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STATISTICALSTUDYON THE ANTHROPOMETRIC MEASURES OF NURSERY SCHOOL PUPILS

BY

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Abstract

This research was aimed at carrying out a statistical study on the anthropometric measures (Weight, Height, Age and Sex) of nursery school pupils in Rivers State using Port-Harcourt as a case study.Multiple linear regression was employed as the statistical technique. The measurements of weight being the dependent variablewere recorded to the nearest 0.1kg. The heights of the pupils were measured with the help of calibrated meter rule to the nearest 0.1cm, and the age and sex of the pupils were recorded for the study, all being the independent variables. The assumptions of the model were examined. The analysis showed that there was no multicollinearity and autocorrelation,whereasheteroscedasticity existed in the data. The analysis revealed on a joint basis that there was significant relationship between weights against height, age, sex of nursery school pupils. Further analysis based on the test of individual parameters shows that only height contributed positively on weight of nursery school pupils. The coefficient of determination (R^2), which indicated the proportion in Y that was explained by X's turned out with a percentage of 74.4% showing that there was a strong relationship between the response variable and the explanatory variables. This result entailed that 74.4% (percent) variation in the value of weight was explained by a change in the explanatory variables.

Keywords: Anthropometric, Measurement, Multiple Linear Regression, NurserySchool Pupils

1. Introduction

1.1 Background to the Study

The study of human body measurements especially on a comparative basis, otherwise known as (Anthropometric measurements), such as weight, height, age and sex have enhance the growth patterns of children's education (Bonin et al., 2023). Considerable information can be achieved about their nutritional status and global health. In the last approximately three decades, reference curves recommended by World Health

Organization (W.H.O) have been used to evaluate nutritional status of children in the world (Kovalskys et al., 2011).

However, a child's growth and fertility can demonstrate differences due to environmental, genetic and nutritional factors(Shi & Qi, 2023). Growth patterns demonstrate differences among different countries and among populations of different ethnic origin. These differences in growth and sex patterns have been reported to persist even after controlling for various factors such as, nutrition, environmental, maternal care, child care, income distribution, gross domestic product, health services and political influences (Storm et al., 2023). Therefore, it is recommended that every country should use reference height and weight curves based on measurements on their own children as well as age-sex predictors.

The anthropometric measurements are major indicators of nutritional status. In particular, the growth of height and weight, sex and age are considered as most sensitive indices of population health (Khan et al., 2023). So, the relationship between weight, height, age and sex is recommendable because it has been an essential tool in investigating children's health-related problems which are faced routinely by pediatricians, particularly in developing countries (Raj et al., 2023).

Experts agree that children and adolescent grow similarly when exposed to similar external conditions of growth. The influence of genetic factors might be postulated to some degree as well(Steves et al., 2012). Secular trends, body composition and sexual maturation are critical determinants in the interpretation of anthropometric measures. These constitute the main obstacles in the development of both local and universal growth charts. Some of the shortcomings mentioned above cannot be ruled out. However, result showed from Benjamin in 2000 showed that country-wide growth charts should be updated every 10 years with no significant changes in Body Mass Index or weight-for-height normal values (Chandra et al., 2019). Application of universal growth references or the growth reference of another country to a specific population can lead to underestimation or overestimation of the real rate of growth retardation. Additionally, it may negatively influence early detection of other measures related to height-for-age.

1.2 Statement of the Problem

Anthropometrically speaking, it has been established that there is a linear relationship between height and weight of primary school pupils. Hence, there is need to employ other measures like sex and age as determinants of weight. However, many researchers especially those in other areas who probably do not have sufficient knowledge of statistics usually employed the multiple linear regression technique to establish a relationship between these variables, without looking at some basic parametric assumptions. It is as a result of the situation that this study looked at the various assumptions using the data generated for height, weight, age and sex of nursery school pupils.

1.3 Aim and Objectives of the Study

The aim of this study was to examine statistically the anthropometric measures of nursery school pupils in Port-Harcourt of Rivers State and the specific objectives were to;

i. Examine if there is any relationship between age, sex, height and weight;
ii. Identify the anthropometric measures that contributed to the weight of nursery school pupils and
iii. Ascertain the proportion in weight that is explained by age, sex and height.

