

## Socioeconomic Inequality and Body Mass Index in Nigeria: Evidence from Demographic Health Surveys

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### Abstract

This study examined the distribution of Body Mass Index (BMI) across socioeconomic strata in Nigeria using nationally representative data from the 2008, 2013 and 2018 Nigeria Demographic and Health Surveys (NDHS). Using wealth indicator, education status and occupation type as ranking variables, this study employed the Concentration Index (CI) to measure inequality in BMI outcomes among adult women. Findings of the study revealed a consistent and rising concentration of BMI on the wealthier groups, with CI values for wealth increasing from 0.0652 in 2008 to 0.0840 in 2018. Similar patterns were observed with education, while occupational differences exhibit a concentration on the disadvantaged group, indicating relatively higher BMI among manual and unskilled workers. These results showed persistent and increasing socioeconomic disparities in nutritional health among the population of the study. The study, therefore, recommended, among others, that health and nutrition interventions be tailored to account for these socioeconomic gradients, particularly by enhancing access to preventive services and promoting awareness among the socioeconomic groups.

**Keywords:** Body Mass Index, Health inequality, socioeconomic status, Concentration Index

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## 1.0 Introduction

Over the past few decades, health inequality has increasingly become a prominent subject of academic and policy discourse. Thus, showing increasing concern about the unequal distribution of health outcomes within and across societies. Health inequality refers to systematic disparities in health status and outcomes between and within different population groups. This inequality is often influenced by underlying socioeconomic factors like income or wealth, education status, occupation type and geographic location (Marmot & Bell, 2016; Braveman, Egerter & Williams., 2011). The disparities are not only unjust but are also avoidable, thereby putting them at the centre of any serious and meaningful effort to improve the health of the public as well as foster equity.

One important indicator used in studying population health and nutritional status is the Body Mass Index (BMI), commonly used to assess underweight, overweight and obesity levels in both clinical and population settings (World Health Organization [WHO], 2021). Beyond its clinical relevance, BMI serves as an important tool in understanding the social hierarchy in health, particularly when examined in relation to socioeconomic status.

Looking critically, one would understand that BMI inequalities follow a pattern shaped by a combination of economic development, urbanisation and cultural mix. For instance, in many high-income countries, research has documented a strong inverse relationship between socioeconomic status and obesity (which is indicated by high BMI scores), with lower-income populations more likely to suffer from excessive weight gain and its related health complications (Drewnowski & Specter, 2004; Flegal, Kit, Orpana & Graubard, 2012). This trend could often be linked to limited access to healthy diets and sedentary lifestyles that in many instances affect the poor section of the society. However, the picture in low- and middle-income countries (LMICs) present a completely different pattern. For, these countries often experience a “double burden of malnutrition,” meaning that undernutrition coexists with increased prevalence of overweight and obesity, especially among the rich and urban dwellers (Popkin, Corvalan, & Grummer-Strawn, 2020; Gouda et al., 2019).

Evidence coming from sub-Saharan Africa, including Nigeria, shows that the region has been at the forefront of this nutritional transition. While undernutrition especially among children and rural population remains a critical public health concern, the evidence suggests a completely opposite picture in that it presented a steady increase in overweight and obesity among adults, particularly

women, urban residents and those in higher socioeconomic strata (Ziraba, Fotso & Ochaka, 2009; Neuman, Kawachi, Gortmaker & Subramanian, 2013). These developments have important implications not only for healthcare systems battling with a growing burden of non-communicable diseases (NCDs) but also for social justice, as they indicate how unequal distribution of health risks is among the population, especially that such disparities are not merely biomedical issues but an evidence of fundamentally ingrained social structures that influence access to resources, health knowledge, dietary patterns and healthcare services (Braveman et al., 2011; Marmot & Bell, 2016).

Nigeria presents an important case study in understanding the relationship between socioeconomic factors and nutritional inequality. The country is already bedevilled by stark inequalities in income, education and occupational attainment across both geographic and demographic lines (National Bureau of Statistics [NBS], 2020). Data shows that approximately 40 percent of Nigerians live below the national poverty line, with significant regional differences in literacy rates, employment opportunities and access to healthcare (World Bank, 2022; United Nations International Children's Emergency Fund [UNICEF], 2019). These disparities invariably manifest in health outcomes, including BMI distribution. For example, studies have shown that urban women in wealthier households are significantly more likely to be overweight or obese than their rural and poorer counterparts ( for example, Ajayi, Adebamowo, Adami, Dalal, & Holmes, 2019).

Despite the increasing recognition of BMI as an important indicator for public health surveillance, relatively few studies have focused explicitly on the inequality of BMI distribution across multiple socioeconomic indicators in Nigeria. Existing studies from Nigeria have predominantly focused on child stunting or maternal undernutrition and often rely on simple mean comparisons or logistic regression without adequately capturing the density or gradient of inequality. Furthermore, many of these studies fail to interrogate how BMI varies within different social categories such as wealth quintiles, education levels and occupational groups.

