



Socioeconomic Status and Cardiovascular Risks in Awka, Nigeria

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Abstract: *Background and Objectives:* Globally, cardiovascular risks constitute a heavy healthcare burden, affecting people with different occupations, across economies in both the developed and the developing countries. Cardiovascular risks and differences in occupations have not been completely defined. This study was set out to evaluate the influence of occupations on the risks of cardiovascular disease in Awka, Nigeria. *Methodology:* This was a cross-sectional study conducted in an unstructured market workers' population. The subjects were classified according to their occupation and screened for cardiovascular risks. Cardiovascular risks were compared between the different occupations. *Results:* The study subjects were 294. Males made up 27.9% and females 72.1%. Their mean age was 43.13 ± 15.38 years, body mass index (BMI) $28.1 \pm 6.0 \text{ kg/m}^2$, systolic blood pressure (SBP) $129.3 \pm 23.7 \text{ mmHg}$ and diastolic blood pressure (DBP) $82.6 \pm 14.7 \text{ mmHg}$. Majority (98.6%) of the study subjects were Igbos, whereas only 1.4% were Hausas. Retailer minor had the highest prevalence of cigarette smoking, 10 (62.5%), $p < 0.001$, tobacco use 6 (37.5%), $p = 0.097$, alcohol use, 68 (54.8%), $p = 0.502$, thickened arterial wall 38 (47.5%), $p = 0.001$, spent > 10 hours work per day 46 (53.5%), $p < 0.001$, overweight 68 (65.4%), obesity 52 (53.1%), $p = 0.010$, hypertension 74 (60.7%), $p = 0.002$, much meat protein 146 (54.1%), $p = 0.019$, night time sleep duration < 4 hours 12 (75.0%), $p = 0.041$, compared to all the other occupations. Cigarette smoking, $p < 0.001$, thickened arterial wall, $p = 0.001$, spent > 10 hours work per day, $p < 0.001$, BMI, $p = 0.010$, hypertension, $p = 0.002$, consumption of much meat protein, $p = 0.019$, night time sleep duration < 4 hours, $p = 0.041$, were associated with economic status whereas tobacco use, $p = 0.097$ and alcohol use, $p = 0.502$, were not. *Conclusion:* The prevalence of cigarette smoking, thickened arterial wall, spending > 10 hours work per day, obesity, hypertension, consumption of much meat protein, night time sleep duration < 4 hours, were high and they were common among Retailer minor subjects in this study.

Keywords: Socioeconomic Status, Cigarette Smoking, Tobacco Snuff, Alcohol, Thickened Arterial Wall, Short Nighttime Sleep Duration, Hypertension, Nigeria

1. Introduction

Socioeconomic status means the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation. Socioeconomic status affects privileges, access to facilities, power and health related quality of life. Socioeconomic status and its association with cardiovascular events has been well studied in the high income countries but not much has been done on the middle and low income countries, reason for this study. Low socioeconomic status has been associated with raised risk of cardiovascular disease and deaths in high income countries. [1-3] High cardiovascular risk among the low socioeconomic class has been associated with high prevalence and compounding effect of multiple behavior and psychosocial risk like poor nutrition, drug abuse, tobacco use, poor access to health facilities which inadvertently affects health. [4] Socioeconomic status affects peoples' way of life and life style practices which is an important determinant of cardiovascular risk. Each component may individually affect cardiovascular risk.

Studies are sparse in Nigeria on socioeconomic influence on cardiovascular risks, prompting us to undertake this study.

2. Materials and Method

The study population consisted of 294 subjects recruited from Eke Awka main market, Nigeria. The approval for this study was given by the management of the market.

The participants were informed of this study through a gong crier, instructed by the management leadership of the market. Each of the participants gave informed oral consent for this study. To them the objectives and aims of the study were explained. A questionnaire was used to collect data which addressed biodata, economic status, cigarette smoking, tobacco snuff use, alcohol use, meat consumption, night-time sleep duration, length of time spent at work daily.

