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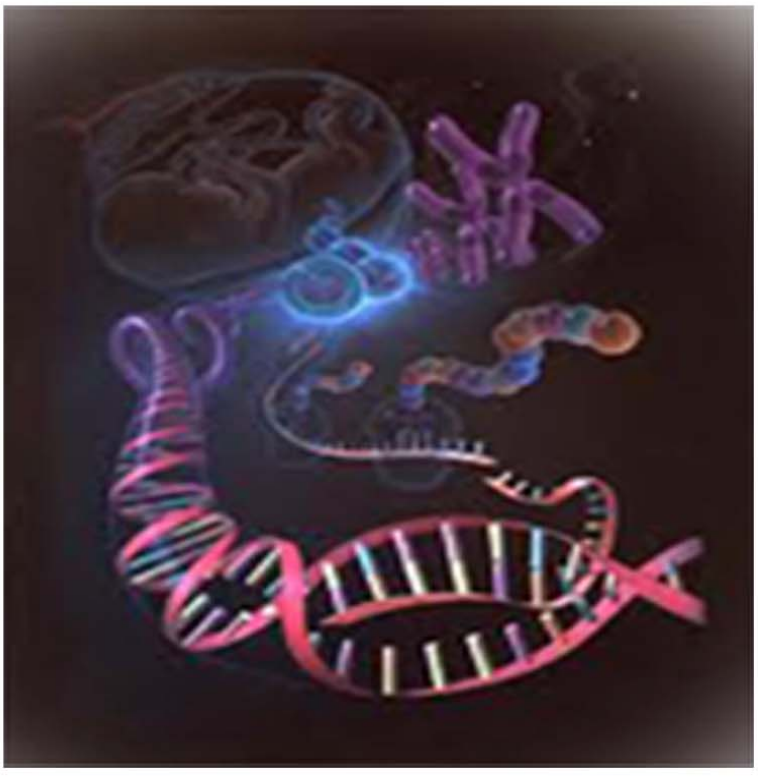

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Research Paper

PREVALENCE OF STUNTING AMONGST PRE-SCHOOL AGE CHILDREN FROM SELECTED TOWNS IN ANAMBRA SOUTH SENATORIAL ZONE

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Stunting is an evidence of chronic malnutrition in children and childhood malnutrition has been associated with serious health problems and risks in latter life. Evaluating the extent of the problem and monitoring related trends is imperative. To assess the prevalence of malnutrition among under-five year old children on the basis of the NCHS (National Center for Health Statistics) reference, and WHO standard, a descriptive cross-sectional survey was carried out between the months of April and May 2012. Anthropometric data was collected using standardized methods and equipments. Five hundred and seventy nine (579) under five year old children from individual homes and five schools distributed in three (3) towns in Anambra South Senatorial district were assessed. Data was analyzed using WHO- ANTHRO software (Version 3.2.2) and stunting was defined as the proportion of pre-school age children with height-for-age values <-2SD from the reference/standard median population. Based on NCHS and WHO criteria, respectively, result of the study revealed 6.8% and 7% prevalence of stunting in the study population. A higher prevalence of stunting was observed amongst the girls (9.0%, 9.0%) compared with the boys (4.9%, 5.3%). Prevalence of stunting was highest (12.0%, 12.7%) amongst children between 4-5 years followed by 3-4 years old (7.1%, 7.1%) and 1-2 years old (6.3%, 6.8%). Prevalence of stunting amongst 2-3 years old children was relatively lower (0.7%, 0.7%) and there was no record of stunting amongst under 12 month infants. The result of this study suggests that childhood nutrition should be prioritized in determining health, educational and Agricultural policies in Anambra State.

Keywords: Z-score, Stunting, NCHS, WHO Anthropometry Pre-school age

INTRODUCTION

Malnutrition which refers to all deviations from adequate nutrition still remains a major source of concern in developing countries (de Onis *et al.,* 2010a; UNICEF, 2008). Evidences of malnutrition include obesity, wasting, stunting and underweight. In 2010, 35 million children in developing countries were classified as stunted.

