

A COMPARATIVE STUDY OF THE MEAN HEIGHT AND WEIGHT OF SCHOOL CHILDREN AGED 3 – 5 IN URBAN AND RURAL COMMUNITIES IN ANAMBRA STATE, NIGERIA WITH THOSE OF WHO/NCHS STANDARDS

¹Ilo, I.C.; ¹Agbapuonwu, N.E.; ²Obasi, S.C.; ³Makata, N.E.; ¹Makachi, M.C. & ¹Okeke, J.E.

¹Department of Nursing Science, Nnamdi Azikiwe University, Nnewi Campus, Anambra State

²Department of Human Kinetics and Health Education, Anambra State University, Uli

³Department of Nursing Services, Enugu State Ministry of Health, Enugu

Correspondence Author: Phone: 08064771717, Email: ilomentina@yahoo.com

ABSTRACT

This is a comparative study of the mean height and weight of pre-primary children aged 3 - 5 in rural and urban communities in Anambra State with the WHO/NCHS standard. Two objectives and one hypothesis were formulated in order to determine the mean measurements of weight and height of preschool children aged 3 – 5 in the urban and rural communities of Anambra State. A cross sectional survey research design was used for the study to collect sampled data of 1280 pre-primary children from three education zones in Anambra State. These data were organized and tested with inferential statistics of t-Test. The weights and heights were compared using graphs. The results showed that pre-primary children aged 3 - 5 in the urban areas indicated higher weights and heights than those in the rural areas. These pre-primary children aged 3 - 5 in both urban and rural locations had weights and heights that are higher than that of WHO/NCHS standards for their age. Based on the findings of the study, the researchers recommended that, it is important that the weight and height measurements of pre-primary children be routinely monitored as part of the school health programme.

INTRODUCTION

Background to the Study

Normal human growth is the progression of changes in weight and height that are compatible with established standard for a given population¹. Normal human growth, as reflected in the growth curves of groups of individuals in various age groups has its determinant factors. Some of these factors include age, sex, place of residence, socio-economic class and the individual's prevailing status of health². Normal growth, therefore, is a reflection of the overall health of an individual which is determined by the measurement of his/her body weight and height.

Optimal growth is often consistent with normal health if the individual is provided with the minimum physiologic nutrient requirement for his age and sex. The interaction of environmental, sociocultural and

demographic factors directly influences the availability, consumption and utilization of food³. A population well adapted to its environment should present indicators of weight and height in accordance with the standards expected. In this study, normal growth means the evident state of nutrition of an individual which is assessed by the measurement of the individual's body weight and height for age.

Growth retardation is shown by retarded weights and heights, inadequate bone development and delayed menarche in girls⁴. It has been confirmed that stature is an index of nutritional status, depending on how well the genetic potentials have been achieved⁵.

According to Burren, the short individual may have lacked the essential nutrients like proteins, vitamins, calcium and iron for optimum development, instead of being short

for reason of genetics. It has also been pointed out that under severe conditions, growth in the body weight is first affected by loss of body fat, followed later by loss of muscle tissue leading to growth retardation⁵.

Environmental factors such as socio-economic class and place of residence have influence on the weight and height of children^{6,2}. Accordingly, Pearce observed that children of parents of high socio-economic class are about 2 cm taller at three years and 5 cm taller at adolescence than those of low socio-economic class. Apparently, this reflects the difference in nutritional habits, rest and sleep, exercise pattern and home conditions⁷. Growth and development retardation are common in city slums and rural areas where there is poverty⁵. Also, it has been observed that American children in low income groups have been found to be shorter and leaner than their peers in affluent groups⁸.

Anthropometric measurement in form of growth monitoring is an essential component of child health supervision. Graphically, plotting anthropometric values for an individual indicates where the individual ranks in relation to all other individuals of the same age and gender. The reference standards most commonly used to standardize measurements were developed by the US National Center for Health Statistics (NCHS) and are recommended for international use by the World Health Organization (WHO). Available evidence suggests that children from well-nourished and healthy families throughout the world grow at approximately the same rate and attain the same height and weight as children from industrialized countries^{9,2}. The international reference standards can therefore be used for standardizing anthropometric data from around the world.

Studies on growth rate have been well documented in developed countries as opposed to developing countries where not much works have documented

anthropometric evaluations¹⁰. This study is important in order to evaluate the weight and height and establish growth standards (compared with WHO/NCHS standards) for pre-primary children in Anambra State and to provide a baseline data for future research and make further contributions to knowledge in this area. Understanding the nutritional status of these children has far-reaching implications for promoting the health of future generations.