Demographic and anthropometric data were collected. Weight (kg) and height (m) were taken and BMI was determined as weight/height^2 (kg/m^2). Radial and brachial arteries were examined for thickening, and pulse rate was obtained. Blood pressure (mmHg) was recorded from the non-dominant hand in sitting position, after the subjects had rested for 10 minutes, using appropriate cuff size to cover about 80% of the arm, and Accoson mercury sphygmomanometer. Three blood pressure readings were taken 5 minutes apart, and the average obtained. [10]

The variables were graded into groups as follows:

Economic status:

- 1) Artisan
- 2) minor retailer
- 3) major retailer/importer
- 4) hawkers
- 5) clerical staff
- 6) banker
- 7) government worker

8) transport worker

9) collectors

10) others

Smoking:

1) those who were smokers

2) those who were non-smokers

Tobacco snuff use:

1) those who used tobacco snuff

2) those who did not

Alcohol:

1) those who have positive alcohol history

2) those who have not.

Arterial wall:

1) those who have thickened arterial wall

2) those with normal arterial wall

Meat consumption:

1) those who consumed a lot of meat

2) those who did not

Night-time sleep duration:

1) >6 hours

2) 4 – 6 hours

3) <4 hours

Night vigil:

1) keeping night vigil

2) no night vigil

Time spent at work daily:

1) <8 hours

2) 8 – 10 hours

3) >10 hours

The influence of economic status on the variables were compared between the groups for each variable.

The association of economic status with the variables were determined. The potential risks evaluated in this study were: tobacco snuff, smoking, arterial wall thickening, alcohol, meat consumption, short night time sleep duration, BMI and hypertension.

3. Data Analyses

The data were analyzed using the Statistical Package for Social Sciences (SPSS Inc, Chicago, IL) version 17.0 statistical software. For continuous variables, mean values and standard deviations were calculated and the means compared using ANOVA or two sample t-test. Categorical variables were compared using the nonparametric tests Chi-square. The distribution and characterization of variables with economic status were analyzed using cross tabulation. All tests were two-tailed with $p < 0.05$ taken as statistically significant.

Definition of terms

Hypertension: $\text{SBP} \geq 140$ mmHg and or $\text{DBP} \geq 90$ mmHg [19]

Mild hypertension: SBP 140–159 mmHg and/or DBP 90–99 mmHg

Moderate hypertension: SBP 160–179 mmHg and/or DBP 100–109 mmHg; Severe hypertension: $\text{SBP} \geq 180$ mmHg and/or $\text{DBP} \geq 110$ mmHg.

Body mass index: [20]

Underweight: BMI < 18.5kg/m²

Normal body weight: BMI 18.5 – 24.9kg/m²

Overweight: BMI 25.0 – 29.9kg/m²

Mild obesity: BMI 30.0 – 34.9kg/m²

Moderate obesity: BMI 35.0 – 39.0kg/m²

Severe obesity: BMI ≥ 40.0kg/m² Obesity: BMI ≥ 30.0kg/m² In this study Obesity was defined as BMI ≥ 30.0kg/m².

The subjects who were found to have hypertension and abnormal weight were counselled and advised to see clinicians in the hospitals.

4. Results

The study subjects were 294. Males made up 27.9% and females 72.1%. The mean age of the study subjects was 43.13 ± 15.38 years, and range 70 years. Their mean BMI was 28.1 ± 6.0kg/m², SBP 129.3 ± 23.7mmHg and DBP 82.6 ± 14.7mmHg (Table 1). Out of the 294 subjects studied, 122 (41.5%) have hypertension (SBP ≥ 140 and/or DBP ≥ 90mmHg). Of these, 38 (31.1%) were males whereas 84 (68.9%) were females. Majority (98.6%) of the study subjects were Igbos, whereas only 1.4% were Hausas.