This paper aims to fill that gap by analysing the distributional inequality of adult BMI across three key socioeconomic status. Essentially, the singular objective of the study is to map the density of BMI inequality on wealth status, educational attainment and occupational categories. In essence, this study seeks to identify which groups in the socioeconomic status categories bear the disproportionate burden of poor nutritional outcomes in Nigeria.

## 2.0 Literature Review

### 2.1 Empirical Review

Atsu et al. (2024) used Demographic and Health Survey (DHS) data from 23 sub-Saharan African countries to analyse residence-based inequalities in overweight and obesity through a multivariate non-linear decomposition approach. Their findings showed that urban residents were more likely to be overweight or obese compared to their rural counterparts. As they reported, this is largely due to differences in education, wealth and lifestyle behaviours. They went ahead to do decomposition which helped quantify how much each factor contributed to the inequality. Nevertheless, the study's reliance on pooled secondary data limited the ability to capture context-specific factors within countries.

Valdez, Ajzoon and Al-Zuwameri (2024) conducted a scoping review of biological, socioeconomic and environmental determinants of overweight and obesity in Middle Eastern and North African (MENA) populations. Reviewing 10 studies published between 2007 and 2022, the authors highlighted urbanisation, dietary transitions, physical inactivity and income disparity as primary determinants recurring the literature. The review emphasised existence of gender disparities in the burden of obesity, with women showing higher obesity prevalence.

Ke, Zhang, Hao and Liu (2023) investigated the association between socioeconomic status and the risk of overweight and obesity among children and adolescents in China. Their research used data from a nationally representative health and nutrition survey to conduct regression analyses on the data. They found that children from wealthier families and those with parents who had higher education levels were more likely to be overweight or obese. This was attributed to diet intake and sedentary lifestyles. Although the study's large sample size strengthens its validity, the reliance on cross-sectional data precludes causal interpretations.

Oyan and Ndu-Akinla (2023) assessed the relationship between overweight/obesity and sociodemographic characteristics among adults attending a tertiary hospital in Rivers State, Nigeria. Employing a descriptive, hospital-based study design, data were collected using interviewer-administered questionnaires and clinical measurements to assess BMI, waist circumference and waist/hip ratio. Using Fisher's exact test, the statistical analysis revealed that

overweight and obesity prevalence were 32.5% and 36.6%, respectively, with female gender being the only sociodemographic factor independently associated with higher BMI ( $P = 0.011$ ). The hospital-based sample may not be representative of the general population, thereby limiting the generalizability of the findings of the study.

Alshaikh, Alqahtani and Alzahrani (2023) examined the impact of socioeconomic and lifestyle factors on obesity among adolescents in the Aseer region of Saudi Arabia. The cross-sectional study, involving 512 participants aged 12–19, found that age, gender, parental income, physical inactivity and stress levels were significantly associated with overweight and obesity. Males had higher obesity rates and those from higher-income families had lower risk. Indeed, the study provides local insights but is limited by its focus on a single region and the use of self-reported data for some variables.

Vale et al. (2022) investigated the social determinants of obesity and stunting among adolescents in Brazil using a multilevel analysis of national survey data. The study's aim was to understand how socioeconomic inequalities at individual and contextual levels affect nutritional status. Results of the analyses showed that adolescents from low-income households and disadvantaged regions were more likely to be both obese and stunted. Also, lack of access to healthcare services and quality education were key contributing factors to the disparity. Despite its comprehensive multilevel approach, the study relied on self-reported indicators, which may introduce measurement bias.

Ukaegbu and Ichoku (2022) investigated the socioeconomic determinants of obesity in Nigeria using cross-sectional data from the Demographic and Health Survey (DHS) 2013. Using a simultaneous equation model to analyse the impact of socioeconomic variables on BMI, the study found that regional differences significantly influenced BMI, with variations observed across different regions of Nigeria. However, the use of 2013 data may not reflect current trends and the cross-sectional design limits causal inferences.

A systematic review and meta-analysis by Chukwuonye et al. (2022) aimed at determining the prevalence of overweight and obesity in Nigeria. Using and analysing data from 33 population-based studies encompassing 37, 205 participants, the study found that the estimated prevalence of overweight and obesity was 27.6% and 14.5%, respectively. The prevalence of overweight among

men and women was 26.3% and 28.3% respectively, while obesity prevalence was 10.9% among men and 23.0% among women. The study highlighted regional variations, with higher prevalence rates in the southern geopolitical zones.

A study by Eze, Odum, Onwe and Njoku (2021) aimed at investigating the socio-demographic determinants of BMI among school children in Ebonyi State, Nigeria. Employing a cross-sectional design, the researchers collected data from 1,000 primary and secondary school students through questionnaires and anthropometric measurements, the study's analysis was carried out using generalised linear models and the analysis revealed that BMI was positively associated with female gender and negatively associated with age and level of education. It also found that additional factors such as mode of cooking, living arrangements and means of transportation to school also influenced BMI. However, the study's focus on a single local government area may limit the generalizability of its findings.

