

Original Research Article

## **Lipids and Lipoproteins in Various Socio-Economic Classes in Enugu South East Nigeria**

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### **ABSTRACT**

A striking relationship exists between peoples' lipid and lipoprotein profile and their socio economic classes.

This work was designed to study the relationship between Lipid and lipoprotein profile and the various socio-economic classes and age groups in Nigeria, with special reference to Enugu, South East Nigeria, hence to determine the effects of the prevailing economic condition in Nigeria, on these socio-economic classes. A total of 90 samples (45 males and 45 Females each) 30 from each of the various socio-economic classes were analyzed for the study. Fasting blood samples were collected, sera separated and properly stored and analyzed. Significant difference was noted in the lipid and lipoprotein profile of various socio-economic classes while none was noted within the age groups except in the cholesterol level of age group 26-35 year. Significant differences were also observed for the triglyceride, cholesterol and LDL - cholesterol levels between males and females with the mean level for the males greater while the differences in the HDL and VLDL - cholesterol were not significant.

**Key words:** Lipids, Lipoproteins, Socio Economic Classes, Cholesterol, Triglycerides.

### **INTRODUCTION**

A striking relationship exists between the lipid and lipoprotein levels of people and their socio-economic classes in society. This is as a result of the intimate relationship that exists between people's socio-economic classes and their diet on one hand and the relationship that exists between the diet and the lipid and lipoprotein profile of people, on another hand. (1-4)

Lipid is any of a diverse group of organic compounds including fats, oils, hormones and certain components of membranes that are grouped together because they do not interact appreciably with water, examples are triglycerides, steroid hormones, phospho-lipids etc. (5,6)

Lipoprotein is a biochemical assembly whose purpose is to transport hydrophobic lipid molecules in water, as in blood or extracellular fluid. They have a single layer phospholipids and cholesterol outer shell, with the hydrophobic positions oriented outward towards the surrounding water and lipophilic portions of each molecule oriented inwards towards lipid molecules within the particles. (7)

The concept of socio-economic classes means the more specific ranking of individuals, according to economic criteria. It denotes those holding a common position along some continuum of the economy, this can be a continuum of wealth or income or at other times of occupation. (8,9)

The objectives of this work include; finding out if there are significant variations in the lipid and lipoprotein profile of the various socio-economic classes and to revisit in the Nigerian context the variations in the lipid and lipoprotein levels, with factors like age and sex.

## **MATERIALS AND METHODS**

A total of 90 samples (45 males and 45 females 30 each from the three socio-economic classes, were analyzed for the study. The three socio-economic classes are upper class, middle class and lower class. The basis for categorization of people into these classes is the apparent financial strength of the subjects so that people in the same continuum of wealth were placed in the same socio-economic class. Since it is almost impossible to get people to reveal their financial strength, Indicators such as occupation, general standard of living, for example the type of car one drives, one's mode of dressing, the kind of house one lives in and the flamboyance of the furnishings etcetera were employed in determining the apparent financial strength of the subjects.

Fasting blood samples were collected from the subjects into clean "plain" test tubes and stoppered. Sera was separated from whole blood within one hour after collection into clean plain bottles, stoppered and stored at 4<sup>0</sup>C for 24 to 48 hours. The requisite spectrophotometric methods were used for the assay of cholesterol, high density lipoproteins (HDL) and triglycerides, while very low density lipoprotein (VLDL) and low density lipoprotein (LDL) were estimated by methods of calculations.

### **Statistical Analysis**

This was done using graph pad prism version 5. The results were presented as mean  $\pm$  standard deviation.

The statistical method utilized for analysis was the student's "t" test at 95% significance.