The association between gender and economic status was significant, $p=0.002$. Out of 82 males in the study, 40 (48.8%) were Retailer minor, a figure that was similar to the females that made up Retailer minor of 122 (57.5%) of the 212 of the females subjects.

Out of the 16 subjects that smoked cigarette, 10 (62.5%) were Retailer minor, trailed by from subjects from other occupations that were not classified. This association between smoking and economic status was significant, $p<0.001$.

The number of those subjects who used tobacco was 16. Out of this number, 6 (37.5%) were Retailer minor whereas 8 (50.0%) were in other unclassified occupations. However, this association between tobacco use and economic status was not significant, $p=0.097$.

For alcohol use, 124 of the subjects were found to have used alcohol. Out of this number, 68 (54.8%) were Retailer minor whereas 30 (24.2%) were unclassified. This association between alcohol use and economic status was not significant, $p=0.502$.

This study showed that 80 subjects had thickened arterial wall. Out of this number, 38 (47.5%) were Retailer minor, followed by Artisans 14 (17.5%), with a significant association between thickened arterial wall and economic status, $p=0.001$.

Retailer minor constituted 36 (42.9%) of the 84 subjects that spent < 8 hours at work daily. Retailer minor also made up 80 (65.5%) of the 122 subjects that spent 8-10hours at work. Similarly, Retailer minor also accounted for 46 (53.5%) of the 86 subjects that spent > 10 hours at work daily. This association between time spent at work daily and economic status was significant, $p<0.001$.

Six subjects had underweight, BMI <18.5kg/m². Out of this number, each of Retailer minor, Artisans and unclassified

occupations categories had 2 (33.3%). The subjects who were overweight, BMI 25.0-29.9kg/m², were 104. Out of this number, 68 (65.4%) were Retailer minor. Similarly, out of 98 subjects with obesity, 52 (53.1%) were Retailer minor. This association between BMI and economic status was significant, $p=0.010$.

The number of those with hypertension was 122. Out of this number, 74 (60.7%) were Retailer minor, followed by Artisans with 14 (11.5%). This relationship between hypertension and economic status was significant, $p=0.002$.

Two hundred and seventy subjects consumed much meat protein. Out of this number, 146 (54.1%) were Retailer minor, trailed by Retailer major with 20 (7.4%). The showed that the association between meat protein consumption and economic status was significant, $p=0.019$.

The subjects with that had night time sleep duration <4 hours was 16. Retailer minor made up 12 (75.0%) of this number, trailed by Artisans with 2 (12.5%). This association between night time sleep duration and economic status was significant, $p=0.041$.

Overall, Retailer minor had the highest prevalence of cigarette smoking, 10 (62.5%), tobacco use 6 (37.5%), alcohol use, 68 (54.8%), thickened arterial wall 38 (47.5%), spent >10hours work per day 46 (53.5%), overweight 68 (65.4%), obesity 52 (53.1%), hypertension 74 (60.7%), consumed much meat protein 146 (54.1%) m night time sleep duration <4hours 12 (75.0%) compared to all the other occupations in this study.

Table 1. Characteristics of study subjects n=294 Variables.

	Study Subjects
Age (years) (M ± SD)	43.13 ± 15.38
Age Distribution	
20 – 29years	68 (23.1%)
30 – 39years	72 (24.5%)
40 – 49years	44 (15.0%)
50 – 59years	62 (21.1%)
60 – 69years	34 (11.6%)
70 – 79years	12 (4.1)
80 -89years	-0-
90 -99years	2 (7.0%)
BMI (kg/m ²) (M ± SD)	28.1 ± 6.0
Systolic blood pressure (mmHg) (M ± SD)	129.3 ± 23.7
Diastolic blood pressure (mmHg) (M ± SD)	82.6 ± 14.7
SD=standard deviation, M=mean, BMI=body mass index	

Table 2. Distribution of occupations of the study group.

	Frequency	Percentage
Artisans	20	6.8
Retailer minor	162	55.1
Retailer major	20	6.8
Government workers	14	4.8
Transport workers	2	7.0
Others	76	25.9
Total	294	100.0

Table 3. Distribution and characterization of variables among subjects with varying occupations.

