epidemiology goes beyond the analysis of individual risk factors to include the study of the social context in which the health-disease phenomenon occurs (Anon, 2005). The field intersects with the social sciences as it focuses on identifying causes in such factors as socioeconomic factors, social networks, social relationships, cultural beliefs, social norms and social and health policies. It reveals how social problems are intrinsically linked to the health of populations and encourages a rich and multidisciplinary approach to analyzing and solving complex contemporary social issues (Julie, 2006).

In any setting, the economic livelihood of people depends to a large extent on the health and nutrition of

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adults. The people believe is that health is wealth and if population is healthy, the national income will be improved. Women with low or high body weight allocate fewer days to heavy labour and are more likely to fail to appear for work owing to illness or exhaustion (Shetty and James, 1994). Malnutrition is a menace that is widespread among women of childbearing age who bear the double burden of caring for themselves and their children. In adults, the main cause of malnutrition is inadequate dietary intake, often in combination with disease. However, when energy intake exceeds energy expenditure, the excess is stored in fat mass. Both underweight and overweight constitute malnutrition among women: once these conditions reach certain levels, the manifestations of malnutrition among women become apparent. Literatures are few on assessment of socio-demographic influence on nutritional status in women. However, important health effects have been shown for those with BMI values below 18.5 kg/m^2 and for those above 25 kg/m^2.

Body weight is measured easily and can be obtained through self-report, thus making it feasible for large-scale studies. However, the emphasis on body weight in epidemiologic studies may be somewhat misleading. Health risk factors may not be captured adequately by simple measurements or reports of body weight, particularly when weight is measured only at a single point in time. An individual's body weight reflects body composition and adipose tissue distribution that in turn reflect a combination of genetic factors, physiologic status, individual behaviors and environmental and social influences. The real health risks are difficult to identify in this complex situation (Kannel *et al*., 2002).

In the course of the review, several health outcomes were dropped from further consideration toward the final burden of disease estimate. In many instances, there was insufficient published evidence within a developing country setting to support a causal relationship between low BMI, high BMI and socioeconomic characteristics. The relationship might be more widely supported given a different choice of anthropometric indicator. The prevalence of underweight and overweight are increasing in most parts of the world and appears likely to continue to increase in the future. The socioeconomic risks associated with these increases need to be evaluated objectively at regular intervals. A synergistic relationship between malnutrition and infection has been recognized for decades (Scrimshaw *et al*., 1968).

For thousands of years overweight was rarely seen (Haslam, 2007). It was not until the 20th century that it became ordinary, so much so that in 1997 the World Health Organization (WHO) formally recognized overweight as a global epidemic (Caballero, 2007). As of 2005 the WHO estimates that at least 400 million adults (9.8%) are overweight, with higher rates among women than men (WHO, 2000). Overweight also increases with age at least up to 50 or 60 years old (Peter *et al*., 2005). Once considered a problem only of high-income countries, obesity rates are rising worldwide. These increases have been felt most dramatically in urban settings (WHO, 2000). The only remaining region of the world where overweight is not common is sub-Saharan Africa (Haslam and James, 2005).

Obesity rates in sub-Saharan Africa are estimated to be 10% and the rates among women are three times those found in men. In urban West Africa for instance, overweight has been more than doubled in the last 15 year (Abubakari *et al*., 2008). Overweight varies by age and sex and by race-ethnic group among adult women. Low pre-pregnancy BMI and short stature are risk factors for poor birth outcomes and obstetric complications. In developing countries, maternal underweight is the leading risk factor for preventable deaths and diseases. Among youth overweight has a low prevalence, occurring primarily in children with a strong family history of diabetes who are from certain ethnic groups (Fagot-Campagna, 2000; Sinha *et al*., 2002). Increased modernization and a Westernized diet and lifestyle are associated with an increased prevalence of overweight in many developing countries (Drewnowski and Popkin, 1997). Clearly, individual behaviors along with social, cultural and environmental factors also play important roles. For adults, tobacco use could be considered among the environmental determinants of weight and overweight. Smoking and tobacco use are also associated with lower body weights and a lower prevalence of overweight or obesity (Perkins, 1992).

In many countries, gender bias and discrimination constrain and limit women's and girls' rights, choices, capabilities and opportunities (Malhotra *et al*., 2002; Kishor and Neitzel, 1996). Poor women have fewer employment opportunities than men; their wages are significantly lower than men's; they have less access to resources and information and are less involved in household decision making processes. Even decisions relating to how many children a woman should have are made by others. Girls, for instance, are less likely to be enrolled in school and drop out earlier than boys. In some countries, socio-cultural norms also dictate that girls marry during adolescence and have their first child soon thereafter. Taken jointly, these constraints limit women's abilities to improve their nutritional status. Gender equality is good for nutritional status (Oniang'o and Mukudi, 2002). In unequal conditions, women and girls have poorer nutrition outcomes throughout the life cycle, higher rates of mortality, less access to health care and greater household food insecurity (Osmani and Sen, 2003; Shiffman and Okonofua, 2007).