1.4 Significance of the Study

The study would be significant in a number of ways: it will be of benefit to the students especially in the areas of statistics, biological and medical sciences and researchers especially when published.

The work when published is expected to motivate future researchers who may wish to research in the areas of regression analysis.

Lastly, this study would add to existing literature in the field of regression/statistics and serve as a relevant reference material to subsequent researchers who might be carrying out research on regression analysis or Econometrics.

1.5 Scope of the Study

This work was delimited to examine statistically the anthropometric measures of nursery school pupils in Port-Harcourt of Rivers State. Multiple OLS regression was examined. Only three explanatory variables such as height, sex and age and one response variable (weight) were employed. The study was limited in employing only one programming language for data analysis, which is IBM SPSS software package.

2 Review of Related Literatures

Oguejiofor and Nwankwo (2023) investigated the anthropometric indices and academic performance of elementary school students in Enugu south, Enugu state, Nigeria. The study's objectives were to determine the anthropometric indices (height-for-age, weight-for-age, and body mass index (BMI-for-age) of primary school pupils, assess their academic performance, and determine the relationship between anthropometric indices (nutritional status) of primary school pupils in Enugu South Local Government Area of

Enugu State and their academic performance. The study used a descriptive cross-sectional research methodology, with a sample size of 434 respondents drawn from 5 public primary schools in rural and urban locations using a multistage sampling technique. 420 copies of the questionnaire were completely returned, yielding a response rate of 96.7%. Data were gathered using a standardized questionnaire developed by the researcher on anthropometric indicators and academic performance in primary school. Data was examined using SPSS Version 23.0 at $p < 0.01$. Analysis included frequencies, percentages, mean, standard deviation, and chi square. The findings revealed that a lower proportion of primary school students were moderately stunted (2.1%) in terms of height, moderately underweight (19.8%) in terms of weight, and moderately thin (3.8%) in terms of BMI for age. Rural schools had a higher proportion of students who were moderately thin, stunted, or underweight than urban schools (13.8%, 9.2%, and 21.8%, respectively). In terms of academic performance, 28.1% of respondents scored less than 50%, 41.7% scored between 50% and 74%, and 30.2% scored above 75%. A higher percentage of the students were classified as average. A higher proportion of kids in rural areas had poor academic performance (29.9%). Anthropometric variables were significantly associated with academic performance ($p < 0.01$). The study advised that health promotion and nutritional information be given to parents and caregivers of children as soon as possible because they play an important role in addressing the children's nutritional demands and defining their nutritional state.

Bekesuoyeibo (2024) looked at the anthropometric measurements of elementary school students in Imo State, utilizing Owerri Municipal Council as a case study. Multiple linear regression was used as a statistical tool. The investigation indicated a strong link between weight and height, age, and gender among elementary school pupils. Further research based on the individual test revealed that only height positively influenced the weight of elementary school pupils. The coefficient of determination (R^2), which measured the proportion of Y that was explained by X, was 51.6%, indicating a substantial link between the response variable and the explanatory factors. According to the findings, a change in the explanatory variables accounted for 51.6% (percent) of the variation in weight value.

Huwaida et al. (2023) conducted study on the evidence-based assessment of physical growth among primary school pupils. The study was carried out at three primary government schools in Baltiem, Kafr El-Sheikh governorate, Egypt. The major findings found that 14.0% of the children investigated had short stature, while 11% had long stature. In addition, 11.7% of the investigated children were underweight, 15.3% were overweight, and 8% were obese. Furthermore, the findings revealed that 59.3% of the youngsters evaluated lived an unhealthy lifestyle. The study concluded that two-thirds of the children were normal weight, and less than one-quarter were underweight. Furthermore, three-quarters of the children evaluated were of normal stature, with one-quarter having both short and long stature. It also concluded that more than half of the investigated children led an unhealthy lifestyle. Furthermore, the study confirmed that the Evidence Based Practice tool was a useful resource for monitoring the physical progress of schoolchildren. The study advised that nutritional educational programs be addressed at schoolchildren, teachers, and parents to improve their knowledge and practice of healthy growth and development.