Henry-Unaeze, Ngwu and Nwamara (2020) investigated the association between demographic and socioeconomic characteristics and BMI among outpatient diabetic adults in Enugu, Nigeria. The study involved 370 type-2 diabetic patients, with data collected through questionnaires and anthropometric measurements. The findings of the study indicated a high prevalence (69%) of overweight and obesity among participants. BMI also showed a slight negative association with age, sex and occupation and a positive association with religion, ethnicity, marital status and education level. The purposive sampling method of the study may limit the generalisability of the results.

In a study conducted by Mbada et al. (2020), the relationship between socioeconomic status (SES) and obesity among semi-urban Nigerians was examined. The cross-sectional study included 1,067 adults aged 30-60 years. Data collection was done through questionnaires and anthropometric measurements. The study used Pearson correlation and multivariate regression analyses. The results revealed an inverse relationship between SES and BMI. Specifically, lower SES associated with higher BMI. However, the study's semi-urban setting may not reflect urban or rural populations.

Keetile, Navaneetham and Letamo (2019) conducted a cross-sectional study in Botswana to assess the socioeconomic and behavioural determinants of overweight and obesity among adults. Using

a sample of 1,178 individuals aged 15 and above drawn through multistage probability sampling, the authors employed logistic regression in order to identify associations between sociodemographic variables and BMI. Their findings revealed that females, older aged (especially 55–64 years), higher education, low physical activity and tobacco use were significantly associated with overweight and obesity.

## **2.2 Theoretical Framework**

This paper relies heavily on the Multidimensional Welfare Inequality Theory, originated in the seminal work of Dalton (1920) and later extended by Atkinson and Bourguignon in 1982. The theory provides a very good premise for assessing inequalities beyond a single dimension of welfare by incorporating multiple aspects such as health, income and education. At its core, the theory posits that inequality exists when the distribution of welfare is uneven across population subgroups, even when average levels remain the same.

The traditional utilitarian model developed by Dalton focused on additive social welfare functions, where individual utility is a function of income. This model was later generalised by Atkinson and Bourguignon to include multiple welfare dimensions, thereby capturing the reality that individual well-being is shaped by more than just monetary income. Their approach allows for a welfare function of the form  $w = \frac{1}{N} \sum_{i=1}^N U(y_i, x_i)$  where  $y_i$  and  $x_i$  represent income and another dimension of well-being, such as health or education. This flexibility is particularly useful in public health studies and health economics, where health outcomes are often influenced by interaction of socioeconomic factors.

The relevance of this theoretical framework to this study lies in its capacity to link socioeconomic attributes: wealth, education and occupation with health outcomes, BMI in this case. In the case of Nigeria's socioeconomic outlook, where disparities in access to education, job opportunities and wealth are so pronounced, using a multidimensional approach would naturally give a more accurate mapping of health inequality. The theory also justifies the use of inequality measures such as the Concentration Index (CI), which can be decomposed to identify the contributions of each individual socioeconomic factor to overall health inequality.

By adopting this theory, the study situates BMI as a health metric determined by other social determinants. It also allows for a clear understanding of how BMI is distributed across different socioeconomic hierarchy, thereby reinforcing the idea that health outcomes are both an effect and a reflection of social inequality.

### **3.0 Methodology**

#### **3.1 Nature and Source of Data**

This study draws on survey data obtained from the Nigeria Demographic and Health Surveys (NDHS). Specifically, the study combines the 2008, 2013 and 2018 survey waves. The NDHS is a nationally representative survey conducted by the National Population Commission (NPC) in collaboration with ICF International under the Demographic and Health Survey (DHS) Programme. The surveys are funded by the United States Agency for International Development (USAID) and other development partners. The NDHS adopts a stratified, multistage cluster sampling design that ensures coverage of both urban and rural areas across all 36 states of Nigeria and the Federal Capital Territory. For each wave, data were collected from thousands of households, with women aged 15–49 years as the primary respondents. The survey collects detailed information on demographic characteristics, health indicators, household wealth, education, employment, nutrition, anthropometric measurements and other important demographic and health indicators.

This study focuses on the individual recode (IR) files from the three waves, because they contain health indicators like BMI alongside socioeconomic variables such as household wealth index, education and occupation. The use of three waves is to allow for a more robust analysis of trends and patterns in socioeconomic health inequality, somewhat yielding a longitudinal perspective while preserving cross-sectional representativeness. The 2023 NDHS, while potentially offering more recent data, had not been released by the DHS programme at the time of analysis and was therefore not included. Consequently, this study provides an analysis of trends up to 2018 and its findings would establish a crucial baseline for future research to build upon once the 2023 data becomes accessible.

