PJN
ISSN 1680-5194

# PAKISTAN JOURNAL OF NUTRITION

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Pakistan Journal of Nutrition 11 (11): 1092-1095, 2012
ISSN 1680-5194
© Asian Network for Scientific Information, 2012

# Prevalence and Determinants of Malnutrition among Pre-School Children in Northern Nigeria

Alhaji A. Aliyu[1], Olugbenga O. Oguntunde[1], Tukur Dahiru[1] and Tajudeen Raji[2]
[1]Department of Community Medicine, [2]Department of Paediatrics,
Ahmadu Bello University, Zaria, Nigeria

**Abstract:** Nutritional assessment in the community is an essential public health tool. The aim of the study was to obtain baseline assessment of nutritional indices of pre-school children in a typical rural Northern Nigerian community in order to estimate the prevalence and determinants of malnutrition. A cross-sectional survey was conducted among children (2-5 years) using structured, interviewer administered questionnaire to collect data from mothers/primary care givers. Data was collected on socio-demographic variables, anthropometric indices and environmental sanitation. A total of 294 children out of 300 aged 2-5 years were studied, both sexes were equal. Mean age was 42.2±12.6 months; overall mean weight and mean height were respectively 13.9±3.0 kg and 91.6±9.6 cm. Generally females had a mean weight and height that was significantly higher than that of males. In this study, 44.9%, 15.6% and 3.7% were respectively stunted, underweight and wasted. 54% of mothers had primary education and were full time housewives. Sources of drinking water were from river and unprotected well, 98% of HHs dispose off their refuse by open dumping. The high prevalence of malnutrition revealed in this study calls for a sustained public health programme to control this menace. There is need for nutrition education to mothers on infant feeding, weaning practices and improved sanitation. Therefore prevention of malnutrition should be given high priority in the implementation of primary health care programmes especially in rural communities.

**Key words:** Anthropometric indices, pre-school children, determinants, Northern Nigeria

## INTRODUCTION

Malnutrition in all its forms amounts to an intolerable burden not only on the health systems, but the entire socio-cultural and economic fabric of the society and is the greatest obstacle to the fulfillment of human potentials. Child malnutrition is a huge public health problem in Africa that is not properly given the priority that it deserves.

Malnutrition is largely a preventable and treatable cause of childhood morbidity and mortality that can be dealt with for less than USD 20 per child per year (Chiabi *et al*., 2008). According to WHO malnutrition accounts for 6.6 million out of 12.2 million deaths among children under 5 (54% of child mortality) in developing countries. In Nigeria and elsewhere about 35.7% and 47.5% of children under 5 years of age are moderately to severely undernourished respectively (Solomon, 1985; Roy *et al*., 2007). It is known that almost any illness will impair a child's growth, however in practice in developing countries, growth deficits are caused by interplay of two preventable factors: inadequate food and infections.

Infections influence body size and growth through their effects on metabolism and nutrition. Additionally, UNICEF conceptual framework also recognizes poor caring practices as equally important cause of malnutrition (UNICEF, 1990). Environmental factors have a profound effect on health and can make nutritional problems worse. A child who is well fed but drinks contaminated water and lives in polluted environment will not grow up healthy (UN, 2004). Studies have shown the association between increasing severity of anthropometric deficits and mortality and substantial contributions are made by all degrees of malnutrition to child mortality (Pelletier *et al*., 1993; Schroeder and Brown, 1994; Pelletier *et al*., 1995; Mendez and Adair, 1999; de Onis *et al*., 2000). Strong evidence exists that poor growth is associated with delayed mental development and that there is a relationship between impaired growth status and both poor school performance and reduced intellectual performance, thus compromising the efforts to achieve universal education (MDG-1) (Martorell *et al*., 1992; PAHO, 1998; UN, 2004; Cesar *et al*., 2008). Nutritional status is the best global indicator of growth and well-being in children. Anthropometric assessment thus remains the most practically useful means of evaluating the health and nutritional status of children, just as it provides an indirect measurement of the quality of life of an entire population. Thus the objective of this study was to determine the nutritional status of pre-school children in a rural community of Kaura Local Government (District) of Kaduna state, Northern Nigeria. This is with a view to increase awareness of the magnitude of all forms of

**Corresponding Author:** Alhaji A. Aliyu, Department of Community Medicine, Ahmadu Bello University, Zaria, Nigeria

malnutrition so as to mobilize both human and financial resources to prevent the problem.