Having reviewed these past works, the study examined how to use multiple linear regression as a statistical technique to study the effect of height, age and sex on weights of nursery school pupils in Port-Harcourt, Rivers State, Nigeria.

3 Materials and Method

A cross- sectional study was conducted on the Anthropometric status of school pupils in nursery schools in Port-Harcourtof Rivers State Nigeria. This study used stratified random and simple random sampling techniques respectively, designed for school pupils. Firstly, the schools were selected randomly by stratified sampling method according to socio-economic levels from nursery schools in Port-Harcourt, which represents the city center district of Rivers State. Secondly, simple random sampling was conducted in each stratum of high socio-economic of interest. A total of 250 nursery school pupils, irrespective of gender were selected for this study. The anthropometric measurements were taken with a range age of 3 to 6 years. The weight measurements were taken with the help of a digital electronic scale, with their shoes, bags and heavy wallets removed. The results of the weight were recorded to the nearest 0.1kg. The heights of the pupils were measured with the help of calibrated meter rule to the nearest 0.1cm. The pupils were positioned with their feet closed together and stand uprightly, barefooted against a vertical measuring meter rule. Once the correct position was achieved the interviewer lowered the head plate until it just touched the top of the pupils head and while maintaining this position, he/she were asked to stand upright without lifting the heels.

Multiple Linear Regression

If a regression model involves more than one independent variable, it is called a multiple regression model and is of the form (Nwachukwu; 2008).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k \qquad \ldots \qquad (1)$$

Due to the nature of numerous explanatory variables, the study employed the general linear model, that is working in matrix form.

The General Linear Regression Model

The general linear regression model expresses a linear relationship between the dependent variable Y, and K explanatory variables, where k can be 1, 2, 3, … etc. In fact, when k is more than two as it is in this research work, estimation of the parameters of the model becomes extremely tedious. However, this difficulty can be greatly reduced by the use of matrix algebra. Matrix algebra provides a compact method of handling regression model.

Suppose we postulate that there is a linear relationship between the dependent variable, Y and k – 1 explanatory variables $x_2, x_3, x_4, \ldots, x_k$ for a population of size N observations on Y and the X's, we may write:

$$Y_i = b_1 + b_2X_{2i} + b_3X_{3i} + \ldots + b_kX_{ki} + u_i,\ i = 1, 2, \ldots, N \qquad \ldots \quad (2)$$

where b_1 = the intercept on the Y-axis, $b_2, b_3, \ldots, b_k$ are the unknown population parameters.

u = error (or stochastic disturbance) term.

Re-writing equation (2) as a set of N simultaneous equation, we obtain:

$$\left.\begin{aligned} Y_1 &= b_1 + b_2X_{21} + b_3X_{31} + \ldots + b_kX_{k1} + U_1 \\ Y_2 &= b_1 + b_2X_{22} + b_3X_{32} + \ldots + b_kX_{k2} + U_2 \\ Y_3 &= b_1 + b_2X_{23} + b_3X_{33} + \ldots + b_kX_{k3} + U_2 \\ \vdots &\qquad \vdots \qquad\qquad\qquad \vdots \qquad \vdots \\ Y_N &= b_1 + b_2X_{2N} + b_3X_{3N} + \ldots + b_kX_{kN} + U_N \end{aligned}\right\} \qquad \ldots \quad (3)$$

Equation (3) can be re-written more compactly in matrix form as:

$$Y = X\beta + U \qquad \ldots \quad (4)$$

where

$$Y = \begin{pmatrix} Y_1 \\ Y_2 \\ Y_3 \\ \vdots \\ Y_N \end{pmatrix}_{N\times 1}, \quad X = \begin{pmatrix} 1 & X_{21} & X_{31} & \ldots & X_{k1} \\ 1 & X_{22} & X_{32} & \ldots & X_{k2} \\ 1 & X_{23} & X_{33} & \ldots & X_{k3} \\ \vdots & \vdots & \vdots & & \vdots \\ 1 & X_{2N} & X_{3N} & \ldots & X_{KN} \end{pmatrix}_{N\times K}$$

$$\beta = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \\ \vdots \\ b_k \end{pmatrix}_{k\times 1}, \quad U = \begin{pmatrix} U_1 \\ U_2 \\ U_3 \\ \vdots \\ U_N \end{pmatrix}_{N\times 1}$$