Every year, more than 500,000 women worldwide die from complications arising from pregnancy and childbirth (WHO, 2000). Maternal malnutrition is

associated with both maternal morbidity and mortality in several ways. Maternal stunting is associated with a small birth canal and obstructed labour, which is a main cause of maternal mortality (Konje and Ladipo, 2000). The most fundamental way to reduce obstructive labour is to break the intergenerational cycle of chronic under-nutrition and adopt measures to improve children's health and nutrition during rapid periods of growth, i.e. infancy, early childhood and adolescence (Konje and Ladipo, 2000).

Undernourishment on the other hand is most prevalent where poverty persists such as sub-Saharan Africa and difficult to isolate its effects from other factors that contribute to poor health conditions. In reviewing the various risk relationships, the likelihood of causality was considered according to Hill's standards (Hill, 1965). In each case, it was observed that sufficient biological plausibility and experimental evidence support the relationship. The relationship between undernutrition and disease are mediated through many biological mechanisms.

Less is known about this double burden in women. The current study used Nigeria Demographic and Health Survey (NDHS) data collected by National Population Commission in 2008 to keep posted knowledge about the prevalence and distribution of underweight and overweight among women. Our crucial intention was to compare patterns of overweight and underweight in women of childbearing age using specific background characteristics. Many documents focus on factors underlying cause of rising maternal malnutrition in the developing world and they emphasize that overweight is more prevalent in developed countries than in developing countries (WHO/FAO, 2002; Martorell *et al*., 2000). However, there are far fewer data on the extent to which marriage patterns and occupational activities face the burden of underweight and overweight.

This study also evaluated the urban and rural malnutrition patterns. Rising wealth index and increasing in levels of education are believed to be central elements fueling the pandemic of overweight and underweight (WHO/FAO, 2002; Martorell *et al*., 2000). Finally, this study examines the ways that malnutrition patterns in women in different socioeconomic status groups vary across regions in Nigeria.

MATERIALS AND METHODS

Sample design: The data for this study is secondary and was obtained from ICF Macro Calverton, Maryland, U.S.A. It is an NDHS data, 2008. A brief description of the methodology involved during data collection is discussed below. The sample was designed to provide population and health indicators at the national, zonal and state levels. The Primary Sampling Unit (PSU), referred to as a cluster for the 2008 NDHS, was defined on the basis of Enumeration Areas (EAs) from the 2006 EA census frame. The 2008 NDHS sample was selected using a stratified two-stage cluster design consisting of 888 clusters, 286 in the urban and 602 in the rural areas. A representative sample of 36 800 households was selected, with a minimum target of 950 completed interviews per state. In each state, the number of households was distributed proportionately among its urban and rural areas.

All women age 15-49 and men age 15-59 who were either permanent residents of the households in the 2008 NDHS sample or visitors present in the households on the night before the survey were eligible to be interviewed. However, men were selected in a sub-sample of half of the households. Three questionnaires were used. These are; the Household Questionnaire, the Women's Questionnaire and the Men's Questionnaire. These questionnaires were adapted to reflect the population and health issues relevant to Nigeria. However, this study used information on women's Questionnaire. All women aged 15-49 were considered in the analysis except the exclusion of those who were either breastfeeding or pregnant or severely ill at the time of the survey.

Methods of analysis: Two indicators of adverse maternal nutritional status were considered for the analysis. These were, those women whose Body Mass Index (BMI) were less than 18.5 kg/m^2 an indication of underweight or thinness and those with BMI greater than or equal to 25 kg/m^2 an indication of overweight or obesity. Chi-square distribution was used to establish the association between each of the indicators mentioned above and selected socioeconomic characteristics of the respondents. What informed the selection of these variables was their significant association with the dependent variable (BMI). Many socioeconomic variables were used in the analysis and thus those who were not statistically significant were eliminated. Multivariate analyses were performed using logistic regression model. The use of logistic regression was possible by re-categorizing the dependent variable (BMI) as shown below:

Underweight $\Rightarrow$:

$$\text{If BMI} > 18.5,\ x_1 = 0,\ \text{If BMI} \leq 18.5,\ x_1 = 1$$

Obesity and overweight $\Rightarrow$:

$$\text{If BMI} < 25,\ x_2 = 0,\ \text{If BMI} \geq 25,\ x_2 = 1$$

The analysis was done at different levels. At first, many variables from previous literatures that were found to be associated with the underweight and overweight or obese were considered for the Chi-square analysis. All the variables that were not significantly related with the dependent variables of this study were eliminated and

were not reported in this manuscript. Secondly, those that were significantly associated with dependent variables were considered for logistic regression. This is with the view to seeing their individual influence on dependent variables. At this level, variables such as children ever born, religion, work status and decision on income were further eliminated due to their insignificant influence on dependent variables. Thereafter, variables that were significant at 5% level were used in the final analysis. This revealed how the individual variable categories contributed to the risks of underweight or thinness and overweight or obesity.