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The nutrition of children in their formative stage of life has substantial and persistent impact on their physical and mental development and on their health status and productivity (Scrimshaw, 2001). Childhood malnutrition is risk factor for health problems later in life (de Onis *et al.,* 2010b) and ultimately affects the workforce of the population. It is therefore important to assess the extent of the problems in the population. Anthropometric measurement of children is particularly important in assessing their nutritional status. Height and weight of children particularly those less than 5 years are accepted measure for nutritional status assessment (Cole and Flegal, 2003; Garza and de Onis, 2004). The three major anthropometric indices used in Nutritional anthropometry for classification of malnutrition by comparing them with a reference population (NCHS/WHO International Growth reference standard) in children are weight-for-age, height/ length-for-age and weight-for-height. Adam and Naoke (1999); WHO (2006) pointed out that these indices can provide different information. Low height for age index identifies past under-nutrition or chronic malnutrition. Deficits in length-for-age or height-for-age are referred to as stunting. Stunting is a failure to achieve expected length as compared to a healthy child of the same age in the reference population and stems from a slowing in the growth of the fetus or the child. It is an indicator of past growth failure and is associated with a number of long-term factors such as chronic insufficient protein and energy intake, sustained inadequate feeding practices, frequent infections poverty and other adverse conditions which are closely linked to a generally poor standard of living. Data on prevalence of stunting may be used for the purpose of evaluation of child nutritional status in populations (Cogill, 2003). The prevalence of stunting in children under two years of age is likely to be more responsive to the impact of interventions than in older children (Cogill, 2003).

Z- score is one of the three available anthropometric descriptors by which a child or group of children can be compared to the reference population (NCHS/WHO). Height- for-age Z-score for instance, describes how far (in terms of units called standard deviations) a child's height is from the median value of a child of the same age in the reference data. It uses an application of statistical theory to describe how far a child's height is from the average height of a child of same age. Z-score has been recommended as the most appropriate descriptor of malnutrition (de Onis *et al.,* 1993). However, health and nutritional facilities have in practice been reluctant to adopt its use.

Previous nutritional surveys in Anambra State Nigeria, have revealed a high (30%) incidence of malnutrition amongst 3 years olds (Nnanyelugo, 1980). A more recent research in Aguata Anambra state. Nigeria revealed a 7.7% incidence of stunting amongst pre-school age children (using NCHS reference) (Okorigwe and Okeke, 2009).

Majority of previous nutritional surveys carried out in Anambra state have been based on older references such as the Harvard standard values and very few nutritional assessment studies in the under-five population have been carried out on the basis of this anthropometric descriptor.

Anambra state is one of the 36 states in Nigeria. Its location co-ordinates are $6^0$20N, 7^0.00 E. Created on August 27, 1999, its capital is Awka. It covers an area of 4,844 km^2 and has a population of 4,055,048 (DHS, 1999). It is divided into 3 senatorial zones. Anambra North, Anambra

South and Anambra central senatorial zones respectively. It comprises three senatorial zones each comprising 7 Local Government Areas. These are:

1. Anambra North senatorial zone; comprising Awka North, Awka South, Njikoka, Dunukofia, Aniocha, Idemili North and south.
2. Anambra Central senatorial zone: comprising Onitsha North and South, Ogbaru, Oyi, Aghamelun, Anambah East and West.
3. Anambah South comprising: Orumba North and South, Aguata, Ihiala, Ekwusigo, Nnewi North and South.

This work was aimed at carrying out a survey of nutritional anthropometric data on 0-5 years old children in Anambra South senatorial district. The objectives were to comparatively evaluate the extent of stunting amongst pre-school age children in the region based on the NCHS 2000 reference and the WHO 2006 standard respectively, to quantify the prevalence of stunting amongst the under five year old population in Anambra South senatorial district, and to practically evaluate the use of Z-score in Nutritional assessment study in Anambra State.

METHODOLOGY

A descriptive cross-sectional survey was carried out between the months of April and May, 2012. A sample size of 579 was drawn comprising under five year old children from three towns (Uli, Ihiala and Nnewi) in Anambra south senatorial zone. Participants included pupils in primary schools, attendees at scheduled immunization visits in pediatric hospitals as well as children from individual households. Consent was obtained from the various hospital authorities and school authorities as well as from parents before embarking on data collection. Structured questionnaires filled by parents or guardians were used to collect some required information. Anthropometric data for each child was collected using standardized equipments and methods as recommended by Cogill (2003). Trained research assistants were employed for data collection and to explain details of the components of the questionnaire to illiterate parents.

