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Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

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Nutritional Status of Newly Enrolled Primary School Children in Jos-Plateau, Nigeria

Akor Francis[1], Okolo Seline[2] and Okolo Angela[3]
[1,2]Department of Paediatrics, Jos University Teaching Hospital, Jos-Plateau State, Nigeria
[3]Institute of Child Health, University of Benin Teaching Hospital, Benin City, Nigeria

Abstract: Nutritional assessment of newly enrolled school children is needful to identify children with poor nutritional status. Poor nutrition as evidenced by poor growth and small stature could affect development, intellectual performance and intellectual achievement. Poor nutrition in school aged children is also likely to negatively affect their participation in normal school activities. Seven hundred and sixty four apparently healthy newly enrolled pupils were randomly selected using a multi stage proportionate sampling from both public and private schools. Their weights and heights were measured using standard methods. Undernutrition was determined using Z scores less than - 2 standard deviations of the NCHS/WHO international reference standard. Pupils from private schools were significantly taller (118.2±6.52) than their public school counterparts (115.7±8.44), p = 001. The prevalence of underweight, stunting and wasting was 10.3, 11.1 and 2.4% respectively. Stunting occurred in a higher proportion of boys than girls. Poor nutritional status was significantly commoner in public school pupils compared with private school pupils. These findings suggest that malnutrition (underweight, wasting and stunting) is not uncommon among newly enrolled school children and it underscores the need for institution and sustenance of a food program among school children.

Key words: Nutritional status, school feeding, anthropometric measure, Jos

INTRODUCTION

The nutritional status of children is an important determinant of child health (Okolo *et al*., 2003). Its assessment in groups of children is necessary in monitoring the health of a community, planning and implementing programmes to reduce malnutrition associated morbidity and mortality (Rabasa *et al*., 1998; Osibogun, 1998). Until recently, the focus of nutritional status assessment has been in children considered more at risk of malnutrition. This group of children are under-five years of age and are generally referred to as pre-school children (World Food Programme, 2002). In the developing world (especially in Sub-Saharan Africa and South Asia) there is widespread undernutrition in this group of children with attendant high under-five mortality rates (WHO, 2005).

In Nigeria, the recommended age for school entry is six years (Federal Ministry of Information, 1981), which is just a year after the risk period of undernutrition. So, many children beginning school are survivors in an environment of very high under-five mortality rates resulting from both micro and macro-nutrition deficiencies and multiple infections that plagued them in early childhood (Oduntan, 1973). Late effects of poor nutrition such as poor growth and small stature have been associated with impaired development and poor intellectual performance (Abidoye *et al*., 1991; Pollitt *et al*., 1993). Also, a relationship between growth status with school performance and intellectual achievement has been documented (Martorell *et al*., 1992). The implication of this is poor nutrition in school aged children would most likely affect their learning and participation in normal school activities.

Primary school children form a sizeable proportion of our population (Federal Ministry of Health, 1991). So it is important to assess nutritional status of not only pre-school children but also school aged children especially at enrolment into primary school. At the point of school entry, simple anthropometric measurement (to determine their nutritional status) would help identify those with poor nutritional status. To the best of our knowledge, there is a paucity of information on nutritional status of school children at the point of school entry. A nutritional status assessment of these school children when they start school will help in detecting those with various forms of malnutrition or the late effects of malnutrition. Ideally every child should undergo routine medical examination while at school-first at school entry, midway through school and at completion of school (Akani and Nkanginieme, 1999). This can be carried out by teachers and school nurses through the school health programme. Those with malnutrition can be easily identified, evaluated and referred for appropriate treatment. Thus nutritional status assessment of school children, at the start of school, can serve as a screening tool to identify children who may need nutritional intervention and so prevent further

Corresponding Author: Akor Francis, Department of Paediatrics, Jos University Teaching Hospital, Jos-Plateau State, Nigeria

deterioration in their nutritional status and reducing the risk of poor performance in school.

This study was therefore designed to assess the nutritional status of new primary school children at the point of school entry in Jos, North Central Nigeria, in order to ascertain the burden of the problem in this locality.

MATERIALS AND METHODS

This was a descriptive cross-sectional study carried out in Jos North Local Government Area (LGA) of Plateau State, Nigeria between October 2002 and May 2003. There are twenty three public and forty six private primary schools in the town. Children from the lower social class usually attend the free government public schools and such schools are heavily populated. In contrast, children from the middle and upper social classes attend the fee paying private schools run either by religious bodies or private individuals and have a lower population density per class and per school compared to public schools. Ethical clearance was obtained from the ethical committee of the Jos University Teaching Hospital and permission was obtained from the Local Government Education Commission. Written informed and signed consent was obtained from the parents/guardians of children.