RESULTS

Table 1 presents the proportion of women falling into high-risk categories of nutritional status according to background characteristics. The Body Mass Index (BMI) was used to measure thinness and obesity. A cut-off point of 18.5 was used to define thinness or acute under-nutrition and a BMI of 25.0 or above usually indicates overweight or obesity. The data showed that slightly more than one in ten (11.5%) and one in four (24.0%) were undernourished or thin and overweight or obese respectively. There are large differentials across background characteristics in the percentage of women assessed as undernourished and overweight or obese. Women who were youths (age group 15-24) constituted the largest (15.6%) and least (11.2%) of undernourished and overweight or obese women respectively. Thus the percentage of undernourished women fell consistently with increase in age but increases with increase in age for underweight or obesity. Higher percentage (13.1%) of

Table 1: The percentage and Chi-square distribution of underweight and overweight women according to background characteristics

Background variables	BMI≥18.50	BMI<18.50 (Underweight or thin)	BMI<25.00	BMI≥25.00 (Overweight or Obese)
Current age	χ^2 = 238.247, p = 0.000		χ^2 = 1363.372, p = 0.000	
15-24	84.4 (7015)	15.6 (1299)	88.8 (7389)	11.2 (931)
25-34	90.9 (4511)	9.1 (451)	72.2 (3580)	27.8 (1379)
35-49	91.6 (6639)	8.4 (605)	64.0 (4635)	36.0 (2610)
Region	χ^2 = 487.638, p = 0.000		χ^2 = 284.404, p = 0.000	
North Central	91.8 (2725)	8.2 (244)	76.5 (2271)	23.5 (699)
North East	79.4 (1657)	20.6 (429)	85.2 (1778)	14.8 (310)
North West	81.9 (3142)	18.1 (696)	82.4 (3163)	17.6 (677)
South East	93.0 (2742)	7.0 (206)	71.5 (2108)	28.5 (840)
South West	92.1 (3564)	7.9 (307)	73.9 (2862)	26.1 (1010)
South South	90.2 (4335)	9.8 (472)	71.2 (3422)	28.8 (1384)
Place of residence	χ^2 = 83.320, p = 0.000		χ^2 = 399.873, p = 0.000	
Urban	91.0 (7472)	9.0 (738)	68.7 (5642)	31.3 (2567)
Rural	86.9 (10694)	13.1 (1617)	80.9 (9962)	19.1 (2353)
Levels of education	χ^2 = 324.587, p = 0.000		χ^2 = 515.691, p = 0.000	
No education	82.8 (4819)	17.2 (1003)	82.7 (4820)	17.3 (1006)
Primary	89.7 (3411)	10.3 (390)	73.1 (2779)	26.9 (1021)
Secondary	90.0 (7759)	10.0 (859)	77.2 (6652)	22.8 (1967)
Higher	95.5 (2178)	4.5 (102)	59.3 (1353)	40.7 (927)
Religion	χ^2 = 417.582, p = 0.000		χ^2 = 173.696, p = 0.000	
Catholic	93.3 (2509)	6.7 (181)	71.7 (1926)	28.3 (761)
Other christian	91.8 (9126)	8.2 (820)	73.4 (7308)	26.6 (2642)
Islam	82.7 (6217)	17.3 (1300)	81.1 (6100)	18.9 (1421)
Traditionalist	83.8 (197)	16.2 (38)	77.9 (183)	22.1 (52)
Other	88.2 (30)	11.8 (4)	64.7 (22)	35.3 (12)
Wealth index	χ^2 = 399.645, p = 0.000		χ^2 = 1027.550, p = 0.000	
Poorest	79.5 (2340)	20.5 (602)	89.4 (2635)	10.6 (312)
Poorer	85.7 (2826)	14.3 (473)	84.3 (2786)	15.7 (517)
Middle	88.5 (3468)	11.5 (449)	80.2 (3140)	19.8 (775)
Richer	90.6 (4312)	9.4 (449)	74.5 (3548)	25.5 (1212)
Richest	93.2 (5220)	6.8 (382)	62.4 (3494)	37.6 (2104)
Children ever born	χ^2 = 107.114, p = 0.000		χ^2 = 788.718, p = 0.000	
None	85.9 (7638)	14.1 (1253)	85.5 (7606)	14.5 (1291)
1-2	90.8 (2689)	9.2 (274)	71.5 (2115)	28.5 (845)
3-4	90.9 (2840)	9.1 (283)	67.1 (2096)	32.9 (1028)
5+	90.2 (4999)	9.8 (545)	68.3 (3786)	31.7 (1756)
Children alive	χ^2 = 106.357, p = 0.000		χ^2 = 811.716, p = 0.000	
None	86.0 (7910)	14.0 (1283)	85.2 (7840)	14.8 (1360)
1-2	89.6 (3082)	10.4 (357)	72.3 (2484)	27.7 (954)
3-4	90.6 (3429)	9.4 (357)	67.7 (2563)	32.3 (1225)
5+	91.3 (3744)	8.7 (357)	66.3 (2716)	33.7 (1381)
Total	88.5 (18166)	11.5 (2355)	76.0 (15604)	24.0 (4920)

undernourished women was found in rural area than urban area (9.0%), but a reverse pattern was observed in these areas relative to overweight or obese. North-East (20.6%) and North-West (18.1%) have higher and least percentages of undernourished and overweight or obese than any other regions across the country.