## MATERIALS AND METHODS

**Study area:** The study location was Kaura Local Government Area (LGA)/ District in the southern part of Kaduna State Nigeria; approximately 100km from the state capital, Kaduna. The study took place before the (2008) farming season; a time when families have virtually ran out of foodstuffs and preparing to go to the farms. The major ethnic groups that made up the study population are Attaker, Kagoro, Kataf and Fulani. The population of the area is 3.7% of Kaduna state and 0.16% of Nigeria respectively (NPC, 2007). Majority (80%) of the community are subsistence farmers, their main crops consists of guinea corn, millet, rice, cassava, potatoes and few seasonal fruits (carrots). Most people in the study area live in typical African extended family compounds and either owns their land or share family land.

This was a cross-sectional survey, which consisted of both questionnaire and anthropometric components, was conducted in Kaura LGA/District. The researchers surveyed 300 Households (HHs) that were randomly selected from the study area. Children aged 2-5 years were identified from each HH and the biological mother/ guardian/caregiver of each child was recruited into the study. Consent for the study was obtained from the ethical committee of the Hospital and verbal informed consent was obtained from each of the heads of household and the mothers. The questionnaires were administered by the researchers and 3 Research Assistants (RAs). The RAs were trained on how to measure the heights and weights of the children using the CDC recommendations for anthropometric measurement (HRSA, 2002). Weights were measured using a UNICEF solar weighing scale (Seca) to the nearest 0.1 kg. Length (cm) was measured with a UNICEF gauge in supine position (Height wall chart). The Mid-Upper Arm Circumference (MUAC) was measured to the nearest 0.1 cm with a normal non-stretch tape (the mid upper arm point is ½ the distance between the tip of the shoulder blade and the tip of the elbow.) These measurements were done with the children undressed and without shoes. The indices studied were: height (cm), weight (kg), Weight-for-Age z Scores (WAZ), Height-for-Age Z scores (HAZ), Weight for Height Z scores (WHZ) and Mid-Upper Arm Circumference (MUAC). According to the World Health Organization (WHO) children with Z score less than-2 are malnourished (stunted, wasted or underweight) (Fig. 1). A standard MUAC measure of <12.5 cm denotes severe malnutrition.

Data was analyzed using Epi-info 15 software and z score calculated from WHO references (National Center for Health Statistics/Centre for Disease Control/World Health Organization reference population, 2008).

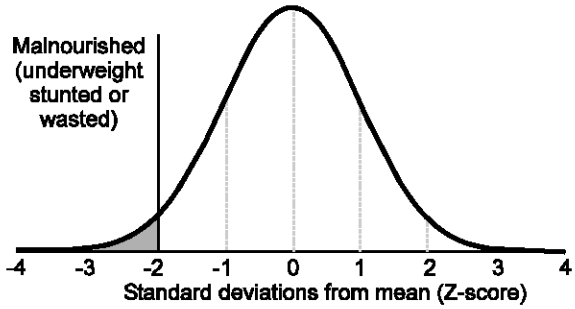


Fig. 1: WHO/CDC/NCHS international reference population, normal dirstribution

Table 1: Age distribution of children, mean weight, SD and mean Z score

| Age (months) | N | Mean wt (kg) | SD | Mean Z score |
|---|---|---|---|---|
| 13-24 | 36 | 11.1 | 1.5 | - 0.96 |
| 25-36 | 83 | 12.3 | 2.6 | - 0.05 |
| 37-48 | 75 | 14.1 | 2.6 | - 0.05 |
| 49-60 | 100 | 16.2 | 2.3 | 0.08 |