## **3.2 Variables Description**

### **3.2.1 Body Mass Index (BMI)**

This is used as a health variable and it is calculated as weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ). It is a widely used measure for classifying individuals into categories such as underweight, normal weight, overweight and obese. In the DHS dataset, BMI is already computed and stored as variable *v445*, which is expressed as BMI multiplied by 100. For the purpose of analysis, it is rescaled by dividing the value by 100 and is treated as a continuous variable in the analysis of this paper.

### **3.2.2 Wealth Status**

This is one of the socioeconomic indicators which is a composite index created by the DHS using principal components analysis (PCA) based on ownership of assets, housing materials and access to utilities. It is already provided in the variable *v190* and categorised into five quintiles: poorest, poorer, middle, richer and richest. This study maintained the structure and coding of this variable for consistency and ease of comparison.

### **3.2.3 Education**

Education is captured in variable *v106* in the dataset. It records the highest level of education attained by the respondent, with categories such as no education, primary, secondary and higher. This ordinal variable is used to reflect differences in health outcomes by educational achievement. This paper maintained the structure of this variable without any recode.

### **3.2.4 Occupation**

In the dataset, occupation is captured by variable *v714*, indicating whether the respondent is currently working and *v717*, which categorises the type of work. Of interest to this study is the latter which includes categories such as professional/technical/managerial, clerical, services, skilled manual, unskilled manual, agriculture and others. For brevity in the analysis, these categories are collapsed into three broader groups: professional/technical/managerial, sales/service and manual/unskilled/others.

### 3.3 Model Specification

This study uses the Concentration Index (CI) to quantify the degree of socioeconomic inequality in BMI across three key stratifying variables: wealth status, educational attainment and occupation category. This is following that CI has become the standard tool for quantifying socioeconomic-related inequalities in a health measurement (Kakwani, 1977; Wagstaff & van Doorslaer, 2000; O'Donnell et al., 2016). The specification of the model follows the standard CI formulation commonly used in health inequality research.

The CI for BMI is computed based on the following expression:

$$CI = \frac{2}{\mu} \cdot Cov(BMI_i, R_i)$$

Where:

$BMI$  is the Body Mass Index of individual  $i$ ,

$\mu$  is the mean of the BMI variable across the population,

$R_i$  is the fractional socioeconomic rank of individual  $i$  (based on wealth quintile, educational level, or occupational group),

$Cov$  denotes the covariance between the BMI and the individual's rank.

The fractional rank  $R_i$  takes values between 0 and 1 and is determined by ranking individuals from the lowest to highest in terms of the socioeconomic variable under consideration. The CI is computed separately for each of the three ranking variables (wealth, education, occupation) to assess how each independently relates to inequality in BMI distribution.

The CI values are interpreted as follows:

$CI > 0$ : BMI is disproportionately higher among the more advantaged ( for example, wealthier or more educated individuals).

$CI < 0$ : BMI is disproportionately higher among the disadvantaged ( for example, the poor or less educated).

$CI = 0$ : BMI is equally distributed across the socioeconomic spectrum.

For each wave of the NDHS data (2008, 2013, 2018), CI values are computed for each of the three socioeconomic variables. This enables cross-sectional comparison across time and across dimensions of socioeconomic status.

The estimations are conducted using STATA 17 statistical software, employing the user-written *conindex* command. To account for the complex survey design of the NDHS, the survey weights, strata and primary sampling units are applied using the *svyset* function. This ensures national representativeness and statistical validity of the CI estimates.

## 4.0 Result Presentation

### 4.1 Descriptive Statistics

Table 4.1 presents the mean of BMI across the key socioeconomic groups of interest. As presented in the table, across all three survey years, a clear and consistent stratification is evident: BMI increases with increase in socioeconomic status. For example, in 2018, individuals in the richest wealth quintile had a mean BMI of 25.73, compared to 21.05 among those in the poorest group. Similar disparities are observed in educational attainment, where those with higher education recorded an average BMI of 26.02, while those with no education had a mean BMI of 21.85. In terms of occupation, professional/skilled workers consistently reported higher BMI values; 25.53 in 2018, compared to 22.87 among manual/unskilled workers.