Purpose of the Study

The study was aimed at determining the weight and height of pre-primary children aged 3 - 5 in urban and rural communities of Anambra State with the objective of comparing them with the WHO/NCHS recommended standards for their age. Specifically, the study aimed at:

1. Determining the mean measurements of weight and height of pre-primary children aged 3 – 5 in the urban and rural communities of Anambra State.
2. Comparing the measurements of the mean weight and height of pre-primary children aged 3 – 5 in rural and urban communities in Anambra State with those of WHO/NCHS recommended standards for their age.

Research Questions

The following research questions guided the study:

1. What are the mean measurements of the weight and height of pre-primary children aged 3 – 5 in urban and rural communities of Anambra State?
2. How do the mean weight and height measurements of pre-primary children aged 3 – 5 in urban and rural communities in Anambra State compare with those of WHO/NCHS recommended standards for their age?

Research Hypothesis

There is no statistically significant difference

in the mean measurements of weight and height of pre-primary children aged 3 – 5 in urban and rural communities in Anambra State.

Method and Materials

The research design adopted for this study, which is concerned with determining the growth of preschool children was the cross-sectional comparative survey design. This study basically focused on the assessment of the growth of preschool children aged 3 – 5 in Anambra State with respect to their weights and heights. The variables were delimited to their age and location of schools. The study involved only public schools approved by the State Ministry of Education located in the six education zones in Anambra State. The age limits were found in the early childhood/pre-primary education classes (3 – 5 years)¹¹.

The target population of the study comprises all pre-primary school children in the public nursery schools in Anambra State. Multi-staged sampling technique was used to select the sample size of 1280 pre-primary children used for the study from three educational zones in the state. The anthropometric measurements of the height and weight of the pre-primary school children were taken.

Data were collected using standard instruments for anthropometric assessment. The validity of the measurement tools was confirmed by experts. There was no test of reliability for the instruments for the study based on the fact that the instruments are standardized and valid instruments that have been recommended for such data collection. Height and weight were measured according to International Society for Advancement of Kinanthropometry standards for anthropometric assessments¹². The children were in their school sport shorts and vest, and barefooted. They stood erect on the weighing scale, looked straight ahead and relaxed. The researchers took the readings when the pointer stabilized. Height was measured using a height ruler calibrated in meter and

centimeter. The participants were dressed as for weight measurement. The height meter was mounted on the wall and the participants stood erect, barefooted, and looked straight ahead. The measurement was taken on the ruler against the vertex of the head. Data were summarized using descriptive statistic of mean and standard deviation. Comparative analyses between variables were done using independent sample t-test. Statistical significance was set at $P < 0.05$ level of significance. All statistics were done using Statistical Package for Social Sciences (SPSS) for Windows (version 16.0). The data were presented in tables, bar charts and also plotted in line graphs for ease of comparison with those of WHO/NCHS recommended standards for their age.

RESULTS AND OBSERVATIONS

Research Question 1

What are the mean measurements of the weight and height of pre-primary school children aged 3 – 5 in urban and rural communities of Anambra State?

Table 1: Mean Weight and Height of Pre-primary School Children Aged 3 - 5 plus According to Location

VARIABLES Measurement	URBAN(n= 582) x Measurement	RURAL (n = 698) x Measurement	x Difference
Weight (Kg)	17.08	16.72	0.36
Height (Cm)	1.04	1.03	0.01

Table 1 shows that the urban pre-primary children of Anambra State aged 3-5 had better mean weight (17.08kg) and mean height (1.04m) than their rural counterparts who had 16.72kg and 1.03m as their mean weight and mean height respectively.

How does the mean weight and height measurements of pre-primary school children aged 3 – 5 years in urban and rural communities in Anambra State compare with those of WHO/NCHS recommended standards for their age?

Research Question 2

Table 2: Mean Weight of Pre-Primary School Children Aged 3-5 compared with those of WHO/NCHS Reference Values in both Urban and Rural Areas

AGE (YEARS)	MEAN WEIGHT OF CHILDREN IN URBAN LOCATIONS(Kg)	MEAN WEIGHT OF CHILDREN IN RURAL LOCATIONS(Kg)	WHO/NCHS REFERENCE MEAN WEIGHT(Kg)
3	15.3	15.4	14.3
4	17.4	16.8	16.3
5	18.1	17.7	17.9