Mean age (X) = 42.2 ± 12.6 months

Table 2: Age distribution of children, mean height, SD and mean Z score

| Age (months) | N | Mean Ht (cm) | SD | Mean Z score |
|---|---|---|---|---|
| 13-24 | 36 | 81.50 | 4.8 | - 1.10 |
| 25-36 | 83 | 85.60 | 6.3 | - 0.66 |
| 37-48 | 75 | 93.00 | 7.3 | 0.11 |
| 49-60 | 100 | 100.3 | 7.3 | 0.86 |

## RESULTS AND DISCUSSION

A total of 294 children out of 300 aged 2-5 years were studied giving a response rate of 98%. Sex distribution of children was equal and their ages ranged from 13-60 months, with a mean age of 42.2±12.6 months (Table 1). The weight observed ranged from 7.0-21.0 kg with a mean weight of 13.9±3.0 kg. The weight range for males was 7.0-21.0 kg with a mean weight of 13.9±2.9 kg, while that for females was 8.0-21.0 kg with a mean of 13.9±3.0 kg. The overall height ranged from 70.0-116.0 cm with a mean of 91.9±9.6 cm (Table 2). The height range for males was 70.0-115.0 cm with a mean of 91.9±9.6 cm, while that for females was 74.0-116.0 cm with a mean of 92.5±9.7 cm. Generally, females had a mean weight and height that was significantly higher than that of males.

The value of 2SD below the NCHS median height and weight for age is typically used as cut-off point for malnutrition. For the purpose of descriptive analysis children are classified as stunted, underweight and wasted if HAZ, WAZ and WHZ scores are below this value. In this study, 44.9% of children were stunted, 15.6% underweight, while 3.7% were wasted respectively. The high prevalence of malnutrition reported in this study (44.9% stunted, 15.6% underweight and 3.7% for wasting) is similar with values reported from other studies in Nigeria and across sub-

Table 3: Socio-demographic characteristics of mother and care givers

| Age (yrs) | Freq (n = 294) | % |
|---|---|---|
| 15-20 | 4 | 1.3 |
| 21-24 | 52 | 17.7 |
| 25-29 | 88 | 29.9 |
| 30-34 | 66 | 22.5 |
| 35-39 | 55 | 18.7 |
| 40-44 | 25 | 8.5 |
| 45-49 | 4 | 1.3 |
| **Level of education** | | |
| None | 15 | 5.1 |
| Quranic | 10 | 3.4 |
| Primary | 159 | 54.1 |
| Secondary | 104 | 35.4 |
| Tertiary | 6 | 2.0 |
| **Source of income** | | |
| House wives | 219 | 74.2 |
| Petty traders | 70 | 23.8 |
| Civil servants | 3 | 1.0 |
| Others (e.g Tailoring) | 2 | 0.7 |

Saharan Africa (Dare, 2001; Emily Bloss *et al*., 2004; Cesar *et al*., 2008). However, this is much lower than 46% stunted, 38% underweight and 11% wasted respectively reported from Ethiopia (Sylvie Chamois, 2006). Though there are zonal and urban/rural variations across the country, these high rates are quite worrisome, since Nigeria in the last 2 decades had promoted lots of child survival strategies that were expected to result in significant improvement in child health and development. The high prevalence of malnutrition observed could be attributed to a number of factors. In the absence of man-made disasters, climate change can affect crop yields and household food security, economic recession presently experienced in the country resulting in sharp accentuation of poverty level and food price crises. Indeed a recent report revealed that Nigeria and Vietnam both have weak nutrition focus, despite strong nutrition governance, which possibly might be due to a dysfunctional linkage between the work related to poverty reduction, national development and nutrition (Kaia Engesveen *et al*., 2009). This study showed that the pattern of malnutrition (stunting, wasting and underweight) is more in males than in females; this is consistent with other studies (NDHS, 2003). This might be due possibly to the fact that boys being very active rarely stay at home, running around in neighbourhood. So girls who are always at home with their mothers get more attention and whatever small feeds that their mothers had. It has been argued that women's educational and social status, national per capital food availability and access to safe water are key determinants of nutritional status in children (de Onis *et al*., 2000).