The gap between women with no education (17.2%) and those with higher level of education is wide in terms of undernourishment. However, women with no education constituted least proportion of women who were overweight or obese (17.3%). The percentage of undernourished women varied considerably across religious group with women who belong to Islam affiliation (17.3%) having the highest proportion while their counterparts in Catholic sect (6.7%) had least. Similar pattern was also observed for overweight or obese. The percentage of undernourished and overweight or obese women fell and increased consistently with better wealth index respectively. Women who had no children at the time of the survey were mostly undernourished (14.1%) and least obese (14.5%).

Table 2 shows the percentage and Chi-square distribution of underweight and overweight or obese women according to marital characteristics. Women who never married have higher percentage (13.3%) of undernourished than those who were married (10.8%), the gap in the percentage became wider for overweight or obese, as 29.8% of married women were overweight or obese versus only 14.0% of never married women. Also, women who married in less than five years preceding the survey have least proportion (19.3%) of overweight or obese. Women who were the only wife of their husbands (monogamy) have lower proportion of underweight (8.8%) than those whose their husbands have more than one wives (14.2%) but have higher percentage of overweight or obese women (33.2%).

Table 3 depicts the percentage and Chi-square distribution of underweight and overweight women according to employment variables. The results in the table showed that underweight women are more common among those women who were not working (14.4%) than those engaged in one economic activity or the other (9.3%). However, reverse pattern was found for women who were either overweight or obese. With respect to occupation, women who were clerical officers have least proportion of underweight (3.2%) whereas; overweight or obese was mostly common among professional women (43.8%). Differential in poor maternal nutritional outcomes were observed among categories of women with respect to their work location, employment period and decision on personal earnings.

Table 4 shows the logistic regression of the influence of underweight, overweight or obese on socioeconomic characteristics. In the table, variables such as religion, children ever born, work status and decision on income were not significantly influencing underweight and these set of variables with number of living children included did not influence overweight or obese.

Table 5 depicts the result of logistic regression of the influence of background characteristics categories on adverse nutritional status outcomes. The result showed that current age of the women was inversely and directly related to underweight and overweight or obese respectively. Women aged 15-24 are twice more likely (RR = 2.2, $p<0.001$) to be underweight than women between the ages of 35 and 49. Whereas, women who aged 35-49 are approximately six times (RR = 5.99, $p<0.001$) more likely to be overweight or obese than those aged 15-24 years. Underweight was mostly pronounced among North East women with risk of underweight twice higher (RR = 2.3, $p<0.001$) than women in the North central. The risk of overweight or obese was least among women in the southwest. Rural women are less likely to be overweight or obese than urban women.

Table 2: The percentage and Chi-square distribution of underweight and overweight women according to marital variables

Marital variables	BMI≥18.50	BMI<18.50 (Underweight)	BMI<25.00	BMI≥25.00 (Overweight and Obese)
Marital status	χ^2 = 65.448, p = 0.000		χ^2 = 696.384, p = 0.000	
Never married	86.7 (6748)	13.3 (1038)	86.0 (6701)	14.0 (1090)
Married	89.2 (10041)	10.8 (1215)	70.2 (7901)	29.8 (3355)
Living together	93.7 (254)	6.3 (17)	66.3 (179)	33.7 (91)
Widowed	93.3 (636)	6.7 (46)	67.5 (461)	32.5 (222)
Divorced	90.2 (193)	9.8 (21)	74.3 (159)	25.7 (55)
Not living together	94.5 (294)	5.5 (17)	65.6 (204)	34.4 (107)
Marital duration	χ^2 = 98.783, p = 0.000		χ^2 = 886.718, p = 0.000	
0-4	85.4 (1627)	14.6 (279)	80.7 (1541)	19.3 (368)
5-9	90.6 (1699)	9.4 (177)	72.2 (1354)	27.8 (521)
10-14	89.6 (1708)	10.4 (199)	68.2 (1300)	31.8 (606)
15-19	90.9 (1850)	9.1 (185)	66.2 (1348)	33.8 (687)
20-24	92.5 (1711)	7.5 (139)	65.3 (1210)	34.7 (642)
25-29	90.0 (1588)	10.0 (176)	64.6 (1139)	35.4 (624)
30+	88.4 (1236)	11.6 (162)	72.5 (1012)	27.5 (384)
Marriage type	χ^2 = 79.033, p = 0.000		χ^2 = 114.980, p = 0.000	
Monogamy	91.2 (6875)	8.8 (665)	66.8 (5032)	33.2 (2504)
Polygamy	85.8 (3421)	14.2 (566)	76.4 (3047)	23.6 (942)

Table 3: The percentage and Chi-square distribution of Underweight and overweight women according to employment variables