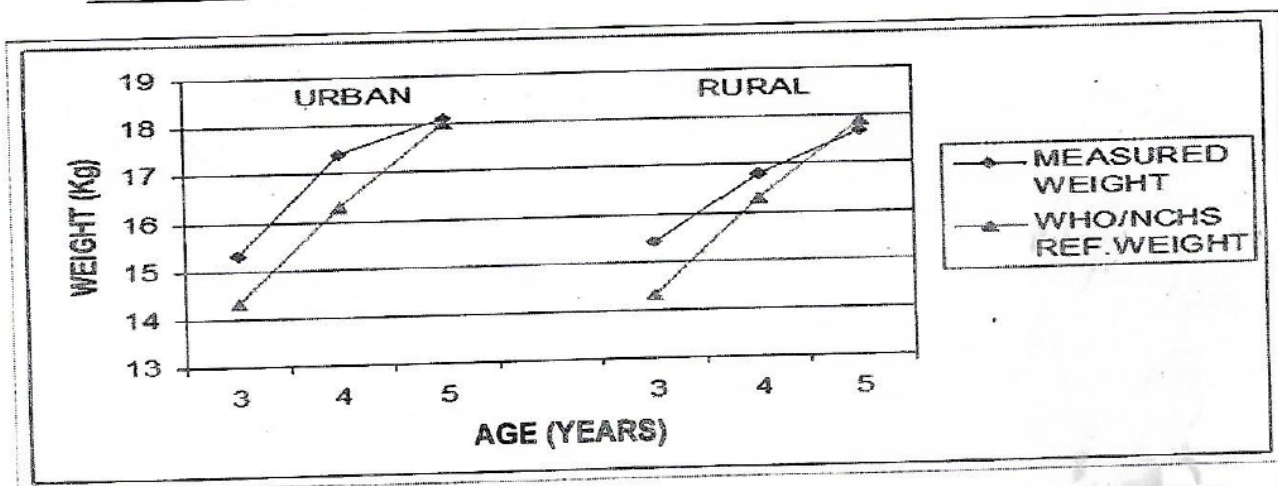


Fig. 1: The Mean Weight of Pre-primary School Children Aged 3-5 compared with those of WHO/NCHS Reference Values in both Urban and Rural Areas

Table 2 and Figure 1 show that the urban and rural pre-primary school children under the study weighed more than the WHO/NCHS reference weight for their age. The table also shows that the mean weight of children in urban locations aged 5

and that of WHO/NCHS reference standard were better than those in rural locations, but these children in urban locations weighed more than the WHO/NCHS reference standard.

Table 3: Mean Height of Pre-primary School Children Aged 3-5 compared with those of WHO/NCHS Reference Values in both Urban and Rural Areas

AGE(YEAR) REFERENCE HEIGHT(Cm)	MEAN HEIGHT OF CHILDREN IN URBAN LOCATIONS (Cm)	MEAN HEIGHT OF CHILDREN IN RURAL LOCATIONS (Cm)	WHO/NCHS MEAN HEIGHT
3	98.2	98.3	95.1
4	104.5	105.3	102.9
5	109.6	105.5	109.2

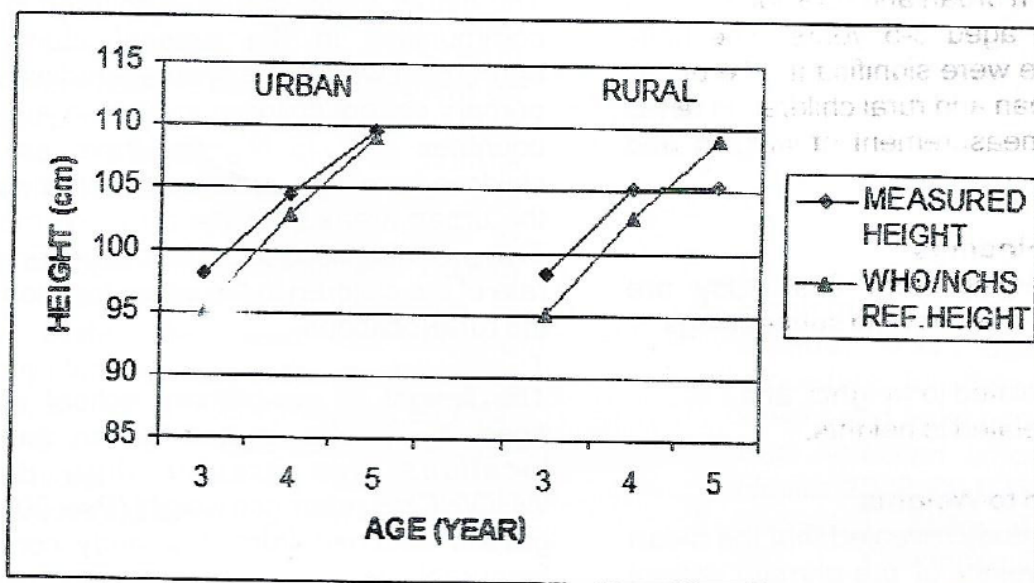


Fig. 2: The Mean Height of Pre-primary School Children Aged 3-5 compared with those of WHO/NCHS Reference Values in both Urban and Rural Areas