## **RESULTS**

Table 3.I shows remarkable significant differences in the lipid and lipoprotein profile of various socio-economic classes. For the triglycerides and VLDL- cholesterol, the difference in the mean levels for the lower and middle classes was not significant while the differences between the mean levels of these parameters, for the lower and middle classes on one hand and the upper class on another hand, when variously compared, were significant ( $p < 0.05$ ) with the mean levels for the upper class being highest, followed by that of the middle class. The cholesterol levels exhibited the same class related variations except that in this case the difference between the mean level for the middle and lower classes was not significant. While the differences between the levels for the lower and middle classes on one hand and that for the upper class on another hand were significant when compared separately. The difference in the LDL – cholesterol levels of the upper and middle classes was not significant.

Table 3.II shows no significant differences in the lipid and lipoprotein profile of various age groups, except in the cholesterol level where significant differences were seen between the mean levels for the group 26-35 years on one hand and the mean levels for the groups 15-25 years and  $> 35$  years on another hand, when separately compared, the mean level of the age groups 26-35 years being the highest.

Table 3.III shows significant differences in the triglycerides cholesterol and LDL – cholesterol levels between males and females with the mean level for the males greater, while the differences in the HDL – and VLDL- cholesterol were not significant.

**TABLE 3.I LIPID AND LIPOPROTEIN LEVELS IN VARIOUS SOCIO-ECONOMIC CLASSES.**

	NO	TRIGLYCE-RIDE MEAN $\pm$ SD (MMOL/L)	TOTAL-CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	HDL - CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	LDL CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	VLDL CHOLESTEROL MEAN $\pm$ SD (MMOL/L)
UPPER CLASS	30	1.95 $\pm$ 0.33 (1.43 – 2.40)	4.34 $\pm$ 0.44 (3.70 – 5.40)	1.03 $\pm$ 0.19 (0.60 – 1.41)	2.31 $\pm$ 0.43 (1.52 – 3.30)	0.90 $\pm$ 0.15 (3.56 – 1.06)
MIDDLE CLASS	30	1.72 $\pm$ 0.50 (0.61 – 2.21)	3.95 $\pm$ 0.36 (3.45 – 4.56)	1.16 $\pm$ 0.20 (0.71 – 1.53)	2.19 $\pm$ 0.30 (1.63 – 2.87)	0.80 $\pm$ 0.22 (0.30 – 1.06)
LOWER CLASS	30	1.69 $\pm$ 0.40 (0.61 – 2.21)	3.75 $\pm$ 0.21 (3.45 – 4.07)	1.41 $\pm$ 0.21 (0.82 – 1.53)	1.85 $\pm$ 0.21 (1.83 – 2.20)	0.78 $\pm$ 0.18 (0.30 – 1.01)
LOWER VS MIDDLE		p > 0.05	p < 0.05	p < 0.05	p < 0.05	p > 0.05
LOWER VS UPPER		p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05
MIDDLE VS UPPER		p < 0.05	p < 0.05	p < 0.05	p > 0.05	p < 0.05

**TABLE 3.II LIPID AND LIPOPROTEIN PROFILE IN VARIOUS AGE GROUPS.**

	NO	TRIGLYCE-RIDE MEAN $\pm$ SD (MMOL/L)	TOTAL-CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	HDL - CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	LDL CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	VLDL CHOLESTEROL MEAN $\pm$ SD (MMOL/L)
15-25 years	39	1.74 $\pm$ 0.48 (0.61 – 2.31)	3.92 $\pm$ 0.44 (3.45 – 5.10)	1.08 $\pm$ 0.24 (0.60 – 1.53)	2.06 $\pm$ 0.54 (1.06 – 2.94)	0.80 $\pm$ 0.22 (3.30 – 1.06)
26-35 years	32	1.87 $\pm$ 0.11 (0.17 – 2.40)	4.22 $\pm$ 0.43 (3.45 – 5.40)	1.16 $\pm$ 0.18 (0.71 – 1.53)	2.21 $\pm$ 0.15 (1.36 – 3.30)	0.86 $\pm$ 0.17 (0.54 – 1.10)
>35 years	19	1.80 $\pm$ 0.35 (1.22 – 2.21)	3.94 $\pm$ 0.24 (3.60 – 4.56)	1.10 $\pm$ 0.17 (0.82 – 1.41)	2.07 $\pm$ 3.33 (1.52 – 2.70)	0.82 $\pm$ 0.16 (0.56 – 1.01)
15-25 vs 26-35		p > 0.05	p < 0.05	p > 0.05	p > 0.05	p > 0.05
15 -25 vs >35		p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05
26-35 vs > 35		p > 0.05	p < 0.05	p > 0.05	p > 0.05	p > 0.05