Variables	Artisans	Retailer minor	Retailer major	Gov workers	Transport Workers	Others	Chi square	df	LHR	p value
Gender										
Male	2 (2.4%)	40 (48.8%)	2 (2.4%)	6 (7.3%)	2 (2.4%)	30 (36.6%)	18.990	5	0.001	0.002
Female	18 (8.5%)	122 (57.5%)	18 (8.5%)	8 (3.8%)	0 (0.0%)	46 (21.7%)				
Smoking										
Yes	0 (0.0%)	10 (62.5%)	0 (0.0%)	0 (0.0%)	2 (12.1%)	4 (25.0%)	38.031	5	0.003	<0.001
No	20 (7.2%)	152 (54.7%)	20 (7.2%)	14 (5.9%)	0 (0.0%)	72 (25.9%)				
Tobacco use										
Yes	0 (0.0%)	6 (37.5%)	0 (0.0%)	2 (12.5%)	0 (0.0%)	8 (50.0%)	9.310	5	0.067	0.097
No	20 (7.2%)	156 (56.1%)	20 (7.2%)	12 (4.3%)	2 (0.7%)	68 (24.5%)				
Alcohol use										
Yes	8 (6.5%)	68 (54.8%)	8 (6.5%)	8 (6.5%)	2 (1.6%)	30 (24.2%)	4.336	5	0.412	0.502
No	12 (7.1%)	94 (55.3%)	12 (7.1%)	6 (3.5%)	0 (0.0%)	46 (27.1%)				
Thick Art Wall										
Yes	14 (17.5%)	38 (47.5%)	6 (7.5%)	2 (2.5%)	0 (0.0%)	20 (25.0%)	21.678	5	0.001	0.001
No	6 (2.8%)	124 (57.9%)	14 (6.5%)	12 (5.6%)	2 (0.9%)	56 (26.2%)				
Time spent on work daily										
<8hrs	8 (9.5%)	36 (42.9%)	0 (0.0%)	4 (4.8%)	0 (0.0%)	36 (42.9%)	42.262	15	<0.001	<0.001
8-10hrs	8 (6.5%)	80 (85.6%)	12 (9.8%)	6 (4.9%)	2 (1.6%)	14 (11.5%)				
<4hrs	4 (4.7%)	46 (53.5%)	8 (9.3%)	4 (4.7%)	0 (0.0%)	24 (27.9%)				
BMI:										
<18.5kg/m ²	2 (33.3%)	2 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (33.3%)	30.509	15	0.0133	0.010
18.5-24.9kg/m ²	6 (7.0%)	40 (46.5%)	6 (7.0%)	2 (2.3%)	0 (0.0%)	32 (37.2%)				
25.0-29.9kg/m ²	2 (1.9%)	68 (65.4%)	6 (5.8%)	8 (7.7%)	2 (1.9%)	18 (17.3%)				
≥30.0kg/m ²	10 (10.2%)	52 (53.1%)	8 (8.2%)	4 (4.1%)	0 (0.0%)	24 (24.5%)				
SBF<140+DBP<90	6 (3.5%)	88 (51.2%)	14 (8.1%)	6 (3.5%)	2 (1.2%)	56 (32.6%)	18.994	5	0.001	0.002
SBP≥140+DBP≥90	14 (11.5%)	74 (60.7%)	6 (4.9%)	8 (6.6%)	0 (0.0%)	20 (16.4%)				
Meat protein Much										
Protein	18 (6.7%)	146 (54.1%)	20 (7.4%)	10 (3.7%)	2 (0.7%)	74 (27.4%)	13.560	5	0.019	0.019
Eats less protein	2 (8.3%)	16 (66.7%)	0 (0.0%)	4 (16.7%)	0 (0.0%)	2 (8.3%)				
Night time sleep										
>8hrs	6 (3.9%)	86 (56.6%)	8 (5.3%)	6 (3.9%)	0 (0.0%)	46 (30.3%)	18.955	10	0.007	0.041
4-8hrs	12 (9.5%)	64 (50.8%)	12 (9.5%)	6 (4.8%)	2 (1.6%)	30 (23.8%)				
<4hrs	2 (12.5%)	12 (75.0%)	0 (0.0%)	2 (12.5%)	0 (0.0%)	0 (0.0%)				

