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Research Article

Effects of BMI on Occupation and Employment Status: An Adult Nigerians Study

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Abstract

Background: Globally, obesity epidemic have implications for workforce, such as its effects on employment and occupation. It can prevent people from being in paid work due to poor health resulting in social or work discrimination. This study is to investigate the effects of BMI on occupation and employment status.

Dataset/Methods: Participants of working age (20-64yrs), adult males and females were randomly selected (n = 240). The BMI was measured using ≥ 30 kg/m^2 as the cut-off; and the employment status categorized based on their occupation in two ways; first contrasting being in paid employment and occupation, and second, contrasting not being in paid employment due to non-working, sickness/disability, unemployment, early retirement and caring for home/family; but capable of paid work. Observational analyses were conducted to investigate the effect of increased BMI on occupation and employment–related outcomes.

Results: BMI association with all the occupation and employment-related outcomes investigated shows evidence of higher BMI causing increased risk of sickness, decreased caring for home/family, underemployment, and lower household income. There were evidence for causal effects and impacts differing by sex and age.

Discussion: BMI exerts causal effect on occupation and employment status, by affecting an individual's health leading to increased unemployment arising from social or work discrimination, and inability to engage in paid occupation. Obesity epidemic may contribute to worklessness and therefore impose an increasing societal burden. This is of policy interest and rationale for government action.

Keywords: Nigeria; Obesity; BMI

Introduction

There has been marked increase in Obesity over the last few decades throughout the world. In 2015 high BMI accounted for 4 million deaths globally, nearly 40% of which occurred in non-obese people [1]. While a considerable focus has been on the associated healthcare costs arising from higher weight [2], the broader adverse consequences to society are less understood [3]. Obesity is one of the most significant public health challenges facing Nigeria. More than 33% of Nigerian adults have obesity (BMI: (weight (kilograms)/height (meters squared)) ≥ 30) [4], putting them at increased risk for heart disease, diabetes, stroke, cancer, depression, and impaired mobility relative to adults without excess weight [5,6].

Government as the largest employers in many states, state governments also foot a large portion of the bill for obesity-related morbidity and mortality among beneficiaries covered by their state employee health plans. Employees with severe obesity [BMI ≥ 40] miss 75% more sick days and average two times more workers' compensation claims than employees with BMI < 25, adding anoth-

er cost burden onto state governments [7,8]. The economic burden associated with obesity-related comorbidities has prompted federal, state, and organizational policy makers to incorporate obesity screening and management into health plan policies; especially in countries like the United State.

The effects of poor health on work, occupation, and employment are of substantial policy interest and provide an important rationale for government action [9]. Employment status is a measure of an individual's economic activity, including being employed (in paid work), unemployed (not employed but capable of paid work), incapacity benefit (not able to work due to poor health), being a career (not in paid work to allow looking after someone else) and retired.

Moreso, health and health inequalities are also found to be related to employment measures [10-12]. The direction of causation has been less thoroughly explored. The pathways by which BMI impacts on employment might be varied. Some of these effects may be directly related to poor health due to illness, injury and disability [13], whereas others may be related to reduced employability even if health is unaffected for example, due to workplace discrimination. Obese individuals face inequalities in hiring, wages, promotions, job termination and negative attitudes from co-workers [14]. For instance, studies have found obesity negatively impacting on perceived job suitability [15]. Despite policy interest in the adverse economic and employment impacts of obesity, establishing causality is challenging.

To investigate the effects of BMI on occupation and employment status, the relationship between BMI, occupation and employment status investigated. The impact of BMI on indicators related to socioeconomic conditions—namely, household income, educational attainment and area-based deprivation were also looked into [16].

Methods

Subjects' BMI were calculated from their height and weight measured during their assessment. The BMIs were coded into categories comparing each other category against employment. All occupations and employments were termed paid employment. Current occupation and employment status was self-reported.

The occupations and employments were categorized as: farming =I, trading =II, civil servant =III, artisan =IV, and not working =V, and also classified as Low Employment (V) = I, and High Employment (I-IV) =II. As the analysis sampled only those of working age, anyone retired is in early retirement.

The educational level was classified as:- Primary School = I, Secondary/High School = II, Technical = III, Vocational = IV, Polytechnic/College of Education = V, University graduate = VI, Postgraduate = VII; which were grouped as LOW = (I-IV) and HIGH = (V-VII); and also as lower than High School, High School graduate, and higher than High school for analysis purposes (38); and related with annual incomes which were classified as Low Income (#30, 000-#110,000) = I; Medium Income (#120,000-#200,000)= II; High Income (#210,000 and above) = III; and also grouped as Low Income (I) and High Income (II-III) for analysis purposes [17-19,37].

