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# The influence of socio-economic status on casual blood pressures of the adult Nigerians

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**Background:** Studies into social inequalities in health tend to focus more on parental socio-economic status (SES) as it affects the children. We aimed to test the hypothesis that socio-economic inequalities would not affect the casual blood pressure among Nigerian adults.

**Methods and results:** Resting blood pressure (BP) and pulse rate of 1067 sedentary adults were measured. Rate pressure product and pulse pressure were later calculated. Second, a structured questionnaire, which objectively assessed the SES of the subjects, was administered. Subsequently, a self-rating SES ladder was employed to classify the subjects into different socio-economic groups. This was used as a check for the structured questionnaire. A Pearson product correlation coefficient comparing the two outcome measures revealed a high correlation ( $r = 0.951$ ,  $P < 0.01$ ). Socio-economic status was found to have an inverse significant ( $P < 0.05$ ) effect on systolic pressure, heart rate and pulse pressure. The 95th centile blood pressure obtained was 154/91 mmHg.

**Conclusion:** Low SES is associated with development of hypertension among the Nigerian adults.

Keywords: socio-economic status, blood pressure, hypertension

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## Introduction

Hypertension is one of the major causes of death in both developed and developing nations [1,2]. Reports from the USA and West Indies confirmed that Blacks have a higher incidence of hypertension than their White counterparts [3–6].

Factors such as genetic, dietary as well as physical activity and body fatness are known to play a major role in the development of hypertension [6]. Many investigators have also reported the influence of socio-economic status (SES) as the reason behind the high incidence of hypertension among the Blacks [7,8]. Balogun and associates [9] investigated the effect of parental SES on casual blood pressure in Nigerian school pupils. They found no significant correlation between the resting blood pressure, heart rate, estimated myocardial oxygen consumption, stroke volume, and the economic status of the parents. They concluded that hypertension in Nigerian children may not be attributed to socio-economic influence alone, but genetic and environmental factors might also contribute. Another group found that the Nigerian children have a consistently higher systolic blood pressure and diastolic pressure than American children [10]. They postulated that the difference might be due to environmental factors rather genetic factors.

Poulton *et al.* [11] found that children that grew up in low SES families tended to have poorer cardiovascular health compared with those from high SES backgrounds in New Zealand. They concluded that protection of children against the effects of SES adversity could reduce the burden of the disease experienced by adults. In the developing nations, where the economy is poor, it is expected that the incidence of hypertension will be high.

That socio-economic factors are related to the development of hypertension among adult Nigerians is yet to be investigated. The aim of this study therefore was to investigate the influence of socio-economic status of adult Nigerians on casual blood pressure.

## Methods

### Subjects

The subjects for this study were recruited from the ancient city of Ile-Ife, Nigeria. A total of 552 males and 515 females whose age ranged between 30 and 60 years voluntarily participated in the study.

## Procedures

The procedure for the study was explained to the subjects prior to measurement. Subjects' height and weight were measured and their ages recorded. After about 10 min of sitting, blood pressure was taken with the use of a digital blood pressure measuring monitor (Kit Omron model HEM-712C, China). The rate pressure product was calculated by multiplying systolic blood pressure (SBP) and heart rate (HR).

A questionnaire was used to aid classification of subjects into three different socio-economic groups [9,14]. The questionnaire sought information on the highest educational attainment of the subjects and the properties they owned. Scores were assigned for each item based on their educational and social strata in Nigerian society. They were categorized as either lower class (< 9); middle (10– 18); or upper (19–27).

Because, most Nigerians are usually reluctant about disclosing their properties, we used alongside the questionnaire, a subjective, self-rating socio-economic status ladder. This was adopted from the MacArthur research network on social economic status. The pictorial ladder has nine rungs—each rung was later multiplied by 3 to make a score minimum of 3 and maximum of 27.

## Analysis

The Pearson moment correlation coefficient was used to determine the relationship between the total SES scores and the physical characteristics of the subjects.

One-way analysis of variance was used to determine if there was any significant difference between the dependent variables and the subjects in the three socio- economic groups. Least square difference (LSD) *post hoc* analysis was used to probe the specific differences found in the *F* ratio of the analysis of variance. The confidence level was set at  $P < 0.05$ . The tests were performed using SPSS 10.0 version software (SPSS Inc., Chicago, Illinois, USA) on a personal computer.