**Table 4.1: Descriptive Statistics of BMI by Socioeconomic Categories (2008–2018)**

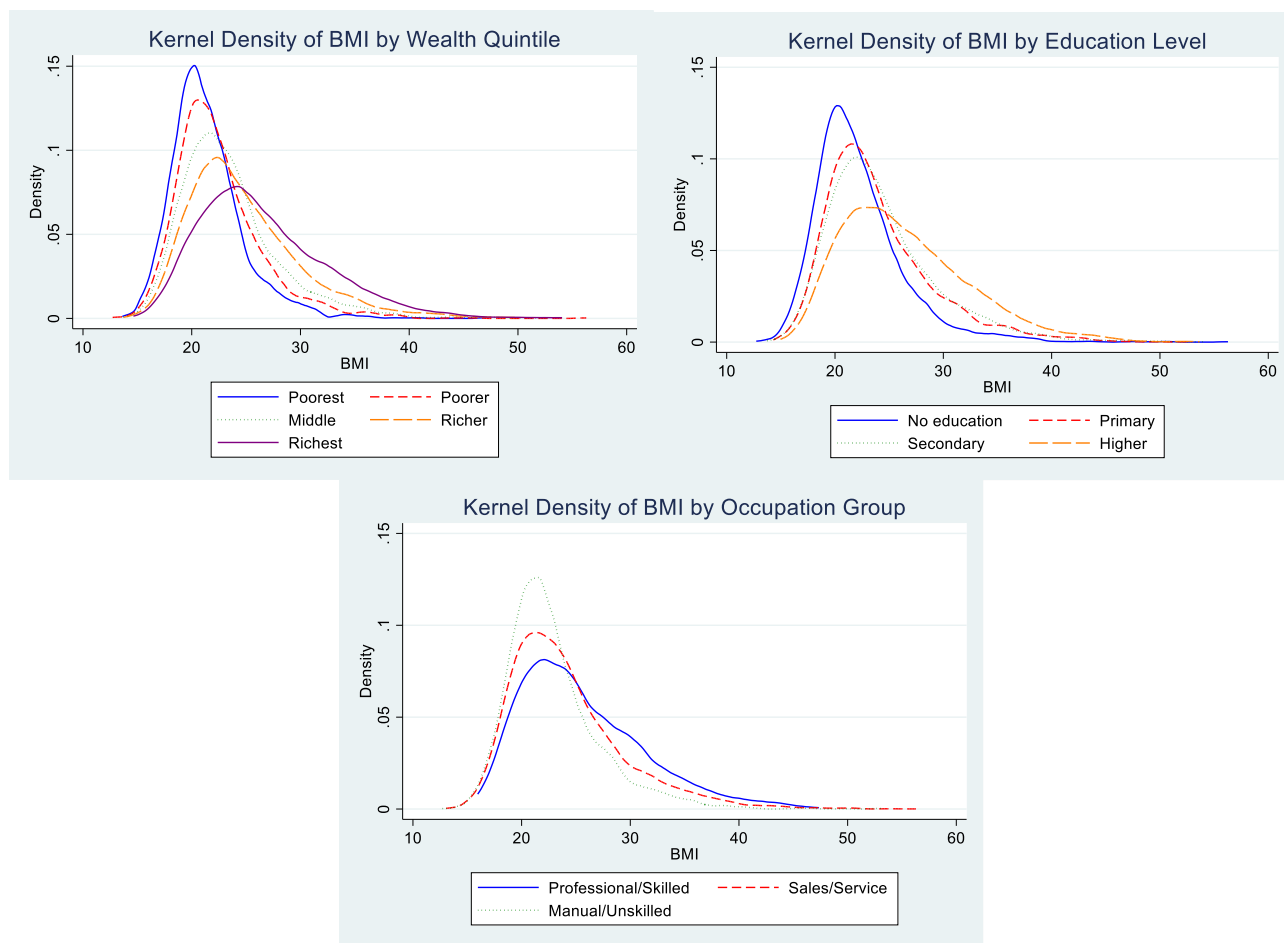
Variable		2008: Mean (SD)	2008: % Sample	2013: Mean (SD)	2013: % Sample	2018: Mean (SD)	2018: % Sample
Wealth Quintile	Poorest	21.62 (0.11)	17.98	22.99 (0.19)	16.60	21.05 (0.09)	17.27
	Poorer	22.10 (0.10)	19.52	23.19 (0.16)	19.14	22.06 (0.08)	19.24
	Middle	23.13 (0.10)	18.95	24.59 (0.19)	19.44	22.90 (0.10)	19.62
	Richer	23.93 (0.10)	20.43	25.15 (0.14)	21.27	24.22 (0.11)	21.50
	Richest	25.71 (0.12)	23.11	27.24 (0.18)	23.56	25.73 (0.14)	22.37

Education Level	No education	22.11 (0.08)	35.45	23.44 (0.12)	36.56	21.85 (0.07)	34.92
	Primary	23.37 (0.09)	24.08	25.12 (0.18)	21.11	23.73 (0.12)	14.44
	Secondary	24.21 (0.09)	31.36	25.47 (0.14)	32.69	23.81 (0.08)	39.65
	Higher	25.93 (0.19)	9.11	27.00 (0.21)	9.64	26.02 (0.19)	10.99
Occupation	Professional/Skilled	24.07 (0.07)	55.05	25.32 (0.10)	61.74	25.53 (0.21)	10.60
	Sales/Service	22.38 (0.08)	24.46	23.75 (0.17)	16.11	24.18 (0.08)	62.24
	Manual/Unskilled/Other	22.95 (0.11)	20.49	24.12 (0.15)	22.15	22.87 (0.09)	27.16
Overall BMI		23.42 (0.05)		24.80 (0.08)		23.38 (0.05)	
Age in Years		28.67 (9.49)		28.88 (9.68)		31.49 (9.10)	
Marital Status (%)	Married		78.92		70.15		76.91
	Single		21.02		29.85		23.09
Observation (N)		32215		38175		10293	