ThickArtWall=thickened arterial wall. BMI=body mass index. SBP=systolic blood pressure. DBP=diastolic blood pressure. Hr=hours

5. Discussion

This cross sectional study appeared to have recruited populations of near same socioeconomic status, considering their occupation and estimated income we may be classifying majority as low socioeconomic class. more females were part of the study than the males in this poor socioeconomic group, this may be linked to poor educational background for 2 of every 3 out of school children are females. This is as a result of violence against females, early and forced marriages. [5] The mean age of the participants was 43.13 ± 15.38 , putting most of the participants among the young adults and middle age which actually has increased prevalence of stress and risk factors for cardiovascular diseases especially among the females as the risk of cardiovascular diseases increases from age 40 and above due to several factors like stress, low HDL and high triglycerides, hormonal changes, mood changes and depression which affects their heart more than the males. [6, 7]

The mean BMI of the study participants was $28.1 \pm 6.0\text{kg/m}^2$, which means that most of the patients were overweight which also increases the cardiovascular risk of the participants. This also supports the fact that obesity is an epidemic among the low socioeconomic the low

socioeconomic class. [8] The retailer minors had significantly higher BMI than other groups, with majority of them overweight and obese. Obesity is determined by several factor such as knowledge of health wellness, food and proper nutrition, level of activity/sedentary life style. Smoking was also significantly higher among the retailer minors, reason for this not well established but incidence of smoking has been observed in previous studies more among the low socioeconomic class who income are usually at or below the poverty level. [9, 10] which is where most of the retailer minors fell into. The use of tobacco snuff however, had no significant association with economic status, this contradicts the CDC report 2016 which stated that both cigarette smoking and use of tobacco snuff are significantly higher in lower socioeconomic class. [11] Retailer minor had the highest rate of alcohol consumption from our study though there was no statistical difference in the rate of consumption across the groups, similar to a study by Srinivasa Vittal Katikireddi et al but socioeconomic status acts as modifier to the effects of alcohol on the individual, it was shown from their study that those from the low socioeconomic status are at great risk of the harmful effects of alcohol. [12]

The retailer minors spent significantly higher number of hours at work than other groups which also increased their

cardiovascular risk. This is similar to the findings of Kang, Mo-Yeol et al in their meta-analysis work. [13] Sleep deprivation and having less than 8 hours of sleep has been shown to increase cardiovascular through increased sympathetic over drive with elevation of catecholamine levels and increase in levels of inflammatory markers like C reactive protein which will increase the atherosclerotic changes in the vessel. This may also explain why significant number of them had thickened arterial wall and their blood pressure was significantly higher. The retailer minors were also noted to consume more meat proteins than others which is significantly associated with increased cardiovascular risk. High consumption of red meat has been known to increase non high density lipoprotein which is associated with increased cardiovascular diseases especially the ischemic heart diseases. These findings are consistent with that of Timothy J. Key et al in Pan European Epic cohort. [14, 15]

6. Conclusion

The prevalence of cigarette smoking, thickened arterial wall, spending >10 hours work per day, obesity, hypertension, consumption of much meat protein, night time sleep duration <4 hours, were high and they were common among Retailer minor subjects in this study.

7. Limitations

The study population was not structured. It was a cross-sectional study, in which many eligible subjects were missed out. The study population was also small. The blood pressure was taken in one sitting only. This might have affected the overall prevalence in this study.

Competing Interests

The authors declare no competing interest.

Authors' Contributions

The authors have read and agreed to the final version of this manuscript.

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