**TABLE 3.III LIPID AND LIPOPROTEIN LEVELS IN DIFFERENT SEXES.**

	NO	TRIGLYCE-RIDE MEAN $\pm$ SD (MMOL/L)	TOTAL-CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	HDL - CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	LDL CHOLESTEROL MEAN $\pm$ SD (MMOL/L)	VLDL CHOLESTEROL MEAN $\pm$ SD (MMOL/L)
MALES	45	1.88 $\pm$ 0.19 (0.71 – 2.26)	4.16 $\pm$ 0.46 (3.45 – 5.40)	1.10 $\pm$ 0.20 (0.70 – 1.53)	2.22 $\pm$ 0.37 (1.05 – 3.30)	0.86 $\pm$ 0.27 (0.43 – 1.06)
FEMALES	45	1.71 $\pm$ 2.29 (0.61 – 2.40)	3.90 $\pm$ 0.35 (3.45 – 5.10)	1.13 $\pm$ 0.05 (0.60 – 1.53)	2.01 $\pm$ 0.17 (1.06 – 3.23)	0.79 $\pm$ 0.20 (0.30 – 1.10)
MALE/FEMALE		p < 0.05	p < 0.05	p > 0.05	p > 0.05	p > 0.05

## DISCUSSIONS

The study shows that the lipid and lipoprotein profile is related to some extent to socio economic classes, with those in the upper class having higher levels of some of these parameters than those in the other classes probably because they have a higher access to economic rewards, with the ability to purchase meat and dairy products which contain saturated fatty acids that significantly increase total cholesterol and related substances in the body, while those in the lower class category, tend to resort to cheaper food materials for example fish, vegetables and other fibrous foods which contain poly and monounsaturated fats, that tend to increase, HDL – cholesterol levels, while decreasing the total and LDL –

cholesterol levels. The findings agree with the literature recorded by Whitby et al., (1993); Gunness and Gidley, (2010) which identified diet as an important factor affecting the lipid and lipoprotein profile. (1,10)

It is also evident in the study, that not much difference exist between the profiles for the middle and lower classes, this can be attributed to the structure of the Nigerian economy, which has succeeded in categorizing the citizens into the cream of society and the masses. This disagrees with Carlton,(1977) who categorized people into the lower, middle and upper classes and New York Times (2006) which categorized people into; lower, lower middle, middle,

upper middle and upper classes according to their financial status. (8,9)

Evident also from the study is that in the Nigerian context, age does not seem to affect the lipid and lipoprotein profile, probably because the populace even those who are advanced in age are most often involved in active work. This both agrees and disagrees with the work of Okecka-Szymanska et al., 2011 which stated that lipid and lipoprotein profile worsens with age but that increase in physical activities improves it. (11)

Sex on the other hand showed a significant effect on the levels of these parameters, while triglycerides, total cholesterol and LDL- cholesterol are higher in the males, HDL- cholesterol is higher in the females. This can be attributed to the sex hormones, since these differences, disappear after menopause in the females. This agrees with the work of Kiraly (1987) and Feingold et al., (2017) which tried to analyze the effects of sex hormones on the lipid and lipoprotein profile of humans. (12,13)

## CONCLUSIONS

From this study one can infer that

- The prevailing adverse economic condition in Nigeria is gradually phasing out the middle class category.
- The lipid and lipoprotein profile in the Nigerian context depends on diet and sex, but unlike the Caucasians may not depend on age.

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