Employment variables	BMI≥18.50	BMI<18.50 (Underweight)	BMI<25.00	BMI≥25.00 (Overweight and Obese)
Work status	χ^2 = 123.399, p = 0.000		χ^2 = 468.704, p = 0.000	
Not working	85.6 (7284)	14.4 (1221)	83.6 (7113)	16.4 (1395)
Working	90.7 (10753)	9.3 (1107)	70.5 (8357)	29.5 (3504)
Occupation	χ^2 = 182.756, p = 0.000		χ^2 = 899.919, p = 0.000	
Prof/Tech/Mangr	94.9 (999)	5.1 (54)	56.2 (591)	43.8 (460)
Clerical	96.8 (298)	3.2 (10)	65.3 (201)	34.7 (107)
Sales	91.0 (5157)	9.0 (513)	66.3 (3762)	33.7 (1910)
Agric-employee	89.3 (2617)	10.7 (312)	81.5 (2387)	18.5 (543)
Services	90.7 (741)	9.3 (76)	71.0 (579)	29.0 (237)
Skilled manual	87.6 (1347)	12.4 (191)	76.4 (1175)	23.6 (363)
Unskilled manual	90.3 (65)	9.7 (7)	81.7 (58)	18.3 (13)
Work location	χ^2 = 77.996, p = 0.000		χ^2 = 17.521, p = 0.000	
At home	87.5 (3783)	12.5 (541)	72.9 (3154)	27.1 (1171)
Away from home	92.3 (7414)	7.7 (615)	69.3 (5567)	30.7 (2463)
EP	χ^2 = 70.192, p = 0.000		χ^2 = 229.643, p = 0.000	
All year	92.0 (8346)	8.0 (730)	66.9 (6069)	33.1 (3008)
Seasonal	87.4 (2496)	12.6 (360)	80.7 (2304)	19.3 (552)
Occasional	85.2 (391)	14.8 (68)	82.1 (375)	17.9 (82)
DOI	χ^2 = 70.192, p = 0.000		χ^2 = 229.643, p = 0.000	
Respondent alone	89.5 (4128)	10.5 (486)	69.2 (3193)	30.8 (1423)
Respondent H/P	95.9 (1464)	4.1 (63)	58.7 (896)	41.3 (631)
H/P alone	89.6 (791)	10.4 (92)	70.3 (619)	29.7 (262)
Other	73.7 (14)	26.3 (5)	89.5 (17)	10.5 (2)

EP: Employment Period, DOI: Decision on Income

Table 4: Logistic regression of the influence of socioeconomic characteristics on adverse nutritional status outcomes

	Underweight (BMI<18.5)					Overweight and obese (BMI≥25.00)				
				95% C.I. for Exp (β)					95% C.I. for Exp (β)	
Background variables	β	Sig.	Exp (β)	Lower	Upper	β	Sig.	Exp (β)	Lower	Upper
Current age	-0.439	0.000*	0.645	0.592	0.703	0.729	0.000*	2.074	1.945	2.211
Region	0.034	0.021**	1.035	1.005	1.066	-0.034	0.003**	0.967	0.946	0.988
Residence	-0.121	0.040**	0.886	0.790	0.994	-0.089	0.036**	0.915	0.842	0.994
Education	-0.403	0.000*	0.668	0.628	0.711	0.236	0.000*	1.267	1.209	1.327
Religion	0.009	0.055	1.009	1.000	1.018	0.003	0.493	1.003	0.995	1.011
Wealth index	-0.211	0.000*	0.810	0.773	0.848	0.391	0.000*	1.478	1.422	1.537
Children ever born	0.052	0.396	1.054	0.934	1.189	0.076	0.140	1.079	0.975	1.193
Living children	-0.169	0.007**	0.844	0.746	0.955	0.077	0.130	1.080	0.978	1.193
Marital status	-0.628	0.014**	0.534	0.324	0.879	0.282	0.033**	1.326	1.023	1.719
Marital duration	-0.079	0.000*	0.924	0.895	0.954	0.115	0.000*	1.122	1.098	1.146
Marriage type	0.595	0.000*	1.813	1.604	2.049	-0.569	0.000*	0.566	0.517	0.619
Work status	-0.256	0.144	0.774	0.549	1.091	0.067	0.613	1.069	0.824	1.388
Occupation	0.075	0.000*	1.078	1.038	1.120	-0.128	0.000*	0.879	0.857	0.903
Work location	-0.734	0.000*	0.480	0.403	0.572	0.327	0.000*	1.387	1.247	1.543
Employment period	0.533	0.000*	1.705	1.475	1.970	-0.596	0.000*	0.551	0.485	0.626
Decision on income	-0.002	0.962	0.998	0.919	1.084	-0.001	0.975	0.999	0.950	1.051

*Significant at 0.1%, **Significant at 5%

The levels of education show negative and positive relationship with the risk of underweight and overweight or obese respectively. For instance, women with no education are approximately three times more likely (RR = 2.7, p<0.001) to be underweight than those with higher levels of education. The risk of overweight follows similar pattern but a reverse direction with respect to levels of education. The risk of overweight or obese and underweight increased and fell consistently with increasing and decreasing wealth index respectively. Women who were categorized as being poorer were twice more likely to be underweight than their counterparts who came from richest home category. However, overweight was more pronounced among the rich than the poor.