Table 1: ANOVA Table for Regression Analysis

Source of variation	Df	SS	MS
Regression	K – 1	$\Sigma\hat{y}_t^2$	$\dfrac{\Sigma\hat{y}_t^2}{k-1}$
Error	n – k	$\Sigma y_t^2 - \Sigma\hat{y}_t^2$	$\Sigma y_t^2 - \dfrac{\Sigma\hat{y}_t^2}{n-k}$
Total	n – 1	Σy_t^2	

$$F_{calculated} = \frac{\frac{\Sigma\hat{y}_t^2}{k-1}}{\frac{\Sigma y_t^2 - \Sigma\hat{y}_t^2}{n-k}} = \frac{RMS}{EMS}$$

The decision rule is to reject H_0 is $F_{cal} \geq F_{k-1,n-k;\alpha}$ otherwise accept H_0.

Coefficient of Determination

The (multiple) coefficient of determination is given by

$$R^2 = \frac{\sum \hat{y}_t^{\,2}}{\sum y_t^{\,2}} \qquad \ldots \qquad (5)$$

where x_1, x_2, y are in deviation form. The adjusted R^2 written as $\bar{R}^2$ is defined by

$$\bar{R}^2 = 1 - (1 - R^2)\frac{n-1}{n-k} \qquad \ldots \qquad (6)$$

Test of Hypotheses

Our model $Y = \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3 + U$ involves two explanatory variables. Hence we can conduct two types of tests about the parameters of the model, namely; individual tests and joint tests.

Individual Test

Individual test involves testing whether an explanatory variable has any influence on the dependent variable when the other explanatory variable is held constant.

The null and alternative hypotheses may be stated as follows:

$H_0 : \beta_i = 0$, i = 1,2,3 (i.e. there is no linear relationship between x_i and y, the other x held constant).

$H_1 : \beta_i \neq 0$ (i.e. a relationship exists between x_i and y).

Under the assumption that each U_i is $N(0, \delta^2)$, the test statistic will be given by

$$t_{cal} = \frac{\hat{\beta}_i}{SE(\hat{\beta}_i)} \qquad \ldots \qquad (7)$$

The decision rule is to reject H_0 at the α level of significance if $t_{cal} > t_{tab}$ (and hence conclude that a relationship exists between y and x_i) and to accept H_0 otherwise.

Joint Test

This involves testing whether $X_{i,}$ i=1,2,3 are jointly related to Y. This is equivalent to testing whether

$\beta_1 = \beta_2 = \ldots = \beta_k = 0$

Thus, the null and alternative hypotheses are:

$H_0 : \beta_1 = \beta_2 = \ldots = \beta_k = 0$ (i.e. $x_1, x_2 \ldots, x_k$ are not jointly related to y)

$H_1 : \beta_i \neq 0$ for at least one i, i.e. $x_1, x_2, \ldots, x_{18}$ and x_{19} are jointly related to y.

Thus, a joint test can be conducted using the Analysis of variance techniques as follows:

$$TSS = \Sigma y_t^2$$

$$RSS = \Sigma \hat{y}_i^2 = \hat{\beta}_1 \Sigma x_1 y + \hat{\beta}_2 \Sigma x_2 y + \hat{\beta}_3 \Sigma x_3 y$$

$$ESS = TSS - RSS = \Sigma y_t^2 - \Sigma \hat{y}_t^2$$

Tests for Multicolinearity using Condition Index

This is perhaps the best available multicollinearity diagnostic. It involves calculating the eigenvalues of the matrix of observations on the independent variables X_i. The eigenvalues can also be derived from computer estimation of the regression model as we shall experience in this research work. Using the eigenvalues, we derive the condition number and the condition index CI defined respectively as:

$$K = \frac{\max imum\ eigenvalue}{\min imum\ eigenvalue}, \qquad (8)$$

and

$$CI = \sqrt{K} \qquad (9)$$

If $10 \leq CI \leq 30$, there is moderate to strong multicollinearity.