Height measurements were taken with height meters mounted against a wall. Supine length measurements and other data from under 1 year old attending immunization clinics were collected with the help of trained health workers at the various health institutions. Height measurements of participants above one year who could stand erect were taken with the children standing barefooted and shoulders erect. Measurements were taken on the meter against the vertex of the head. Height-for-age Z-scores was obtained from standard growth chart (NCHS, 2000 and WHO, 2006) and recommended cutoffs (<-2SD) was used to classify stunted children. Data was analyzed using the WHO-Anthro software (Version 3.2.2) and growth retardation prevalence for the under five year old was estimated by the proportion of height-for-age below -2SD Z-score of the references population. Mean Z-scores and standard deviations of the anthropometric index being assessed was used to summarize the data for each age group.

RESULTS

Prevalence of stunting within each age range is represented by the percentage of children with height-for-age Z-scores below -2SD as shown in Table 1. Prevalence of low length for age by sex

Table 1: Prevalence of low length - for age by sex and by age in a sample of 579 under 5- years old children in Anambra South. Using NCHS reference

Age group (months)	Sex	% below cut off (≤ 2SD)	Mean Z-score	SD
<6	BoysGirlsCombined	000	000	000
6-11	BoysGirlsCombined	000	1.4-0.690.00	00.41.24
12-23	BoysGirlsCombined	023.56.3	2.82.482.64	1.962.462.49
24-35	BoysGirlsCombined	01.40.7	2.482.742.62	1.751.991.88
36-47	BoysGirlsCombined	4.410.67.1	1.321.151.25	2.051.972.02
48 -59	BoysGirlsCombined	10.513.912.0	-0.33-0.32-0.32	1.621.881.74
Total	BoysGirlsCombined	4.99.06.8	1.21.291.24	2.172.412.29

Note: Prevalence values shown on table 1 above are based on the NCHS (2000) reference. Prevalence of stunting within each age range is given by the percentage of children with height- for-age Z scores below -2SD. Prevalence of stunting amongst girls in all age groups except under-one year olds was higher compared with boys. Age range 48-59 months recorded the highest prevalence of stunting. Total prevalence of stunting by NCHS criteria was 6.8%.

Table 2: Prevalence of low length for age by sex and by age in a sample of 597 under five year oldchildren from Anambra South using WHO reference

Age group (months)	Sex	% below cutoff (<-2SD)	Mean Z score	SD
<6	BoysGirlsCombined	000	000	000
6-11	BoysGirlsCombined	000	1.74-0.510.24	0.0.261.32
12-23	BoysGirlsCombined	0136.8	2.922.692.80	1.933.052.55
24-35	BoysGirlsCombined	01.40.7	2.242.432.34	1.892.001.94
36-47	BoysGirlsCombined	4.410.67.1	1.130.831.00	2.091.882.00
48-59	BoysGirlsCombined	11.613.912.7	0.37-0.54-0.45	1.621.761.68
Total	BoysGirlsCombined	5.39.07.0	1.071.061.06	2.192.382.28

Note: Prevalence values shown on table 2 above are based on the WHO (2006) reference. Prevalence of stunting within each age range is given by the percentage of children with height- for-age Z scores below -2SD. Prevalence of stunting amongst girls in all age groups except under-one year olds was higher compared with boys. Age range 48-59 months recorded the highest prevalence of stunting. Total prevalence of stunting byWHO standard was 7.0%

and age in a sample of 579 under-five year old children from Anambra South using NCHS and WHO reference are shown in Tables 1 and 2 respectively. Going by the WHO criteria, prevalence of stunting was highest (12.7%) amongst children 4-5 years old. This was followed by children between 3-4 years (7.1%) and children 1-2 years old (6.8%). Prevalence of stunting amongst 2-3 years olds was 0.7% while no case of stunting was observed among under—1 year old children. A similar pattern was observed from the prevalence results obtained with the NCHC reference, even though more children were classified as stunted by WHO standard when compared with the NCHS references within some age groups as well as in the entire population (Tables 3, 4 and Figure 3).