The subjects were newly enrolled primary school entrants who were apparently healthy asymptomatic children. During the academic year 2002/2003 8,380 children were newly enrolled in public schools in Jos North LGA and 3,872 children were in private schools giving a total of 12,242 newly enrolled pupils. A sample size of 764 was calculated using a standard formula (Oyejide, 1989). Through a multistage stratified randomization procedure and proportionate sampling, 519 pupils were selected from public schools and 245 pupils were selected from private schools.

The pupils had a complete physical examination in the morning and their anthropometric measurements taken. Height was measured using an ACCUSTAT™ ROSS stadiometer as described by Paynter and Parkin, 1991. The measurements were recorded to the nearest 0.1 cm. The weight of the pupils was measured after the height using a Weylux scale, which has an accuracy of 0.5 kg (Paynter and Parkin, 1991). The weight was measured to the nearest 0.1 kg. The measurement was done with pupils standing bare footed and with light underclothes only. The scale was periodically calibrated to ensure accuracy using standard weights.

Socio-economic status of the subjects was calculated using the socio-economic indices of the parents (fathers' occupation and mothers' level of education) as described by Olusanya *et al.* (1985). Father's occupation was scored 1 for professional, top civil servant, politician or businessman; 2 for middle level bureaucrat, technician, skilled artisan, well to do trader and scored 3 if an unskilled worker or income is below national minimum wage. Mother's educational status was scored as 0 if up to university level, 1 if up to secondary or tertiary level below university e.g college of education, school of nursing and 2 if no schooling. The total score of both parents gives the socioeconomic index of the child. Score of 1-2 is Upper social class, 3 is middle class and 4-5 is lower social class.

Percentile curves were constructed for the weight-for-age and height-for-age for subjects and compared with standard age and sex specific National Centre for Health Statistics (NCHS) growth charts, the international reference recommended by the World Health Organisation (WHO) then. The percentile curve for the NCHS were generated using the Cole's LMS method (Kuczmarski *et al.*, 2000).

Data analysis: Data obtained were analyzed using the EPI Info 2000 1.1.2a statistical software. Mean values and standard deviations expressed as means ± Standard Deviation (SD) of age, weight and height were calculated.

The student t test was used to compare means of variables while the chi-square was used to test for significance of association. P values <0.05 was considered significant.

RESULTS

A total of seven hundred and sixty four pupils (764) were studied, majority (68.1%) of whom attended public primary schools while 244 (31.9%) attended private primary schools. Three hundred and fifty six (356) were males while four hundred and eight (408) were females, giving a male to female ratio of 0.9:1. Majority (93%) of pupils in the public schools were from low socio-economic class while the private schools (95%) had pupils from the middle and high socio-economic class. Their ages ranged from 5 to 12 years with a mean age of 6.7±1.3 years. Although pupils from private schools were younger than those from public schools, the mean weight and height were greater in the former when compared with the latter and this was significantly so for height p = 0.0001 (Table 1). The mean age, weight and height measurements were not significantly different when compared by gender (p>0.05).

Table 1: Comparison of mean age, weight and height of newly enrolled private and public school pupils

Parameters	Private school	Public school	p-value
Age (years)			
Range	5-11	5-12	
Mean±SD	6.3±0.98	6.8±1.43	0.01
Weight (kg)			
Range	12-43	12-35	
Mean±SD	20.4±3.24	20.1±3.71	0.2
Height (cm)			
Range	99-145	95-142	
Mean±SD	118.2±6.52	115.7±8.44	0.001

Table 2: Prevalence of malnutrition of newly enrolled pupils

Nutritional indices	Z-scores	Type of school		Total
		Private	Public	
Underweight (W/A)	< - 2SD	14 (1.8)	65 (8.5)	79 (10.3)
Stunting (H/A)	< - 2SD	9 (1.2)	76 (9.9)	85 (11.1)
Wasting (W/H)	< - 2SD	8 (1.0)	10 (1.3)	18 (2.4)
Both stunting and wasting	< - 2SD	3 (0.4)	31 (4.1)	44 (5.8)