If $CI > 30$, there is severe multicollinearity.

If $CI < 10$, there is no significant multicollinearity.

Test for Autocorrelation

An autocorrelation is a correlation between members of series of observations ordered in time (as in time series data) or space. In the regression context, the classical linear regression model assumes that such autocorrelation does not exist in the disturbances U_i. Symbolically,

$$COV(U_i, U_j / x_i, x_j) = E(U_i U_j) = 0 \qquad i \neq j$$

The Durbin-Watson test shall be used to test for the presence of autocorrelation which is given by

$$D = \frac{\sum_{t=2}^{n} (e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2} \quad \ldots \quad (10)$$

where e_t is the OLS residual

Hypotheses

H_0 : $\rho = 0$ (no autocorrelation)

H_1 : $\rho \neq 0$ (autocorrelation exist)

The decision rule is to

Reject H_0 if $D > 4 - D_L$

Accept H_0 if $D < 4 - D_u$, and it is inconclusive if D falls between

$4 - D_u$ and $4 - D_L$

Test for Heteroscedasticity using the White Test

To a dataset, we can check for the presence of heteroscedasticity in the data as follows:

- Obtain the estimated error term e_t from the regression.
- Regress the error term squared on the original explanatory variables (X), their squared values and their cross products.
- Then reject H_0 that there is no heteroscedasticity of $\chi^2_{cal} = nR^2 > \chi^2_{tab}$ … (11) and accept H_0 otherwise, where the degree of freedom is equal to the number of regressors.
- It is not advisable to apply the test to a model with several independent variables as this will consume degrees of freedom.

4 Results

From the data presented, weight of nursery school pupils is the response variable, while height, age and sex are the explanatory variables.

This is the summary of computer regression results.

However, from the SPSS output, the regression equation becomes

Weight = – 41.371 + 0.449Height – 0.467 Age– 0.408 Sex

Joint Test

Hypothesis

H_0: There is no relationship between weight of nursery school pupils and height, age, sex of nursery school pupils.

H_1: Relationship exists.

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$F_{cal} = 87.391$

The decision rule is to reject H_0 if $F_{cal} \geq F_{tab}$ where $F_{tab} = F_{3, 246, 0.05} = 13.90$

Since $F_{cal} = 87.391 > F_{tab} = 13.90$, we reject H_0 and accept H_1. Because we have rejected the null hypothesis in the joint test, it becomes imperative to carry out an individual test.

Table 2: Result of ANOVA Table for Multiple Regression Model

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	6088.729	3	2029.576	88.454	.000[b]
	Residual	5644.543	246	22.945		
	Total	11733.272	249			

a. Dependent Variable: Weight
b. Predictors: (Constant), Sex, Age, Height

Individual Test

From the output of the SPSS software,

T-calculatedfor $\beta_1 = 14.635$, $\beta_2 = -0.985$ and it is -0.550 for β_3.

$SE(\beta_1) = 0.027$, $SE(\beta_2) = 0.396$ and $SE(\beta_3) = 0.664$

The necessary hypotheses are as follows:

$H_0^1 : \hat{\beta}_1 = 0$ (There is no relationship between weight and height of nursery school pupils).

$H_1^1 : \hat{\beta}_1 \neq 0$ (Relationship exists)

$H_0^2 : \hat{\beta}_2 = 0$ (There is no relationship between weight and age of nursery school pupils).

$H_1^2 : \hat{\beta}_2 \neq 0$ (Relationship exists).

and

$H_0^2 : \hat{\beta}_3 = 0$ (There is no relationship between weight and sex of nursery school pupils).

$H_1^2 : \hat{\beta}_3 \neq 0$ (Relationship exists).

The decision rule is to reject H_0 if $t_{cal} \geq t_{tab}$ where

$$t_{tab} = t_{\frac{\alpha}{2},v} = t_{0.025,246} = 1.960$$

Since t-calculated for β_1 is greater than its tabulated value, we reject H_0 and do not reject H_o for β_2 and β_3 since the absolute values of their t-calculated is less than its tabulated value.