Table 3: Comparative prevalence of low level of Anthropometric indicator (H/AZ<-2 SD) by sex in a sample of 579 children from Anambra South

	H/A Z-score <-2SD)	
Gender	WHO	NCHS
Boys	5.3	4.9
Girls	9.0	9.0
Total	7.0	6.8

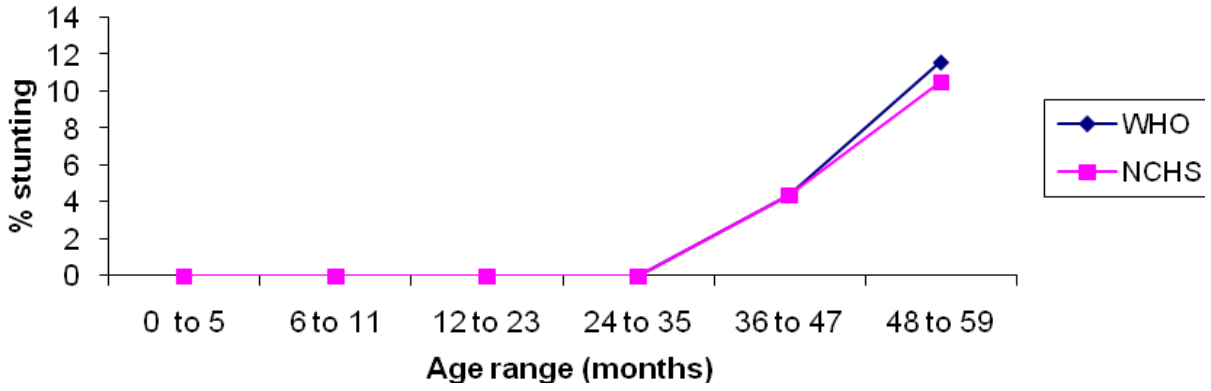
Note: Prevalence values shown on table three are based on WHO (2006) and NCHS 2000 reference standard respectively. Prevalence stunting was higher amongst girls compared with the boys by both criteria.

Table 4: Comparison of growth retardation prevalence across age ranges using NCHS(2000) and WHO(2006) references respectively

	AGE RANGE (MONTHS)													
	>6		6-11		12-23		24-35		36-47		48-59		0-60	
	NCHS	WHO	NCHS	WHO	NCHS	WHO	NCHS	WHO	NCHS	WHO	NCHS	WHO	NCHS	WHO
H/A Z < -2SD	0	0	0	0	6.3	6.8	0.7	0.7	7.1	7.1	12.0	12.7	6.8	7.0

Note: More children are classified as stunted when the WHO standard was used rather than the NCHS references.

Figure 1: Prevalence Of Stunting Amongst Zero To Five Year Old Male Children From Anambra South



Using NCHS 2000 reference, mean height-for-age Z-score for the 579 children examined was 1.24±1.29. Age group 48-59 months had the lowest mean H/A Z-score (–0.32 ± 1.02). No case of low height-for-age (stunting) was observed among children less than 12 months. Highest

prevalence of stunting was found amongst age group 48-59 months. Prevalence of stunting was higher among girls in all age groups (Figure 2).

Using WHO 2006 standard, mean height-for-age Z-score for the 579 children examined was 1.06 ± 1.28. Age group 48-59 months had the lowest mean H/A Z-score (–0.4.5 ± 1.68). No case of low height-for-age (stunting) was observed among less than 12 months old children. Highest prevalence of stunting was found amongst age group 48-59 months. Prevalence of stunting was higher among girls in all age groups.