## Results

The average systolic and diastolic blood pressures of the subjects were  $123.40 \pm 15.5$  and  $76.90 \pm 9.9$  mmHg, respectively. The mean resting HR was  $70.14 \pm 7.9$  beats per minute. The rate pressure product, (RPP) and pulse pressure (PP) recorded  $9034.4 \pm 5484.21$  mmHg beats per minute and  $46.30 \pm 12.03$  mmHg, respectively. High concurrent-criterion validity between the structured questionnaire and the modified socio-economic ladder was obtained ( $r = -0.951$ ;  $P < 0.01$ ).

The result of the Pearson moment correlation showed a significant inverse relationship between socio-economic status and systolic blood pressure ( $r = -0.131$ ,  $P < 0.01$ ). An inverse correlation was also obtained between socio-economic status and weight ( $r = -0.113$ ,  $P < 0.01$ ) and body mass index (BMI) ( $r = -0.172$ ,  $P < 0.01$ ).

Subjects in the middle and upper classes were found to be significantly heavier, having higher systolic blood pressure and pulse pressure than the subjects in the lower class. However, no significant difference was found in diastolic blood pressure and rate pressure products of the subjects in the three classes (Table 1).

Table 1 Summary of the one-way analysis of variance and least-square difference *post hoc* test between the three socio-economic classes

Dependent variables	F ratio	Lower class <i>n</i> = 319 <i>P</i> value	Middle class <i>n</i> = 460	Higher class <i>n</i> = 288
Age	2.962	45.74 ± 7.17 <sup>a</sup> 0.000	42.22 ± 6.48 <sup>b</sup>	46.13 ± 8.6 <sup>a</sup>
Height	7.471	1.65 ± 9.03 <sup>a</sup> 0.001	1.67 ± 7.61 <sup>b</sup>	1.66 ± 9.30 <sup>a</sup>
Weight	8.407	66.40 ± 13.4 <sup>a</sup> 0.000	64.24 ± 10.7 <sup>b</sup>	62.49 ± 10.01 <sup>b</sup>
Body mass index	20.664	24.59 ± 4.42 <sup>a</sup> 0.000	23.158 ± 3.79 <sup>b</sup>	22.68 ± 3.05 <sup>b</sup>
Systolic BP	15.20	127.12 ± 18.08 <sup>a</sup> 0.000	121.13 ± 13.58 <sup>b</sup>	121.05 ± 14.04 <sup>b</sup>
Diastolic BP	1.329	76.44 ± 10.74 <sup>a</sup> 0.0265	77.05 ± 9.29 <sup>a</sup>	77.46 ± 9.71 <sup>a</sup>
Heart rate	4.207	70.56 ± 8.79 <sup>a</sup> 0.015	69.35 ± 6.92 <sup>b</sup>	70.78 ± 8.22 <sup>a</sup>
Rate pressure product	2.215	9569.47 ± 6324.51 <sup>a</sup> 0.110	8747.18 ± 5334.79 <sup>a</sup>	8900.35 ± 4626.92 <sup>a</sup>
Pulse pressure	29.190	50.62 ± 12.02 <sup>b</sup> 0.000	45.05 ± 11.2 <sup>b</sup>	43.67 ± 12.24 <sup>b</sup>

<sup>a,b,c</sup>For a particular variable, mode means with different superscripts are significantly ( $P < 0.05$ ) different. Mode means with same superscripts are not significantly ( $P > 0.05$ ) different. BP, blood pressure.

## Discussion

We found significant differences in the SBP, HR and pulse pressure of Nigerian adults from the different socio-economic strata. This finding is at variance with the findings of Balogun *et al.* [9] and Simpson *et al.* [2]. These two studies focused on the influence of parental socio-economic status on children. Our finding is however consistent with studies from multiracial populations conducted on children [12,15]. Specifically, inverse correlations were obtained in the systolic blood pressure, weight, BMI of the subjects in the lower socio-economic class. Studies have shown that poverty and affluence are one of the causes of hypertension in the low and high stratum, respectively [13,16].

The food culture among the low socio-economic class may be responsible for the high incidence of hypertension in this group. In most of the developing world, body or size is believed to be a sign of good living among the poor. Thus, more quantity but less of quality of food is taken. Furthermore, most of the high calorific foods are usually cheaper. To the best of our knowledge, this is the first study that investigates the influence of socio-economic status on blood pressure in a Nigerian adult population.

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