Table 3: Result Coefficients for Multiple Regression Model[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF

1	(Constant)	-41.371	5.098		-8.012	.000		
	Height	.449	.027	.736	14.635	.000	.714	1.255
	Age	-.467	.396	-.044	-.985	.313	.762	1.259
	Sex	-.408	.664	-.019	-.550	.532	.947	1.003

a. Dependent Variable: Weight

Test For Multi-Collinearity Using Condition Index (CI)

Using Equation (8),

$$K = \frac{0.109}{0.003} = 36.333$$

And using Equation (9),

$$\therefore \quad CI = \sqrt{36.333} \approx 6.028$$

Table 4: Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Height	Age	Sex
1	1	3.486	1.000	.00	.00	.00	.03
	2	.109	2.620	.00	.00	.00	.96
	3	.005	28.241	.23	.07	.95	.01
	4	.003	38.737	.75	.91	.02	.00

a. Dependent Variable: Weight

Since CI <10, we conclude that there is no significant multicollinearity.

Test for Autocorrelation

Hypotheses

$H_0 : \rho = 0$ (no autocorrelation)

$H_1 : \rho \neq 0$ (autocorrelation exists)

From the SPSS output, Durbin Watson Statistic (D) = 1.204

From the Durbin Watson table, D_L = 1.006, D_U = 1.421. Then 4-1.006 = 2.994, and 4-1.421 = 2.579. since D = 1.204< 4- D_U = 2.579, the study do not reject H_0 and concludes that autocorrelation does not exist in the data.

Table 5: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson R Square Change
1	.863[a]	.744	.659	9.81998	1.204

a. Predictors: (Constant), Sex, Age, Height
b. Dependent Variable: Weight

Test for Heteroscedasticity

Hypotheses

H_0 : There is no presence of heteroscedasticity.

H_1 : there is presence of heteroscedasticity.

$R^2 = 0.744$

Using Equation (18),

$$\therefore \quad \chi^2_{cal} = 250(0.744) = 186$$

$$\chi^2_{tab} = \chi^2_{3,0.05} = 7.815$$

Since $\chi^2_{cal} = 186 > \chi^2_{tab} = 7.815$, the study rejects H_0 and concludes that there is presence of heteroscedasticity in the data.

5 Discussion of Findings

The result of this study revealed that there is significant relationship between weight and height, age, sex of nursery school pupils. Furthermore, analysis based on the individual test shows that only height contributes positively on weight of nursery school pupils. The coefficient of determination (R^2), which indicates the proportion in Y that is explained by X's turned out with a percentage of 74.4% showing that there is a strong relationship between the response variable and the explanatory variables. This result entails that 74.4% (percent) variation in the value of weight is explained by a change in the explanatory variables. These findings are in agreement with Bekesuoyeibo (2024) who studied the anthropometric measures of primary school pupils in Imo State, and whose results indicated a strong link between weight and height, age, and gender among elementary school pupils and its further research revealed that only height positively influenced the weight of elementary school pupils, with a coefficient of determination (R^2), which measured the proportion of Y that was explained by X as 51.6%.

6 Summary, Conclusion and Recommendations

The analysis showed that there is no multicollinearity, autocorrelation which agrees with the assumptions of multiple linear regression. The analysis shows that heteroscedasticity exists in the data. The analysis revealed that there is significant relationship between weight and height, age, sex of nursery school pupils. Further analysis based on the individual test shows that only height contributes positively on weight of nursery school pupils. The coefficient of determination (R^2), which indicates the proportion in Y that is explained by X's turned out with a percentage of 74.4% showing that there is a strong relationship between the response variable and the explanatory variables. This result entails that 74.4% (percent) variation in the value of weight is explained by a change in our explanatory variables.

Having completed the analysis of this study, the study concludes that height is a determinant of weight of nursery school pupils.

As a result of findings from the analysis in this study and general knowledge, the following recommendations were made:

- Since weight and height of pupils contribute to their health system, government should create room for such an exercise.
- The government should give incentive to teachers and the society as well, so as to make allowance for meaningful nursery education for their wards, because as education improves, the pupils will also improve in carrying out the exercise effectively.

7 Contribution to Knowledge

This study is of significant contribution to knowledge as it has established the fact that multiple regression technique could be employed to examine anthropometric measures of nursery school pupils.

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