Results

To establish causality is somehow challenging, and the direction of relationship is possible as changes in employment can cause changes in weight. In many localized epidemiological studies, common socioeconomic factors can be confounding to both weight and occupation or employment; making it difficult to accurately measure these variables in relation to obesity in some cases.

Occupation/ Employment	m-60	f-60	BMI (kg/m^2)		PAL	
Urban			**M**	**f**	**m**	**f**
Farming	3	2	30.13 ± 2.91	31.05 ± 4.44	1.86 ± 0.39	1.74 ± 0.51
Trading	19	23	31.16 ± 3.17	36.12 ± 4.18	1.76 ± 0.21	1.83 ± 0.19
Civil servant	27	23	34.32 ± 3.48	38.14 ± 3.22	1.72 ± 0.17	1.66 ± 0.13
Artisan	12	5	32.14 ± 4.31	31.63 ± 5.41	1.86 ± 0.19	1.69 ± 0.27
Not working	3	3	30.14 ± 4.55	31.32 ± 5.15	1.75 ± 0.31	1.63 ± 0.21
Rural			**M**	**f**	**m**	**f**

Farming	40	15	29.19 ± 3.33	30.30 ± 6.60	1.85 ± 0.31	1.73 ± 0.39
Trading	7	13	30.49 ± 3.01	32.63 ± 6.14	1.75 ± 0.33	1.67 ± 0.23
Civil servant	13	10	33.91 ± 5.29	36.39 ± 5.61	1.71 ± 0.29	1.68 ± 0.12
Artisan	7	5	31.04 ± 2.88	33.04 ± 2.11	1.83 ± 0.20	1.82 ± 0.14
Not working	6	4	30.58 ± 5.13	30.67 ± 3.90	1.72 ± 0.22	1.61 ± 0.11

Table 1: The mean descriptive distribution of BMI and PAL according to the categories of the occupation and employment.

Table 1 showed the descriptive information of the sample, which comprised of 120 men and 120 women between the age (20-64 years) i.e. the working age. All the sample population were engaged in paid occupation and employment, except for those not working (due to sickness, early retirement, or unemployed). The results for the employment or occupation in relation to the BMI showed the mean BMI of urban female (28.49 kg/m^2) and rural female (27.64 kg/m^2) according to the overall population and categories of occupation and employment i.e. farming, trading, civil servant, artisan and not working. Their mean BMI fell below the cut-off value of BMI that can raise alarm for obesity pandemic. The mean BMI for rural male (26.17 kg/m^2) and urban male (29.30 kg/m^2) according to the categories of occupation and employment showed that they are also below the cut-off value of BMI for obesity.

Table 1 also shows that, among the employed in the urban localities, civil servants had the highest mean BMI (34.32 ± 3.48 for males and 38.14 ± 3.22 for females) and the lowest mean PAL (1.72 ± 0.17 for males and 1.66 ± 0.13 for females); while in the rural localities civil servants also had the highest mean BMI (33.91 ± 5.29 for males and 36.39 ± 5.61 for females).

The not working group in the urban localities had mean BMI (30.14 ± 4.55 for males and 31.32 ± 5.15 for females) and the mean PAL values (1.75 ± 0.31 for males and 1.63 ± 0.21 for females).

Since occupation and employment status had great influence on the income with resultant causal effects on the prevalence of obesity, the overall population of the respondents were assessed and categorized based on the income that corresponds with their occupation and employment categories. This is revealed in table 2, where the urban localities that are predominantly occupied by the educated of any of the working categories had 18.3% of their males which were obese in the low income class and 53.9% of them in the high income class.

Also, 35% of the females of the urban localities were in the low income class, and 51.3% of them were in the high income class. The table 2 also reflects the results of the rural people, of which their males are majorly in the farming category of occupation and employment, where 0.0% of the males which were obese are in the lower income class and 33.3% in the higher income class. The females that were obese were 25% in the lower income class and 50% of them were in the higher income class.

In contrast to all these evidences, only improved level of education which changes occupation and employment states, and increases income levels as the GDP per capita and GNI per capita profiles rise across all localities can contribute to the rising BMI among the population, thus creating a fixed effects estimates on the employment-related outcomes on the BMI overtime. According to a report on Mendelian Randomisation, the estimates of causal effects of BMI on employment presented by (1) and (2) which estimators selected via the Rucker model selection framework, agreed on existence of an interval lying within the 95% confidence intervals of all the estimates except on maximum educational level. They showed that based on MR analyses, there is wide evidences for no (or very little) effect of BMI on early retirement, unemployment, non-employment, hours worked, and educational attainment.