Characteristics of mothers/caregivers revealed that most (53.4%) were in the age range of 25-34 years, 54.1% had at least primary education and 74.2% were full time housewives, (not on any paid employment) (Table 3). Majority of households (42.9%) source of drinking water was from a river and traditional (unprotected) well 24.8%, while the method of refuse disposal is by open dumping 98.0%. In this study, most of the stunted (52.3%), underweight (63.0%) and wasted (63.6%) children respectively belonged to mothers with primary education. This is consistent with earlier reports that the level of malnutrition is related to maternal educational status (NDHS, 2003; Sibetchea *et al*., 2005).

There was statistical significant relationship between food security and stunting ($X^2 = 6.43$, df = 1, p = 0.05), as 50.9% of children were from families that do not have enough food round the year. Several studies have observed strong association between family size and malnutrition (Gorstein *et al*., 1994; Rabasa *et al*., 1996; Hamidu *et al*., 2003; Kabir *et al*., 2003; de Onis *et al*., 2000). The findings of this study are congruent with this statement. Large family size most often is associated with low socio-economic status, so the little resources available to the Households (HHs) are barely adequate to cater for every member (including children) of the family.

**Study limitations:** The study tried to highlight silent factors associated with malnutrition in a typical rural community that is likely to be applicable to most of the developing world. There are many limitations; this was a cross-sectional study so it was difficult to study any potential temporal relationships. Like similar studies in tropical areas, this study was affected by seasonal variations and varying availability of food (Parry, 1984) The study was conducted just before the farming season, a period when most families are preparing to go to the farms. We did not look into the effects of childhood infectious diseases (Malaria, measles etc) and their impacts on nutritional status of pre-school children, thus these must be kept in mind when interpreting the data. Also data on confounding variables were not collected, so as not to "complicate" issues in the process of interpreting results. Parasitic infestations (Hookworm, Ascaris) are quite common among children in Africa and can affect the nutritional growth of children by interfering and impairing intestinal luminal absorption of nutrients.

**Conclusion:** The causes of malnutrition are known, the knowledge and strategies to combat it are also available, so efforts to reduce and hopefully eliminate malnutrition should be based on successful nutrition programmes. The best approach should involve the local community in the identification of the problems and the measures (community-based nutrition projects, nutritional training) taken to tackle them. Furthermore, mothers need to be educated on healthy feeding practices and efforts made to improve their situation as primary child carers with particular reference to their own health and economic status through government poverty alleviation initiatives.

## REFERENCES


Cesar Victora, G., Linda Adair, Caroline Fall, C. Pedro Hallal, Reynaldo Martonell, Linda Richter and Harshpal Singh Sachdev, 2008. Maternal and child undernutrition: Consequences of adult health and human capital. Lancet, 371: 340-357.

Chiabi, A., P.F. Tchokoteu, V. Takou and F. Tchovine, 2008. Anthropometric measurements of children attending a vaccination clinic in Yaounde, Cameroon. Afr. Health Sci., 8: 174-179.

Dare, O., 2001. Survival rights. In Anthony Hodges (Ed). Children and Women's Right in Nigeria: A wake-up call; Situation Assessment and Analysis 2001. Abuja, Nigeria.

de Onis, M., E.A. Frongillo and M. Blossner, 2000. Is Malnutrition declining? An analysis of changes in levels of child malnutrition since 1980. Bull. World Health Organiz., 78: 1222-1233.

Emily Bloss, Fidelis Waina ina and C. Robert Bailey, 2004. Prevalence and predictors of underweight, stunting and wasting among children aged 5 and under in Western Kenya. J. Trop. Paediatrics, 50: 260-270.

Gorstein, J., K. Sullivan, R. Yip, M. de Onis, F. Trowbridge, P. Fajans and G. Clugston, 1994. Issues in the assessment of nutritional status using anthropometry. Bull. World Health Organiz., 72: 273-283.

Hamidu, J.L., H.A. Salami, A.U. Ekanem and L. Hamman, 2003. Prevalence of protein energy malnutrition in Maiduguri Nigeria. Afr. J. Biomed. Res., 6: 123-127.

HRSA, 2002. Growth charts Training modules. Maternal and child Health Bureau, Available at http://depts. washington.edu/growth/cited at 27/04/09.