Table 3 and Figure 2 show that the mean height of the pre-primary school children in urban and rural locations aged 3 - 4 was greater than that of WHO/NCHS reference standard for their age. The table also shows that among the children aged 5, the mean height of those in urban locations and that of WHO/NCHS reference standard were better than that of those in rural locations, but these children in urban locations had better mean height (109.6cm) than the children of WHO/NCHS reference values who had a

mean height of 109.2cm.

Research Hypothesis

There is no statistically significant difference in the mean measurements of weight and height of pre-primary school children aged 3 - 5 in urban and rural communities in Anambra State. The data verifying this hypothesis are contained in Table 4.

Table 4: Summary of the t-test comparison of the Mean Weight and Height of the Pre-primary School Children in Anambra State Aged 3-5 According to Location

VARIABLES	N	\bar{x}	SD	Df	t- Cal	t-VALUE	P-VALUE	Remarks
Weight (Kg)		\bar{x}						
Urban	582	17.08	2.81	79	2.24	1.99	<0.05	Reject
Rural	698	16.72	2.45					
Height (m)								
Urban	582	1.04	0.07	87	2.66	1.99	<0.05	Reject
Rural	698	1.03	0.07					

Table 4 presents the t-test summary of the mean weight and height of the pre-primary school children in urban and rural locations of Anambra State aged 3-5 years. The table shows that there were significant differences between the urban and rural children in terms of their mean measurement of weights and heights.

Discussion of Findings

The facts emerging from this study are discussed under the following subheadings:

- Results related to weights, and
- Results related to heights.

Results Related to Weights

Findings of this study revealed that the mean scores of the weight of pre-primary school children aged 3 – 5 in Anambra State were within normal range. However, when compared based on location, children in the urban areas indicated higher mean weight (17.8kg) than those of their rural counterparts. This might be due to differences in the socio-economic status of their parents because most of the children attending schools in rural areas are from relatively low socio-economic background. Therefore, the low socio-economic backgrounds of these children suggest that factors such as education, occupation and economic status of their parents may account for the differences. In addition, the usual higher prevalence rates of intestinal parasites in the rural communities compared with the urban areas could

contribute to the disparity in the growth rate of these children.

The higher mean weight of children in urban communities in the present study is in agreement with those of other studies on pre-primary school children in Nigeria and other countries^{13, 18}. In Nigeria, there are more children from high socio-economic classes in the urban areas than the rural communities. This probably accounted for the better growth rate of the children in the urban locations than the rural locations.

The weight of pre-primary school children aged 3 - 5 plus in both urban and rural locations was greater than that of WHO/NCHS reference weight ($P < 0.001$). The graphs obtained from this study compared favourably with the WHO standards, showed that it did not fall below the recommended standards. This is in contrast to the study done elsewhere in Nigeria where it was found that the mean weight of the children at all ages was much lower compared to WHO/NCHS reference standard^{19,20,21}.

Results Related to Heights

The height of pre-primary school children aged 3 – 5 plus in both urban and rural locations were higher than that of WHO/NCHS recommended reference height for their ages. Findings have shown that factors such as socio-economic class and genetic factors have influence on the weight and height of children^{6,2}. In this connection, it has been reported that growth and

development retardation are common in city slums and rural areas where there is poverty⁵.

Implications of the Study

The findings of the study indicated that location has significant influence on the anthropometric indicators of the children. What this implies is that children in the urban locations have adequate dietary intake than their rural counterparts. This, therefore, calls for health education of the parents and caregivers on the need for adequate nutrition and elimination of some of the factors that contribute to low dietary intake especially in the rural areas. Parents should monitor the type and quantity of food their children consume and make sure they are adequate in quantity and quality. This will guide them on the need to provide adequate nutrition for their children to enable them achieve normal growth and brain development for their age and sex. This is because of the need to maintain an optimum wellness and normal growth of the school age population in Anambra State. This need has become abundantly clear by virtue of the results of this study. It is, therefore, recommended that the weight and height measurements of pre-primary children be routinely monitored as part of the school health programme.