But our finding showed wide evidences of PAL, educational attainment, occupation and employment status, and income levels having causal effects on the BMI outcomes.

Figure 1: Occupation/Employment and BMI.

% Obese			
Rural population of categorized occupation/employment:	Low Income (I)	Income	
		High Income (II-III)	
	m-60	0.0	33.3
	f-60	25.0	50.0
Urban population of categorized occupation/employment: m-60 f-60	Low Income (I)	Income	
		High Income (II-III)	
	18.3	53.9	
	35.0	51.3	

Table 2: Percentage obese in relation occupation/employment status and income levels.

Figure 2: Occupation/Employment and PAL.

Figures 1 and 2, revealed our investigation based on observational analyses either physical or psychological (which are more subject to bias). This indicated that increased BMI was associated with a lower likelihood of being in work that involves more working hour, living in more deprived area, and with less income and education. Increased PAL was associated with the nature of the activities the participants were engaging with at home and in their occupation and employment. The mean values differed among the sexes for all the several outcomes across the employment categories.

Discussion

This study has some important strenghts, which also serves as the importance to a larger population-based sample. Firstly, reasons for not working were established, and secondly we also showed the continuous use of BMI as a variable, of which its effects may not reflect the mechanisms pertaining to extremes of BMI distribution. Thirdly, the BMI outcome for each individual either low or high differs in relation to the employment or occupational status. The limitations to be noted in this study, range from (1) the measure of adiposity used (BMI), (2) the outcomes related to database in Nigeria population, (3) the analyses were observational and cross-sectional.

The BMI outcome is proportional to the PAL. Causal effects of types of occupation and employment state on the levels of income are not easily assessable, as the categorization of the occupation/employment state may not fit exactly into analyses in relation to grouping of the income levels. The relationships were expressed as the overall population from farming to not working.

Randomization of the sample selection, made the findings to be a bit representative, as it cut across some healthier, wealthier, and better educated participants and reflective of the general population. The not working class, as seen in table 1 and 2 are lower mostly among females, which can be attributed to caring for the family, lower educational attainment, resulting in not to be paid employment, and lower household income outcomes.

In comparison, employed people had lower chances of higher BMI as against the not working people with greater chances of higher BMI due to sedentarism and some other factor that may metabolic or hereditary. The level of occupation and employment determines the level of activities and the outcomes of the household income levels [36].

Previous works that investigated relationship between BMI, occupation and employment have conflicting results, which include traditional cohort studies [21], twin studies [22], longitudinal studies [23,24] and instrument variable studies [25].

The instrument variables included area-based mean BMI [25], area-based obesity prevalence [26,27], distance to closest exercise centre [27], child BMI [28,29], mean family BMI [30], parental BMI [31], sibling BMI [32], lagged BMI [33], and genes (i.e. MR) [32,34].

The mixed results of these studies showed a lower probability of paid employment or occupation and lower wages. But inclusion of health covariates tended to have little effect on the results, meaning that discrimination may be a possible route through which BMI could affect employment or occupation outcomes [20,30].

Kinge reports that BMI affected employment via health. Sex differences were also reported in [27,30], and regional BMI level plays role against which individuals can be compared [30]. BMI being a causal on sickness/disability and general adverse health consequences of obesity, and also a risk factor for many disorders, is associated with unemployment and poor health.

Clement., *et al*. [35], established the idea of health selection for unemployment by comparing the mortality rate in the unemployed against the "wear off" rate. They found no effect of BMI on unemployment risk, and that health selection for unemployment was not supported. However, this study evidence of higher BMI, higher risk of sickness/disability, reduced income [37] and higher deprivation which is a broad range phenomenon, is not just for the obese; but has been as a result of recent years rise in those of working age, out of work due to sickness and disability in many high GDP countries.

The findings on adverse unemployment of higher BMI seem largely limited to those experiencing disability, and not affecting employment rate; showing that early intervention through effective health care could help combat the adverse societal impacts of obesity.

Conclusion

Furthermore, quantification of the population impact through development of epidemiological and economical models could also help government in reducing obesity burden. Further future research, pilot studies, and modeling studies are needed to explore more cases, to inform, to formulate policies, and to intervene in new adiposity-related, employment-related, and occupation-related outcomes.

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Author Contributions

Conceived and designed the experiments. Performed the experiments. Analyzed the data. Wrote the first draft. Contributed to the final paper. All authors approved the final version.

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