Kabir, M., Z. Ilyasu, I.S. Abubakar and U. Also, 2003. Factors associated with nutritional status of pre-school children in Danmaliki village. Kano state, Northern Nigeria. J. Primary Care Community Health, 15: 30-33.

Kaia Engesveen, Chizuru Nishida and Claudine Prudhon, 2009. Roger Shrimpton. Assessing countries' commitment to accelerate nutrition action demonstrated in PRSPs, UNDAFs and through nutrition governance. SCN NEWS, pp: 10-16.

Martorell, R., D.G. Schroeder, J.A. Rivera, M.T. Ruel and J.P. Habicht, 1992. Long term consequences of growth retardation during early childhood. In: Hernandez M, Argente J, eds. Human growth: basic and clinical aspects. Amsterdam, Elsevier Science Publishers, 1992: 143-149.

Mendez, M.A. and L.S. Adair, 1999. Severity and timing of stunting in the first two years of life affect performance on cognitive tests in late childhood. J. Nutr., 129: 1555-1562.

National Population Commission, Abuja, Nigeria. Nigeria Census Report, 2007.

National, Population Commission and ORC Macro, 2004. Nigeria Demographic and Health Survey (NDHS) 2003 Calverton, Maryland: National Population Commission and Macro., pp: 152-166.

Nutrition, Health and Child Development, 1998. Washington, DC, Pan American Health Organization, (PAHO Scientific Publication No 566).

Oninla, S.O., J.A. Owa, A.A. Onayade and O. Taiwo, 2006. Comparative study of nutritional status of urban and rural Nigerian school children. J. Trop. Paediatrics, 53: 39-43.

Parry, E.H.O., 1984. Effects of season on health and disease. In Parry EHO (Ed). Principle of Medicine in Africa. Britain, Butler and Tanner Ltd., pp: 14-19.

Pelletier, D., E.A. Frongillo and J.P. Habicht, 1993. Epidemiologic evidence for a potentiating effect of malnutrition on child mortality. Am. J. Publ. Health, 83: 1130-1133.

Pelletier, D.L., E.A. Frongillo, Jr., D.G. Schroeder and J.P. Habicht, 1995. The effects of malnutrition on child mortality in developing countries. Bulletin of the World Health Organization, 73: 443-448.

Rabasa, A.I., B.A. Omotara and M.K.O. Padonu, 1996. Assessment of nutritional status of children in a sub-Saharan rural community with reference to anthropometry. Sahel Med. J., 1: 15-18.

Roy, S.K., S.P. Jolly, S. Shafique, G.J. Fuchs, Z. Mahmud, Chakraborty Barnali and Roy Suchismita, 2007. Prevention of malnutrition among young children in rural Bangladesh by a food-health-care educational intervention: A randomized controlled trial. Food and Nutr. Bull., 28: 375-383.

Schroeder, D.G. and K.H. Brown, 1994. Nutritional status as a predictor of child survival: Summarizing the association and quantifying its global impact. Bull. World Health Organiz., 72: 569-579.

Sylvie Chamois, 2006. Ethiopia experience in the management of severe acute malnutrition (2003-2005) SCN News. Dev. Int. Nutr., 33: 45-48.

Sibetchea, D., M.A. Fomo, P.R. Libite and E. Jazet, 2005. Allaitement Maternel, et et nutritionnel des enfants et des femmes. In: Enquete Demographique et de Sante du Cameroon 2004 (EDSC111), Calverton, Maryland, USA: INS et ORC Macro 2, June 2005, pp: 179-207.

Solomon, N.W., 1985. Rehabilitating the severely malnourished infant and children. J. Am. Diabetic Assoc., 1: 28-29.

UNICEF, 1990. Strategy for improved nutrition of children and women in developing countries. A UNICEF Policy Review. New York. UNICEF.

UN, Standing Committee on Nutrition, 2004. Nutrition and the Millennium Development Goals. July, 28: 9-10.

World Health Organization Child Growth Standards, 2008. Available at www.who.int/nut/publications cited 15/01/009.