Table 6 showed the results of logistic regression of the influence of marriage and work activities categories on adverse nutritional status outcomes. In the table, marriage is an antidote for underweight, but risk factor of overweight or obese. Married women are significantly at

Table 5: Logistic regression of the influence of background characteristics categories on adverse nutritional status outcomes

	Underweight (BMI<18.5)					Overweight and obese (BMI≥25.00)				
				95% C.I. for Exp (β)					95% C.I. for Exp (β)	
Background variables	β	Sig.	Exp (β)	Lower	Upper	β	Sig.	Exp (β)	Lower	Upper
Current age										
15-24	0.776	0.000	2.173*	1.833	2.576	R.C	R.C	R.C	R.C	R.C
25-34	0.237	0.002	1.268**	1.095	1.468	1.163	0.000	3.201*	2.903	3.529
35-49	R.C	R.C	R.C	R.C	R.C	1.791	0.000	5.994*	5.452	6.591
Region										
North Central	R.C	R.C	R.C	R.C	R.C	-0.210	0.011	0.811**	0.690	0.952
North East	0.834	0.000	2.303*	1.929	2.749	-0.162	0.016	0.851**	0.746	0.970
North West	0.763	0.000	2.145*	1.822	2.526	0.000	0.997	1.000	0.879	1.137
South East	0.022	0.825	1.023	0.838	1.248	-0.094	0.134	0.910	0.805	1.029
South West	0.167	0.072	1.182	0.985	1.418	-0.251	0.000	0.778*	0.691	0.876
South South	0.531	0.000	1.700*	1.433	2.017	R.C	R.C	R.C	R.C	R.C
Residence										
Urban	0.013	0.825	1.014	0.899	1.142	R.C	R.C	R.C	R.C	R.C
Rural	R.C	R.C	R.C	R.C	R.C	-0.104	0.018	0.902**	0.827	0.982
Education										
No education	1.006	0.000	2.734*	2.133	3.505	R.C	R.C	R.C	R.C	R.C
Primary	0.743	0.000	2.102*	1.650	2.678	0.279	0.000	1.322*	1.174	1.488
Secondary	0.502	0.000	1.652*	1.327	2.057	0.350	0.000	1.419*	1.254	1.605
Higher	R.C	R.C	R.C	R.C	R.C	0.528	0.000	1.696*	1.467	1.962
Wealth index										
Poorest	0.729	0.000	2.072*	1.696	2.532	R.C	R.C	R.C	R.C	R.C
Poorer	0.443	0.000	1.557*	1.288	1.881	0.448	0.000	1.566*	1.339	1.831
Middle	0.386	0.000	1.472*	1.242	1.743	0.691	0.000	1.995*	1.708	2.331
Richer	0.254	0.001	1.289**	1.107	1.500	1.030	0.000	2.800*	2.382	3.291
Richest	R.C	R.C	R.C	R.C	R.C	1.548	0.000	4.703*	3.953	5.595
CEB										
None	0.356	0.000	1.427*	1.175	1.734	N.S	N.S	N.S	N.S	N.S
1-2	0.001	0.989	1.001	0.834	1.202	N.S	N.S	N.S	N.S	N.S
3-4	0.104	0.214	1.110	0.942	1.308	N.S	N.S	N.S	N.S	N.S
5+	R.C	R.C	R.C	R.C	R.C	N.S	N.S	N.S	N.S	N.S

*Significant at 0.1%, **Significant at 5%, R.C: Reference category, N.S: Not Significant, CEB: Children Ever Born

Table 6: Logistic regression of the influence of marriage and work activities categories on adverse nutritional status outcomes

	Underweight (BMI<18.5)					Overweight and obese (BMI≥25.00)				
				95% C.I. for Exp (β)					95% C.I. for Exp (β)	
Background variables	β	Sig.	Exp (β)	Lower	Upper	β	Sig.	Exp (β)	Lower	Upper
Marital status										
Never married	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C
Married	-0.704	0.006	0.495**	0.300	0.816	0.388	0.004	1.475**	1.134	1.918
Marital duration										
0-4	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C
5-9	-0.530	0.000	0.588*	0.478	0.724	0.539	0.000	1.714*	1.463	2.008
10-14	-0.483	0.000	0.617*	0.504	0.754	0.747	0.000	2.112*	1.806	2.469
15-19	-0.665	0.000	0.514*	0.418	0.632	0.895	0.000	2.448*	2.099	2.856
20-24	-0.878	0.000	0.416*	0.332	0.521	0.951	0.000	2.588*	2.209	3.031
25-29	-0.571	0.000	0.565*	0.457	0.698	0.993	0.000	2.699*	2.299	3.169
30+	-0.425	0.000	0.654*	0.525	0.815	0.644	0.000	1.905*	1.597	2.273
Marriage type										
Monogamy	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C
Polygamy	0.600	0.000	1.822*	1.611	2.061	-0.574	0.000	0.563*	0.515	0.616
Occupation										
Prof., Tech., Manag.	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C
Clerical	-0.414	0.236	0.661	0.334	1.310	-0.391	0.004	0.676**	0.519	0.882
Sales	0.420	0.006	1.523**	1.128	2.054	-0.327	0.000	0.721*	0.628	0.828
Agric-employee	0.564	0.000	1.757*	1.286	2.402	-1.011	0.000	0.364*	0.310	0.427
Services	0.534	0.005	1.706**	1.176	2.473	-0.616	0.000	0.540*	0.443	0.657
Skilled manual	0.700	0.000	2.013*	1.450	2.794	-0.797	0.000	0.451*	0.378	0.537
Unskilled manual	0.334	0.468	1.397	0.566	3.443	-1.021	0.001	0.360**	0.194	0.669