*Source: Authors' Computation (2025)*

The mean age of respondents is also shown to have increased across survey years: from 28.67 years in 2008 to 28.88 in 2013 and 31.49 in 2018. Marital status also reflects a predominance of married respondents, who constituted 78.92%, 70.15% and 76.91% in 2008, 2013 and 2018 respectively, while singles made up 21.02%, 29.85% and 23.09% in those same years. The total number of observations for each survey wave was 32,215 in 2008, 38,175 in 2013 and 10,293 in 2018. Notably, the sample comprises only women, as is typical of the DHS individual recode (IR) files used in this analysis, thereby explaining the omission of gender-based statistics. The relatively small standard deviations in BMI across groups suggest modest within-group variability and the percentage distributions confirm adequate representation across socioeconomic categories.

### 4.1.1 Kernel Density Distribution



**Figure 1: Distribution of BMI by socioeconomic status using 2018 data**

To provide a visual insight to the already established inequality patterns suggested by the summary statistics, the study used kernel density plots in Figure 1 to display the distribution of BMI across different socioeconomic groups in 2018. From the figure, wealth quintile showed that the distribution for the richest group is visibly shifted to the right compared to the poorest group. This indicates a higher BMI concentration among wealthier individuals. The distribution is also slightly narrower, indicating that there is less within-group variability in the distribution. Conversely, the poorest group exhibits a lower mode and a longer left tail, indicating lower BMI levels.

In the education panel, similar patterns are seen. Individuals with higher education show a right-skewed distribution with a higher modal BMI, while those with no education have a distribution

centred around a lower BMI value. The relatively compact shape for higher-educated individuals may reflect greater dietary stability and lifestyle homogeneity. In occupation panel, professional/skilled workers exhibit the highest BMI distribution curve, peaking further to the right, indicating a higher average BMI. Manual/unskilled labourers have a left-shifted distribution, again implying lower average BMI. Sales/service workers lie somewhere in between, reflecting the transitional socioeconomic nature of their roles.

Across all panels, the consistent rightward shift of distributions for higher socioeconomic status visually asserts the positive gradient in BMI and supports the idea that socioeconomic advantage may be well associated with higher BMI.

#### 4.2 Concentration Index Estimates

The CI estimates presented in Table 4.2 revealed consistent evidence of socioeconomic inequality in the distribution of BMI in Nigeria. Across the three survey years, the CI values for wealth index and education level are positive and statistically significant. The CI values for occupation, on the other hand, are consistently negative but statistically significant too. This simply implies that BMI is disproportionately concentrated among individuals in higher wealth and education groups, whereas higher BMI scores are concentrated among lower occupational categories.

**Table 4.2: Concentration Index (CI) of BMI by Socioeconomic Status in Nigeria**

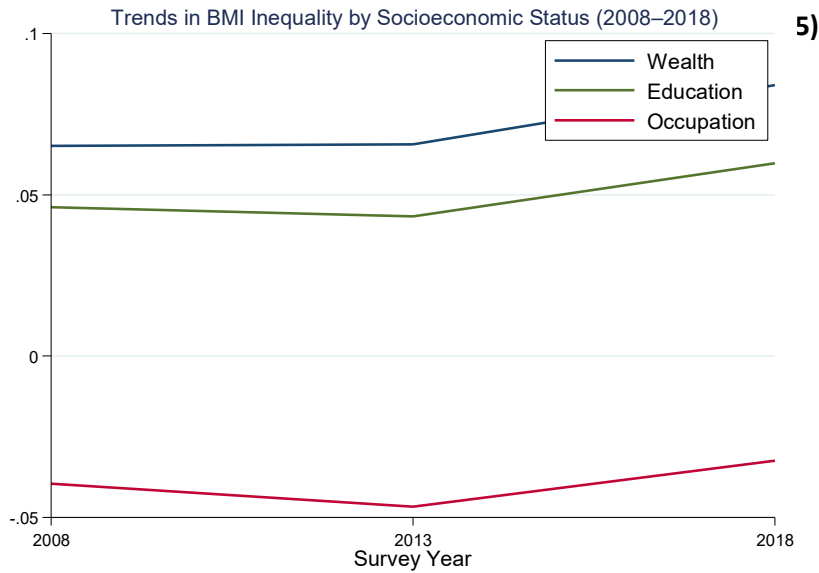
Year	Wealth Quintile CI (SE)	Education Level CI (SE)	Occupation Group CI (SE)
2008	0.0652 (0.0023)***	0.0461 (0.0023)***	-0.0396 (0.0017)***
2013	0.0656 (0.0152)***	0.0432 (0.0039)***	-0.0467 (0.0190)***
2018	0.0840 (0.0031)***	0.0597 (0.0035)***	-0.0324 (0.0025)***