*Figures in parenthesis are percentages

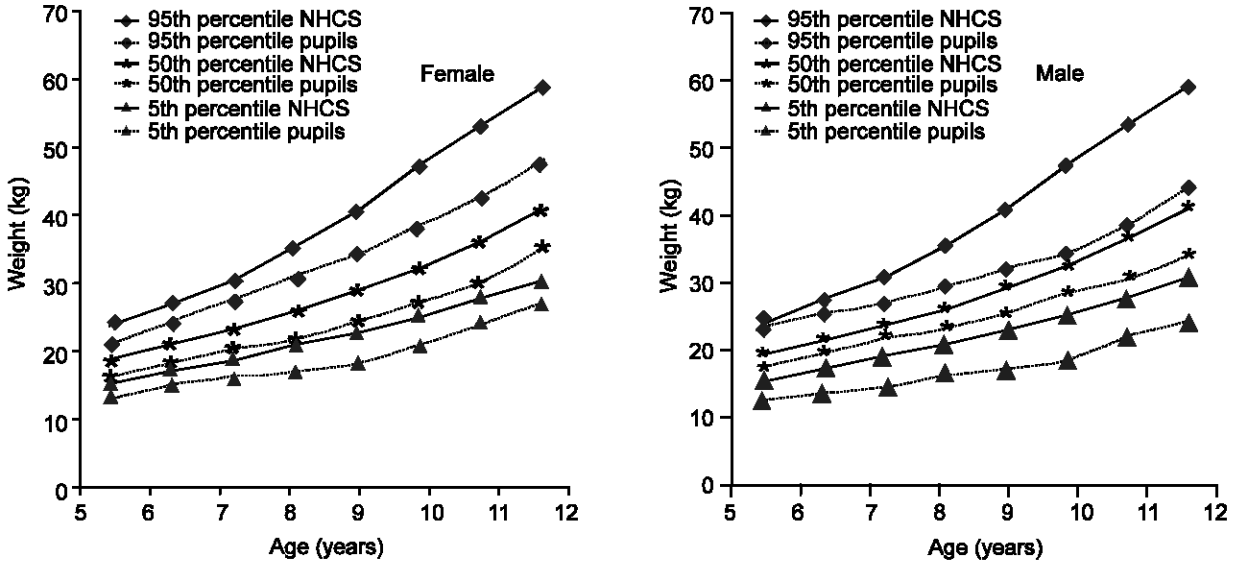

Fig. 1: Weight for age percentile curves of pupils compared to age and gender specific NCHS percentiles

The measured height and weight were used to assess the nutritional status of the pupils by using Z scores less than - 2 standard deviations below the mean weight for age (underweight), weight for height (wasting) and height for age (stunting) on the NCHS/WHO international reference standard. Prevalence of underweight, stunting and wasting was 10.3, 11.1 and 2.4% respectively (Table 2). On the whole nutritional indices were worse off in pupils from public schools, significantly so for underweight and stunting. A higher proportion (58%) of the stunted pupils was boys while there was no gender difference for underweight malnutrition. Stunting and wasting occurring together was recorded in 5.8% of the study population.

Weight and height percentile curves plotted for the study population and compared to age and sex specific NCHS reference standard, showed the study subjects had much lower values of all measurements (Fig. 1 and 2).

DISCUSSION

Our study assessed the nutritional status of apparently healthy newly enrolled primary school children in an urban Nigerian city. The mean age of new primary school entrants was 6.6 years with a wide range of 5 to 12 years. The mean age of the subjects is comparable to the recommended national policy and suggested age of school readiness (Federal Ministry of Information 1981 and Ikefuna and Iloeje, 2002). However the wide age range including older children of up to 12 years negates this recommendation. Although we did not search for reasons for late enrolment of the older children it may not be unconnected with previous undernutrition for example stunting, wasting and small size of child delaying start of school. Parents may deem shorter children to be younger and not physically large enough to attend school (Jukes *et al*., 2002). There is also the practice of late enrolment of house helps by more affluent families in our setting.

This study found that male subjects were heavier and taller than their female counterparts increasingly until 9 to 10 years when the trend changes with females being heavier and taller than males. This change in the trend could be explained by the pre-pubertal growth spurt that occurs earlier in females than males (Nkanginieme, 1999). The prevalence of underweight, stunting and wasting in these apparently healthy school children were low compared to the national rates of 27, 46 and 12% in under-five children (UNICEF, 2003) Recent reports from neighboring North Western state of Kaduna showed that less than 32% of children were severely stunted which