Table 6 Cont.

Background variables	Underweight (BMI<18.5)					Overweight and obese (BMI≥25.00)				
				95% C.I. for Exp (β)					95% C.I. for Exp (β)	
	β	Sig.	Exp (β)	Lower	Upper	β	Sig.	Exp (β)	Lower	Upper
Work location										
At home	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C
Away from home	-0.497	0.000	0.609*	0.532	0.695	0.218	0.000	1.244*	1.137	1.360
EP										
All year	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C	R.C
Seasonal	0.476	0.000	1.609*	1.381	1.876	-0.484	0.000	0.616*	0.550	0.690
Occasional	0.575	0.000	1.776*	1.349	2.338	-0.730	0.000	0.482*	0.377	0.617

*Significant at 0.1%, **Significant at 5%, R.C: Reference Category, EP: Employment Period

higher risk of overweight or obese than women who never married. Differential also existed by marital duration, as women who married in less than five years ago having higher risk of underweight than those who had been engaged for a higher period. Married women whose their husbands having more than one wife are at higher risk of underweight (RR = 1.8, p<0.001) than their colleagues from a monogamous home, but less likely to be overweight or obese. Significant variations existed among women across different occupation categories with respect to overweight or obese and underweight. For instance, women who belong to professional are less likely to be undernourished than those who are either into sales, agriculture, services and skilled manual workers. Similar but a reverse pattern was observed for overweight or obese women. Also, women who work away from home are less likely (RR = 0.61, p<0.001) to be underweight but more likely (RR = 1.24, p<0.001) to be overweight or obese than their counterparts who work at home. Also, who work all year round are less likely to be underweight than either seasonal or occasional workers. However, these set of women are at higher risk of overweight.

DISCUSSION

The study of the influence of socio-demographic factors on the health conditions of people has always been a subject of curiosity to public health practitioners. In Nigeria, different researches have been conducted by epidemiologists and the social scientists to track down determinants of health among people. However, very few have used adverse nutritional outcomes as part of their key variables, hence this study.

What informed the choice of the parameters used in this study was high poverty rate which affect larger proportion of the population. Politicians and political office holders in the country do not channel the country's resources towards programme that can improve the health of the citizenry. Many people earn less than one dollar a day and as such poverty is widespread across the country which hinders families from meeting their required daily dietary intake. All these combined with poor environment, lack of access to sound health facilities contribute a lot to adverse nutritional status outcomes in the country.

The study used data obtained by National Population Commission on Nigeria Demographic Health Survey, 2008 based on information sought from women of childbearing age. Nutritional status which was obtained from Body Mass Index (BMI) was classified into different groups. Groups with BMI less than 18.5 kg/m^2 and those above 24.99 kg/m^2 were considered as under-nutrition and over-nutrition respectfully. The classification was based on WHO standard. These groups were considered as women who had malnutrition or adverse nutritional status outcomes as at the time of the survey. This study is different from the report on maternal nutritional status as written in NDHS (2008) report in that the measurement of BMI excluded women who were either breastfeeding or pregnant or severely ill during the survey.

The results of present study showed that the proportion of undernourished women (11.5%) is less than that of overweight or obese women (24.0%) in the study area and differentials existed across background characteristics in the percentage of women assessed as undernourished and overweight or obese. The percentage of undernourished and overweight or obese women fell and increased consistently with better wealth index respectively. Explanation for level education also goes for wealth index. Wealthier women have more resources to channel towards having better dietary intake, better health care, living in healthier environment than poor women.

The study further showed that, women under-nutrition is a serious problem in Nigeria and has provided evidence of concentration of women malnutrition among the poorest households. These findings are consistent with evidence from other developing countries and provide further evidence that socioeconomic status is an important determinant of women under-nutrition in developing countries. Poverty affects women nutritional status through insufficient food intake, greater exposure to infections and lack of access to basic health care. It is noted that income-related inequalities are the strongest in underweight, an indicator of malnutrition that is often associated with socio-economic deprivation.