*Source: Authors' computation (2025). Note: CI = Concentration Index; SE = Standard Error. Asterisks (\*\*\*) indicate statistical significance at 1% level ( $p < 0.01$ )*

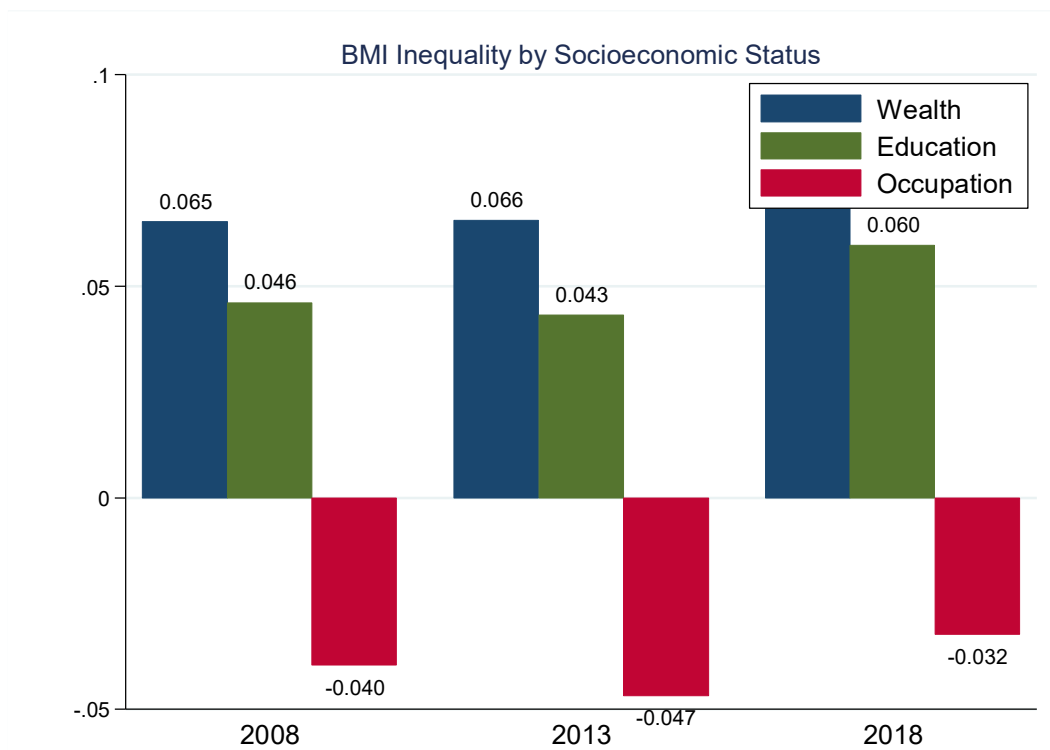
Essentially, the CI for wealth index was estimated as 0.0652 in 2008, 0.0656 in 2013 and 0.0840 in 2018. This result shows that the trend of BMI inequality is gradually increasing along the wealth disparity across the years of study. This trend indicates that the higher concentration of BMI on wealthier group has become more and more over time. Similarly, CI values for education is reported to be 0.0461 in 2008, 0.0432 in 2013 and 0.0597 in 2018. This also suggests that higher

educational attainment continues to be positively associated with higher BMI outcomes across the years, with a noticeable increase in inequality by 2018. On the other hand, the occupation type presents a reverse pattern. The CI values were  $-0.0396$  in 2008,  $-0.0467$  in 2013 and  $-0.0324$  in 2018. This implies that lower occupational groups bear a disproportionate burden of high BMI. Although the negative values indicate a pro-poor concentration of potential obesity, the slight narrowing in 2018 suggests a potential reduction in inequality by occupation, albeit marginal. Generally, the results demonstrate that BMI inequality in Nigeria is not only persistent but it is also truly stratified across key socioeconomic determinants. The increasing inequality along wealth and educational lines is especially worrying as it reflects growing disparities in access to nutrition, healthcare and healthy lifestyles.

Further to this, figures 2 (line graph) and 3 (bar chart) offer visual comparative magnitudes and directions of socioeconomic inequality in BMI across the three survey years. In each wave, wealth-related inequality consistently recorded the highest CI values, showing that the role of economic position in determining nutritional status is persistent. The values for education followed a similar trajectory but at lower levels, reinforcing its secondary influence relative to wealth. In contrast, occupation displayed negative CI values in 2008 ( $-0.040$ ) and 2013 ( $-0.047$ ), suggesting that lower occupational classes were mostly affected by higher BMI levels during those years. However, in 2018, the occupation-based CI became less negative ( $-0.032$ ), potentially reflecting improved access to food or changes in work-related physical activity patterns. In essence, these results point to the increased socioeconomic disparities in BMI in Nigeria, with wealth playing the most dominant role.