CONCLUSION

Growth monitoring has been identified as an opportunity for health care providers to increase awareness and provide anticipatory guidance on the importance of healthy feeding and eating practices. Growth monitoring is essential in order to identify the risk of inadequate nutrition and conditions manifested by growth disorders. There is, therefore, the need for regular measurements of the weight and height of Nigerian children through the school health services in order to monitor their growth. The need to educate mothers and caregivers to bring their children for growth monitoring and the importance of referring conditions manifested by growth disorders to health care providers for adequate management can never be over-

emphasized.

REFERENCES

1. Touwslager, R.N., Gielen, M., Derom, C. Determinants of infant growth in four age windows: A twin study. *Journal of Paediatrics* (2011)56, 158:566
2. Pearce, E.O. *A General textbook of Nursing*. London: Faber & Faber; 2002
3. Pipes, P.C. *Nutrition in infancy and childhood*. St Louis: The CV. Mosby; 2001.
4. Medhi, G.K., Barua, A., Mahante, J. Growth and nutritional status of school age children (6-14yrs) of tea garden workers of Assam. *Journal of Human Ecology*. 2006 19, 83-85.
5. Burren, C.P. *Normal and Abnormal Growth*. United Bristol care NHS Trust. London: Cambridge University Press; 2009.
6. Habicht, J.P, Martorell, H.A., Melina, V.W. Standardization procedure for the collections of weight and height data in the field. *Pan American official Bulletin of Health*. 2002. 76, 375-384.
7. Daniels, L., Miller, M., Wobsey, W., Wu, J., Cavente, S., Crotty, M. Upper arm anthropometry: An alternative indicator of nutritional health & body mass index in unilateral lower extremity amputee. *Archives of Physical Medicine and Rehabilitation* 2008.89 (10), 2031-2035).
8. Arlin, M.E. *The Science of Nutrition*. New York: Macmillan Publishers; 2007
9. Garza, C., de Onis, M. For the WHO Multicenter Growth Reference Study Group. Rationale for developing a new international growth reference. *Food and Nutrition Bulletin*, 2004 25 (Suppl.), S10-S14.
10. Onimawo, I.A., Cole, A.H. A

- Longitudinal study of changes in body composition of young adult in Nigerians. *Nigerian Journal of Sociology* 2010.36, 47-57.
11. National Policy on Education (NPE). *National Policy on Education*. (Rev ed.). Abuja Nigeria: NERDC Press; 2004
 12. International Society for the Advancement in Kinanthropometry (ISIAK) International Standard for Anthropometric Assessment. Unerdale, SA, Australia: ISIAK 20011-133.
 13. Ogechi, U.P., Onimawo, I.A., Ukegbu, A.U. Nutritional study and energy intake of adolescent in Umuahia urban Nigeria. *Pakistan Journal of Nutrition* 2007. 6 (6), 641-646.
 14. Nwokolo, S., Ifada, K., Onochie, O., Olomu, J. Anthropometric assessment of nutritional status and growth of 10 - 20 year old individuals in Benin City metropolis (Nigeria). *Pakistan Journal of Nutrition* 2007 5(2), 117-121.
 15. Cole, A.H., Timori, O.F., Odumbako, S.O., Aminu, K.S. Nutrient intakes, Basal Metabolic Rate (BMR) and body composition of Nigerian female adolescents. *Nigerian Journal of Nutrition Science*, 2002 36, 97-104.
 16. Onimawo, I.A., Ukegbu, P.O. Energy intake and energy expenditure of institutionalized female adolescents in a Nigerian secondary school. *Journal of Sustainable Agriculture and Environment*, 2005 9, 34-32.
 17. Osisanya, J.O., Awala, M.A., Cole, A.H. Anthropometry and body composition of adolescent boys in a Federal Government institution (A case study of Kings College Lagos.) Proceedings of the 33rd Annual conference of the nutritional society of Nigeria, Dec, 2002 23:96-101.
 18. Onimawo, I.A., Cole, A.H. A Longitudinal study of changes in body composition of young adult in Nigerians. *Nigerian Journal of Sociology*. 2000 36, 47-57.
 19. Nnanyelugo, D.O., Ngwu, E.K., Okeke, E.K. Determination of energy expenditure in humid tropical climate and its relationship to dietary intake. *Nigerian Journal of Nutrition Science*, 2008.20 & 21, 21-28.
 20. Oninla, S.O., Owa, J.A., Onayade, A.A., Taiwo, O. Comparative study of nutritional status of urban and rural Nigerian school children. *Journal of Tropical Paediatrics* 2007. 53(1), 39-43
 21. Amuta, A.C., Houmsou, M.M. Assessment of the nutritional status of school children aged 6 - 17 years in Makurdi Benue State. Nigeria. *Pakistan Journal of Nutrition* 2006. 6 (6), 83-92.