Women who were youths (age group 15-24) constituted the largest (15.6%) and least (11.2%) of undernourished and overweight or obese women respectively. High proportion of youths who were undernourished is an indication of poor dietary intake in homes of average Nigerian due to harsh economic conditions in the country. Higher percentage (13.1%) of undernourished women was found in rural area than urban area (9.0%), but a reverse pattern was observed in these areas relative to overweight or obese. It is agreed that rural dwellers in the country produce food through agriculture, but in an attempt to satisfy other daily needs in terms of shelter, health and meeting the needs of their children, such as paying school fees, clothing do sell substantial part of their farm produce to supplement for these needs. In most cases, they sell best of their farm produce to attract more money and fed on the left over. Women from rural area have low level of education, earn low income and have limited access to modern health facilities for their care and that of their children and as such likely to be undernourished than their urban counterparts.

The study find that age, levels of education, place of residence are important determinants of women nutritional status, which is consistent with the findings of most studies in the literature. Consistent with previous studies, this study found that women's education has strong negative effect on underweight but positive effect on overweight or obese independent of other factors. In terms of education, women with no education constituted least proportion of women who were overweight or obese (17.3%). Literatures are consistent with the view that more educated women earn better income than less educated, do less tedious tasks, eat foods that are rich in fats, less participation in household shores and so on. All these activities have tendency to accumulate other than reducing excess fats in the body. There is a very large literature from around the world that demonstrates the significance of schooling to lower malnutrition rate among women. The pathways from women's schooling lower women malnutrition rate include, but are not limited to, greater likelihood of obtaining modern health care, seeking prompt medical care at the first sign illness and nutritional supplementary practices. Contrary to expectation, women who work at home are associated with higher underweight than those who work away from home.

North-East (20.6%) and North-West (18.1%) have higher and least percentages of undernourished and overweight or obese than any other regions across the country. Poor and harsh climatic condition and Islamic religion which allowed man to marry more than one wife that perpetrated every part of regions in the Northern Nigeria can be explanatory factors. Family resources are shared among the wives and their children and thus will reduce food intake per head when compared with one man one wife family. Monogamy is more common in southern regions than the north.

Of particular interest in this investigation are possible effects of marriage and economic activity context on women malnutrition. They constituted key determinant of disparities in health, as they shape individual opportunities and resources over the life course. Women who never married have higher percentage (13.3%) of undernourished than those who were married (10.8%), the gap in the percentage became wider for overweight or obese, as 29.8% of married women were overweight or obese versus only 14.0% of never married women. Several factors can account for undernourishment among women who have never married, ranging from physiological, psychological and biological. Physiological in terms of enlargement of body mechanisms after child birth and the trauma of not marrying early which is common among women in Africa, particularly Nigeria where social environment stigmatize women who are due for marriage but have not. Women are in displaced mood if their marriage is not forth coming and as a result affect absorption of food nutrients in their body. Using multilevel framework, this study has shown malnutrition in Nigeria and demonstrates significant variation in chronic childhood malnutrition among women.

Underweight women are more common among those women who were not working (14.4%) than those engaged in one economic activity or the other (9.3%). Higher proportion of underweight women among those who are not working as compared with those who are working may not be too far from the fact that participation in labour force would enable women to provide for their immediate needs in terms of food intake and health care without relying solely on their husbands earnings. With respect to occupation, women who were clerical officers have least proportion of underweight (3.2%) whereas; overweight or obese was mostly common among professional women (43.8%). Discrepancy in wages and salary can be reasons for disparity in nutritional status outcome among various occupation categories. Differential in poor maternal nutritional outcomes were observed among categories of women with respect to their work location, employment period and decision on personal earnings.

The multivariate analysis was performed to see the exact contributions of each variable category. It was revealed that significant relationship exists between age of a woman and underweight and overweight or obese. Women aged 15-24 are significantly at higher risk (RR = 2.2) of underweight than women between the ages of 35 and 49. The relative risk of overweight or obese among women whose their age were between 35 and 49 was significantly higher (RR = 5.99) than those aged 15-24 years. The risk of overweight or obese was least among women in the southwest. Rural women were

significantly less likely to be overweight or obese than their urban counterparts.

The risks of underweight reduced significantly with increasing levels of education, but increased in the level of education also caused increasing risk of overweight or obese. Wealth index showed similar patterns as levels of education in terms of risk of underweight and overweight or obese with the risk of overweight being more pronounced among the rich than the poor. Further analysis showed that marriage, monogamy, longer marital duration and being a professional are remedy for underweight, but risk factor of overweight or obese.

Conclusion: Some important and relevant policy issues have been revealed by this study. Strategies for reducing economic disproportion and enhancement of the relative income of the poorest sections of the populace should be put in place. Globally, the pandemic of over-nutrition and under-nutrition continue to rise particularly in developing countries (WHO/FAO, 2002). The scope and distribution of both types of malnutrition in a population must be understood so that public health resources can be channeled appropriately. The study was able to explain part of the differentials in women malnutrition in terms of underweight, overweight or obese. These findings have important implications for targeting policy as well as the search for left-out variables that might account for this unexplained variation.

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