**Figure 2: Line Graph of Concentration Indices of BMI by Socioeconomic Status**



**Figure 3: Bar Chart of BMI Concentration Indices by Socioeconomic Status and Survey Year**

### 4.3 Discussion of Findings

The results of the analysis show a persistent and rising pattern of socioeconomic inequality in BMI across wealth and educational classes in Nigeria between 2008 and 2018. The CIs derived from the three waves of the NDHS reveal that individuals with higher socioeconomic status consistently

experience higher BMI, with the inequality being most pronounced along wealth lines. This goes with global findings that rising income levels often correspond with lifestyle changes such as increased consumption of energy-dense foods and sedentary behaviour that contribute to overweight and obesity (Popkin et al., 2020).

Specifically, the CI for BMI by wealth increased from 0.065 in 2008 to 0.084 in 2018, indicating a steady intensification of BMI concentration among wealthier individuals. This result is in line with existing literature that documents a nutrition transition in developing countries, where wealthier groups initially bear the brunt of overweight and obesity before the burden gradually shifts to poorer populations (Jaacks et al., 2019). The implication of this is that BMI inequality is becoming more income-driven in Nigeria, perhaps due to their higher access to high-calorie foods, sedentary occupations and private healthcare facilities among the rich.

A similar pattern, though less pronounced, is observed with education. The education-based CI goes from 0.046 in 2008 to 0.060 in 2018, showing that higher levels of education are associated with higher BMI. This may appear paradoxical in that we may assume that higher educational attainment is linked to healthier lifestyles. However, in Nigeria, higher education is typically associated with better employment, increased income, urban residence and access to more calorie-dense foods, all of which can contribute to a higher BMI (Dinsa et al., 2012). These findings show that the role of education is both a health-promoting factor and a proxy for upward mobility that may carry certain health risks with it.

In contrast, the results for occupation-based inequality show a negative CI in 2008 (-0.040) and 2013 (-0.047) indicating that lower occupational classes had relatively higher BMI in those years. This trend may suggest subscription to poor diet among lower occupational groups. By 2018, the CI rose to -0.032, indicating a somewhat narrowing of occupational disparity. This could be a pointer that lower-occupation individuals rely on in even more poor diet and calorie-densed diet as years go by (Adebowale et al., 2013).

Taken together, the findings suggest that wealth and education remain the strongest determinants of BMI inequality, while occupational differences, though still relevant, have become less intensified over time. The increasing inequality in BMI along wealth and education lines reflects wider structural inequalities in access to nutritious food, physical activity environments and access

to healthcare services. These results highlight the urgent need of designing targeted public health interventions that address the socioeconomic roots of nutritional inequality.

## **5. Conclusion and Recommendations**

This study has examined the extent and direction of BMI inequality across wealth, education status and occupation in Nigeria using the 2008, 2013 and 2018 NDHS datasets. Employing the Concentration Index as the main analytical tool, the findings revealed significant and consistent socioeconomic-related health inequalities, with BMI mostly concentrated among wealthier and more educated individuals across all three survey years. Conversely, occupational groups involved in manual and unskilled labour were consistently having higher BMI distribution.

The consistent upward trend in CI values over the years for wealth and education also points to a widening gap in health outcomes, particularly in the context of rising income and educational inequality in Nigeria. These findings support global evidence that socioeconomic stratification plays a crucial role in shaping health outcomes and reinforce the argument for targeted policy responses in addressing such inequalities.

In light of the findings, which reveal a complex and evolving pattern of BMI inequality, the following targeted policy recommendations are proposed:

- i. Public health campaigns and nutritional education should be specifically designed for wealthier and more educated women, particularly in urban areas. These interventions should move beyond general healthy eating advice to address the specific risks associated with high-calorie diets and sedentary lifestyles that are connected to higher socioeconomic status. This is crucial to curb the rising pro-rich concentration of overweight and obesity.
  - a. Policy interventions must be geared towards tackling the double burden of malnutrition. First, by implementing regulations on food marketing and promoting healthy food environments in urban and semi-urban settings. Second, by strengthening food security and social safety nets for the poorest wealth quintiles and those with no education, who remain at risk of low BMI, as suggested by the left-shifted distributions in the kernel density plots.

- ii. Given the consistent concentration of higher BMI among manual and unskilled labourers, there is a critical need for workplace-based health programmes. These should focus on providing access to healthy and affordable food options at or near work sites.
- iii. The consistent rise in the Concentration Index for wealth and education highlights a widening health gap. Therefore, government agencies like the National Bureau of Statistics (NBS) and the Federal Ministry of Health should institutionalize the regular calculation and reporting of inequality indices like the CI for key health and nutritional outcomes. This will ensure that policymaking is not just informed by national averages but is explicitly focused on closing the inequality gap.

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