Centrepoint Journal (Science Edition)
Volume 20, No. 1, pages 34 - 44
http://www.unilorin.edu.ng/centrepoint

2141-3819/2014 $5.00 + 0.00
© 2014 University of Ilorin

CPJ 2014002/20104

Prevalence of Malnutrition among Under-Five Children in Kazaure Local Government Area of Jigawa State Nigeria

O. Soji-Omoniwa[1*] and B. P. Omoniwa[2]

[1]*Nutritional Epidemiology Division, Department of Biochemistry, Faculty of Natural and Applied Sciences, Plateau State University, Bokkos, Nigeria*
[2]*Ethnopharmacology/Toxicology Laboratory, Department of Science Laboratory Technology, University of Jos, Nigeria*

Address: Nutritional Epidemiology division, Department of Biochemistry, Faculty of Natural and Applied Sciences, Plateau State University, Nigeria.
E-Mail: adejillian234@yahoo.com
Telephone: +2347034205898

Abstract

This study was conducted to determine the prevalence of malnutrition among under-five children in Kazaure Local Government Area of Jigawa State, Nigeria. The design of the study was a descriptive cross sectional survey and the sampling procedure was a multi-stage cluster sampling using the EPI method. Thirty (30) clusters were selected randomly from the list of all the villages by assigning probability proportional to population size (PPS), using Emergency Nutrition Assessment (ENA) Delta software. The second stage was selection of households and finally, selection of at least 20 children aged 6-59 months within each cluster. Variables such as age, sex, weight and height were collected for each child included in the survey on standardized questionnaire. The result showed that the overall prevalence of Severe Acute Malnutrition (SAM) from the study was 1.7% (0.9-3.1 95%CI). Two cases of oedema were found during the survey, while Global Acute Malnutrition (GAM) was 10.2% (7.8-13.3 95% CI) and 59.2% (42.2-57.4 95% CI) for stunting. It is concluded that chronic malnutrition is endemic in the study area based on the high prevalence of stunting found, hence intervention study should be targeted at preventing acute malnutrition in the study area.

Keywords: *Prevalence; malnutrition, Under-five; Kazaure, Nigeria*

Introduction

In spite of global efforts at achieving adequate nutrition, malnutrition remains a significant contributor to morbidity and mortality among children worldwide. The World Health Organization estimated that malnutrition was associated with over 50% of all childhood deaths in developing countries [1, 2]. About 230 million under-five children are believed to be chronically malnourished in developing countries [3]. In Sub-Saharan Africa, 41% of under-five children are malnourished and deaths from malnutrition are increasing on a daily basis in the region [4].

The 2008 National Demographic Health Survey revealed that the percentage of children in Nigeria who were stunted, wasted and underweight were 41%, 14%, and 23% respectively [5]. Studies also showed that the high under-5 mortality rate in Nigeria of 191/1000 may also have underlying malnutrition as one of the important factors influencing the outcome of diseases [6]. In 2012, the report of the summary of findings of cross sectional surveys in Northern Nigeria showed that the prevalence of severe acute malnutrition ranged from 0.6% in Katsina to 3.1% in Yobe states, Global acute malnutrition ranged from 6.4 to 14.5 percent and over 40 percent of children under-five were suffering from stunting across northern Nigeria [7].

Malnutrition is insufficient, excessive or imbalanced consumption of dietary energy and nutrients. It manifests in different forms, such as under nutrition, over nutrition and micronutrients malnutrition [8]. It is a health outcome as well as a risk factor for disease and exacerbated malnutrition and it can increase the risk of morbidity and mortality. Malnutrition in early childhood is associated with functional impairment in adult life as malnourished children are physically and intellectually less productive when they become adults [8]. Children that are malnourished tend to have increased risk of morbidity and mortality and often suffer delayed mental development, poor school performances and reduced intellectual achievement. Malnutrition remains a public health problem in most developing countries [9].

Growth assessment is the single measurement that best defines the health and nutritional status of a child because disturbances in health and nutrition, regardless of their etiology, invariably affect child growth. There is ample evidence that the growth (height and weight) of well-fed, healthy children from different ethnic backgrounds and different continents is remarkably similar, at least up to six years of age [10]. Based on this finding, WHO has been recommending that a single international reference population be used worldwide, with common indicators and cut-offs, and that standard methods be used to analyse child growth data [11],[12]. Moreover, growth assessment is universally applicable: it does not pose any cultural problems; measuring equipment is easy to transport, the tools are simple and robust and can be set up

in any environment; users require little training, and the procedure is inexpensive and non-invasive [12]

The Northeastern state of Jigawa is one of the poorest states in Nigeria. Most poor households there are highly vulnerable to food insecurity even as a result of small shocks, due to chronic poverty rooted in historically low wages, limited opportunities for local employment, and frequent production shortages. The objective of this study is to determine the prevalence of malnutrition among children aged 6 to 59 months in Kazaure LGA of Jigawa state, Nigeria.

Materials and Methods

Study Area and Population

This study was conducted in Kazaure Local Government Area of Jigawa State (LGA), Nigeria. The LGA is one of the 27 LGAs in the state and it is composed of 11 political wards. The projected population figure according to the 2006 National census was 185,676, with growth rate of 0.3% [13, 14]. The LGA is predominantly Hausa and Fulani ethnic groups. The major economic activity there is agriculture, with over 80% of the population engaging in subsistence farming and animal husbandry. Located to the west of Jigawa State is Kano State and Katsina State, to the east is Bauchi State and to the North is Yobe State and the Republic of Niger [14]. The study populations were children aged between 6 to 59 months old living in Kazaure LGA of Jigawa State. Children below 6 months and above 59 months were excluded from the survey.