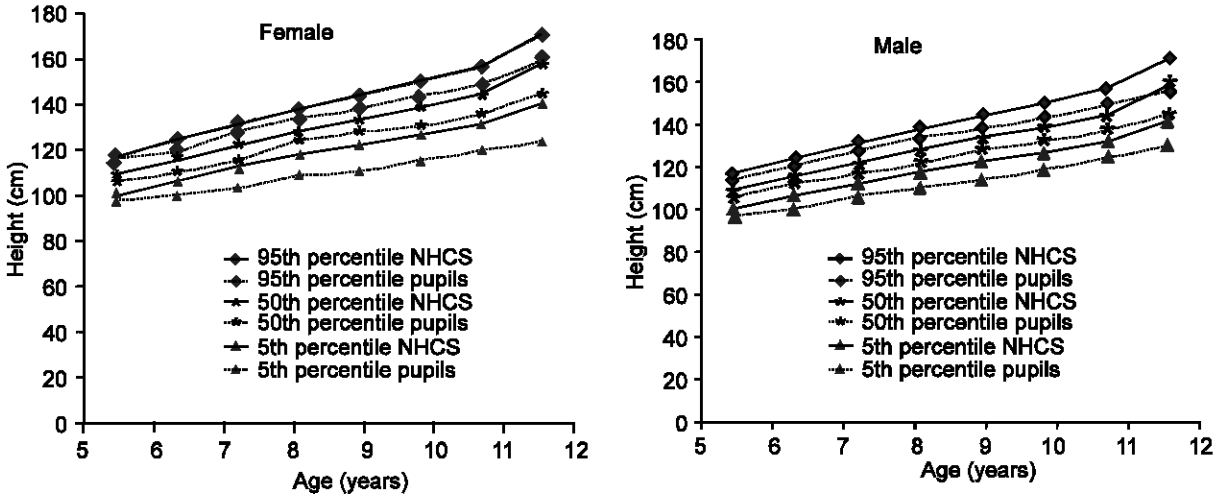

Fig. 2: Height for age percentile curves of pupils compared to age and gender specific NCHS percentiles

is lower than the national average (Matthew *et al*., 2009), although this was in younger children. Our study also had a lower prevalence probably because they were apparently healthy older children; however the pattern of stunting being the commonest form of poor nutrition and wasting the least is similar to the national pattern.

Stunting occurring more in male pupils is consistent with several studies of childhood malnutrition in sub-Saharan Africa. In a meta-analysis of 16 demographic and health surveys in this region it was shown that male children under five years of age are more likely to become stunted than female children (Wamani *et al*., 2007). There were two demographic and health surveys in Nigeria in 2003 and 2008 but these surveys are unable to capture the important issue of malnutrition among school going children as only under five years children are surveyed. Our study investigated children aged 5 to 12 years with majority in the 5-6 year old range. The fact that stunting which indicates past or chronic malnutrition was still prevalent in the study group would suggest that our school children are likely survivors of past malnutrition and so possibly suffering from the late effects of chronic malnutrition (Oduntan, 1973). The occurrence of both stunting and wasting in some of the school children indicates an on-going acute on chronic malnutrition process.

The most significant finding in this study was the occurrence of underweight and stunting in a higher proportion of public school pupils compared to private school pupils. Pupils from public schools had poorer socioeconomic background and individuals from this socioeconomic class are least nourished (Amuta and Houmsou, 2009). This also explains the rather low percentiles observed among the study population when their weight and height percentile curves were compared to corresponding age and sex specific percentiles of the NCHS reference population. The median values for 5^{th}, 50^{th}, 90^{th} and 3^{rd}, 50^{th}, 90^{th} percentiles weight for age and height for age respectively amongst the pupils were much inferior compared to the same age and gender of the corresponding NCHS reference values. The implication of this is that our study population was much lighter and shorter than the standard reference group. While our study population was generally a poor sub-Saharan population the latter was from a western developed country. Under nutrition is widespread among school children (particularly in South Asia and Africa) and their nutritional status often deteriorates during their school years (World Food Programme, 2002). This makes identification of this problem early, at the start of school, important. Remedial steps such as institutionalising school feeding at least once during school day in primary schools would be needful.

At the time of the study there was no government supported school feeding programme in the country but in 2005 a pilot school feeding programme was initiated by the then Nigerian president in a neighbouring state. This is yet to be widely implemented nationally.

Conclusion: This study shows that malnutrition is present even among apparently healthy school children and so is still a problem in school aged children in Nigeria. Since the nutritional status of school children has an impact their cognitive development and school performance it is suggested that school feeding programmes be established in primary schools and this should be fully supported by the government and private partners. This should be targeted especially at primary schools where the burden of the problem lies. In addition the school health programme should be revived and empowered to conduct regular medical examination including nutritional status assessment and improve

nutrition of school children by providing micronutrients and mass de-worming programs. This will help improve nutritional deficiencies and thus school performance in these primary school children.

REFERENCES

Abidoye, R.O., T.A. George and C.O. Akitoye, 1991. Effect of nutritional status on intellectual performance of Nigerian children. Early Child Dev. Care, 65: 87-94.