There was no incidence of stunting amongst under one year old children by both criteria. Similar prevalence of stunting was recorded in two age groups (24-35 and 36-47 months, respectively) when both NCHS 2000 and WHO 2006 growth reference\standards were used. Highest prevalence of stunting was recorded amongst children within the age ranges of 48-59 and 36-

Figure 2: Prevalence Of Stunting Amongst Zero To Five Year Old Female Children From Anambra South

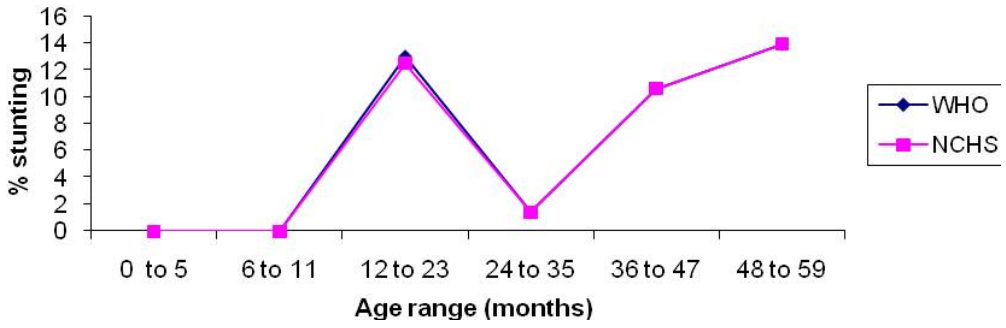
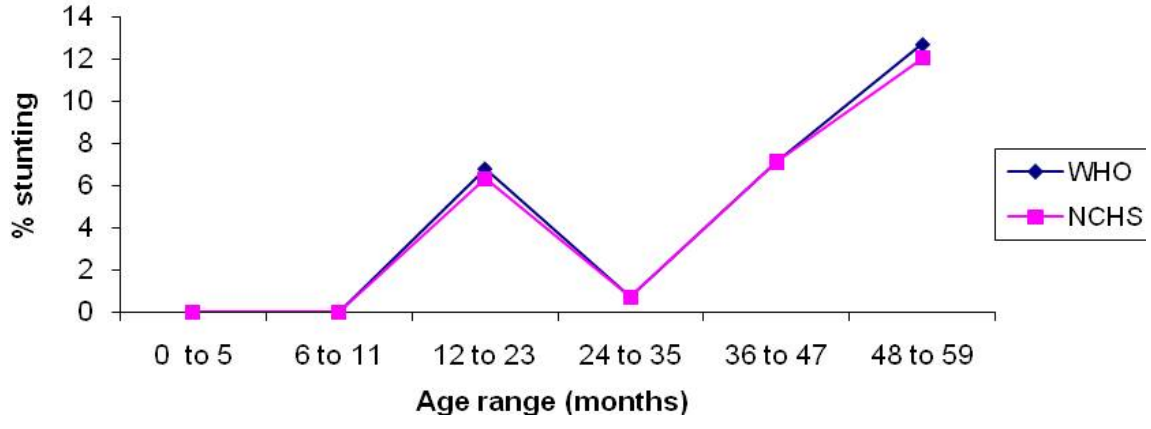


Figure 3: Prevalence Of Stunting Amongst Zero To Five Year Old Male And Female Children From Anambra South



47 months by both criteria. Also, the WHO reference standard reflected a higher prevalence of stunting in the same age groups referred to above (Figures 1 to 3).

DISCUSSION

A Nigerian national survey conducted by the Demographic and Health Survey (DHS) in 1999 placed the proportion of stunted children H/A< -2 Z-score under 5 years of age at 43% including severe stunting (below -2SD). A previous study by Okoroigwe and Okeke (2009) in Aguata, Anambra South senatorial district revealed a 7.7% prevalence of stunting among under five-year olds using NCHS reference. The present study shows a slight decline in the prevalence of low H/A (6.8%) among the same population (under-five years old) in Anambra South using NCHS reference and the anthropometric descriptor Z-score. Result of the study also revealed a higher prevalence (9%) of stunting among the girls compared with the boys in the study population, suggesting that the girls in the study population were more susceptible to the adverse that led to malnutrition.

Prevalence of stunting was highest (12.0%) amongst children between 4-5 years olds followed and 3-4 year old (7.1%) and 1-2 year old (6.3%). The prevalence of stunting observed among 2-3 years old in this study was relatively lower (0.7%) while there was no record of stunting amongst under 12 months old. This is a great improvement compared with the trends observed by Okoroigwe and Okeke (2009) who had carried out a similar study amongst the same group in Anambra South.

The higher prevalence (6.3%) of stunting observed among 1-2 years olds in this study compared with 2-3 years old (0.7%) could be linked to poor weaning practices as well as to the long periods of the day that children within this age range who attend day care centers and nursery schools are kept away from their homes. Operators of this educational outfit may not be able to pay enough attention to the quality and timing of feeding that these children would have obtained if they were left in the care of their mothers during those hours that they are kept away from their various homes. Stunting is an indicator of chronic malnutrition. The trend is reversible if detected in the earlier ages, i.e., before 2 years of age. The detection of stunting amongst this age group (i.e., 1-2 years) is therefore significant because in Children over 2 years of age such chronic insufficient protein and energy intake that are associated with stunting may not be easily reversible (Cogill, 2003). The improved trend (i.e., a prevalence of 0.7%) observed in children within age group 2-3 years was probably due to the fact that children within this age range are better able to eat a greater quantity and more variety of adult food from the family pot compared with children in the previous age group. The prevalence of stunting amongst the older age ranges 3-4 years and 4-5 years which were respectively 7.1% and 12.0% by NCHS reference and 7.1% and 12.7% by WHO reference also points to the fact that less attention is being payed to the diets of children in these age range. This could probably be due to the fact that because these children are often wrongly assumed to be more capable of independent feeding than the children in the lower age ranges.

No incidence of stunting was observed amongst the age group 0-1 years in this study. This could be attributed to the improved feeding practices and gradual weaning process now

popularly advocated and practiced amongst most mothers for children within this age group. Many of the mothers practiced exclusive breast feeding at least up to six months and subsequently combine breast feeding with improved weaning formulae that have been largely introduced to women through primary health care programs. Examples of such improved weaning formulae are those introduced by Fashakin and Ogonsola (1987) and Akinrele and Edwards (1971) who respectively formulated nut-ogi (a mixture of corn gruel and peanut) and soya-ogi (a mixture of corn gruel plus soya bean). The collaborative research support program (CRSP) cowpea linkage protect at United Nations university also formulated cerebabe (corn cowpea) combination. Some of these combinations have been adopted by food processors and mothers and are available in Nigerian market (United Nations University, 2012)

Fashakin *et al.* (1986) also noted that a mixture of cowpea, melon, soya bean and ogi (pap made from corn, millet or guinea corn) was found to be superior to any single protein source in protein efficiency ratio, net protein retention, biological value and net protein utilization.

The higher prevalence of stunting observed amongst girls in the population studied suggests that more attention should be given to the nutrition of the girl child, especially as stunting in girls could have medical implications. It could lead to development of narrow pelvis (Stephen *et al.,* 2012).

Only 2.3% of children are expected to fall below the cut-off (i.e., below -2SD) from the median value of the WHO 2006 standard population (Stephen *et al.,* 2012). The result of this work showed that three times the expected prevalence of malnutrition existed in the study population. This value is however still classified as low in terms of severity. Although the severity of stunting (by prevalence ranges) in the study region could be classified as low (i.e., less than 20%), preventive measures should be taken to prevent further increase in the observed prevalence rate.

More attention should be given to training of rural mothers on weaning practices as well as feeding older children. Poor economic status of women in the community and other cultural factors may also have affected child nutrition in the area studied. In Uli town (one of the towns in the study area) it was noticed in the course of this study that much of the economic burden of feeding the children, paying their school fees as well as providing other needs for the child rested mainly on the women population. The women in rural communities constitute a greater percentage of the rural agricultural work force (UNIFEM, 1988). Reducing work load of women as well as social and financial responsibilities placed on them will enable them save more time and energy for tending to the children. (Aguillo*n,* 1983). Finally complementary breast feeding should continue into the second year and more attention should be given to the nutrition of the older child.

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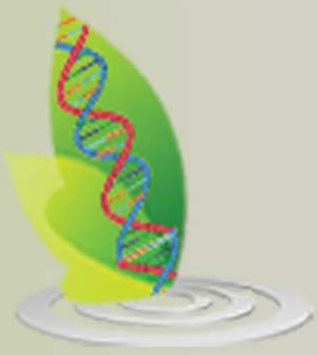

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