Akani, N.A. and K.E.O. Nkanginieme, 1999. The School Health Programme. Paediatrics and Child Health in A Tropical Region, Azubuike, J.C. and K.E.O. Nkanginieme (Eds.). African Educational Publishers Ltd., Owerri, pp: 510-521.

Amuta, E.U. and R.S. Houmsou, 2009. Assessment of nutritional status of school children in Makurdi, Benue State. Pak. J. Nutr., 8: 691-694.

Federal Ministry of Health, 1991. Expanded programme on immunisation: The national coverage survey Nigeria. Preliminary Report. Lagos: Federal Ministry of Health.

Federal Republic of Nigeria, 1981. New policy on education. Federal Ministry of Information, Lagos Printing Division.

Ikefuna, A.N. and S.O. Iloeje, 2002. Evaluation of school readiness among nursery school children in Enugu. Nig. J. Paediatr., 29: 34-39.

Jukes, M., J. McGuire, F. Method and R. Sternberg, 2002. Nutrition and Education. Nutrition: A Foundation for Development. ACC/SCN, Geneva.

Kuczmarski, R.J., C.L. Ogden, L.M. Grummer-Strawn, K.M. Flegal and S.S. Guo, 2000. CDC growth charts: United States. 314: 1-27.

Martorell, R., J.A. Rivera, H. Kaplowitz and E. Pollit, 1992. Long-term Consequences of Growth Retardation During Early Childhood. Human Growth: Basic and Clinical Aspects, Hernandez, M. and Argente J. (Eds.), Elsevier Science Publishers. Amsterdam, The Netherlands, pp: 143-149.

Matthew, A.K., A.D. Amodu, I. Sani and S.D. Solomon, 2009. Infant feeding practices and nutritional status of children in North Western Nigeria. Asian J. Clin. Nutr., 1: 12-22.

Nkanginieme, K.E.O., 1999. Growth and Development. Paediatrics and Child Health in a Tropical Region, Azubuike, J.C. and K.E.O. Nkanginieme (Eds.), African Educational Publishers Ltd., Owerri, pp: 456-474.

Oduntan, S.O., 1973. Medical care for the Nigerian school child. Nig. Med. J., 3: 116-119.

Okolo, S.N., O.A. Adeleke, G.A. Chukwu, N.H. Egbuaba, A. Hassan and C. Onwuanaku, 2003. Immunization and nutritional status survey of children in selected rural communities of Sokoto state. Nig. J. Paediatr., 30: 123-127.

Olusanya, O., E. Okpere and M. Ezimokhai, 1985. The importance of social class in fertility control in a developing country. West Afr. J. Med., 4: 205-212.

Osibogun, A., 1998. A Handbook of Public Health Nutrition for Developing Countries. Akin Osibogun consultants, Lagos, pp: 48-65.

Oyejide, O.C., 1989. Sample Size Determination. Health Research Methods for Developing Country Scientists, Oyejide, O.C. (Ed.). Codat Publications, Ibadan, pp: 56-63.

Paynter, A.S. and M. Parkin, 1991. Growth in Childhood. Diseases of Children in the Tropics and Subtropics, P. Stanfield and M. Brueton (Eds.). Hodder and Stoughton, London, pp: 255-270.

Pollitt, E., K.S. Gorman, P.L. Engle, R. Martorell and J. Rivera, 1993. Early supplementary feeding and cognition: Effects over two decades. Monogr. Soc. Res. Child Dev., 58: 1-99.

Rabasa, A.I., B.A. Omatara and M.K.O. Padomu, 1998. Assessment of nutritional status of children in a Sub-Saharan rural community with reference to anthropometry. Sahel Med. J., 1: 15-18.

UNICEF, 2003. The state of the world's children 2003. http://www.unicef.org/sowc03/tables/table2. html.

Wamani, H., A. Nordrehaug Astrom, S. Peterson, J.K. Tumwine and T. Tylleskar, 2007. Boys are more stunted than girls in Sub-saharan Africa: A meta-analysis of 16 demographic and health surveys. BMC Pediatr., 7: 17.

World Food Programme, 2002. Food security for human resources development or why nutrition is important for human capital. ECOSOC High-Level Segment 2002, Ministerial Roundtable Breakfast on Food Security for Human Resources Development, 2 July 2002. http://www.un.org/Docs/ecosoc/meetings/hl 2002/WFP.pdf.

WHO, 2005. The World Health Report 2005: Make every mother and child count, World Health Organization. http://www.who.int/whr/2005/en/index.html.