Research Design, Selection of Respondents and Data Collection

The design of this study was a descriptive cross sectional survey and the sampling procedure was a multi-stage cluster sampling using the EPI method [15]. The first stage was the selection of clusters in the study area. Thirty (30) clusters were selected randomly from the list of all the villages in the 11 wards of the LGA by assigning probability proportional to population size (PPS), using Emergency Nutrition Assessment (ENA) Delta software. The second stage was selection of households using EPI method and finally, selection of at least 20 children aged 6-59 months within each cluster. In a selected household, if the family is composed of one husband and several wives with their respective children, one of the wives with her children was selected. Sample size was calculated by ENA Delta software based on estimated prevalence of 15% of global acute malnutrition, a precision of ± 5% and a design effect of 2. The resulting sample size was 427 children based on 18% of children under five years for an expected average of 5 members per household.

Variables such as age, sex, weight and height were collected for each child included in the survey on standardized questionnaire after obtaining consent from the village heads and household heads to participate in the study. The age in months was estimated from child birth date by interviewing the mother or an

adult member of the household. A local events calendar was also designed to help in the correct estimation of the age. The vaccination card reporting the child birth date was also used when available. The Height was measured with a wooden measuring board (Shorr®) and reported with a precision of 1 mm. Children of 85 cm or more were measured in the upright position. While children less than 85 cm had their length measured in the lying down position. The Weight was measured with a hanging scale (Salter®) and reported with a precision of 100g. Children were weighed undressed. All scales were checked for accuracy with a 5 kg standard weight each morning before departure. Zero was examined before each measurement.

Data Processing and Analysis

Data entry and anthropometric analysis were performed by using ENA Delta software (version 2010) and the result based on WHO (2006) growth standards. Outlier values were excluded with SMART flags if they did not fit the normalized curve of growth, both weight for height and height for age, for the survey population.

Training and supervision

Research assistants were recruited and trained by the principal researcher during this study. Six teams, comprising of two measurers and one team leader, were recruited. All team members attended a three-day training on principles, methodology, anthropometric measurements and data collection for the survey. The training included a pilot survey in a village to test the questionnaires, observe measurements being taken and address possible questions. A surveyor's guide was given to all participants to help survey teams to manage their work on the field. During the survey, each team was closely supervised.

Results and Discussion

Description of the Sample and Data Quality

The overall data quality of this study according to the summary of plausibility check was excellent with overall score of 4 %. The nutrition status results of children 6 to 59 months of age were analysed using the WHO growth reference standards of 2006. Flagged data which indicates outliers due to incorrect measurements was excluded from the analysis. According to Weight-for-Height Z scores (WHZ), Global acute malnutrition (GAM) is <-2SD and severe acute malnutrition (SAM) is <-3 SD. Estimate of global and severe acute malnutrition included bilateral oedema cases.

A total of 605 boys and girls had their anthropometric parameters measured in this survey. However the weight of two children could not be measured because the mother refused to weigh her child but other variables were measured. Hence, the data was not included for Weight for Height analysis. The height of 1 child

could not be measured as well due to physical disability. Three (3) Z-scores values were not available and 6 were out of range according to SMART flags, hence, were excluded for analysis (Table 2). Thirty-four households were absent as at the time of data collection and 23 households refused to participate. These households were replaced for the survey. Four children were missing. The overall boy to girl ratio of the sample was 1.1.

Table1: Plausibility Check for Kazaure Nutrition Survey: Overall Data Quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	0 (0.7 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	0 (p=0.387)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	4 (p=0.021)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	0 (5)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	0 (5)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	0 (1.02)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	0 (-0.10)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	0 (-0.03)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	0 (p=0.417)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	4 %

The overall score of this survey was 4 %, this is excellent.
Standard/Reference used for z-score calculation: WHO standards 2006
(If it is not mentioned, flagged data is included in the evaluation.)
Incl- Included, Excl- Excluded, SD- standard deviation, WHZ- Weight for Height Z-score

Table 2: Mean z-scores, Design Effects and excluded subjects with SMART flags, Kazaure LGA, Jigawa Sate, Nigeria

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	596	-0.68±1.00	1.21	3	6
Height-for-Age	574	-1.97±1.32	3.22	1	30

Exclusion of outliers: SMART flags
LGA: Local Government Area

The design effect for the Weight-for-Height (WFH) was 1.21. This shows that the clusters were quite homogenous in terms of children that were wasted. This was not the case for stunting (Height-for-Age) with design effect of 3.22. This value is quite high and it suggests that there might be pocket of stunting in the study population. Design effect is the correcting factor accounting for heterogeneity among clusters in the population. The imprecision of cluster sampling is compensated for by multiplying (increasing) the sample size calculated for a simple random sample by the design effect. Design effects can vary from 1 (if the population is homogeneous so that all the clusters are similar to one another) to 4 or higher where some clusters are not affected and others are severely affected (SMART).

Table 3: Distribution of age and sex of sample, Kazaure LGA, Jigawa Sate, Nigeria

Age (months)	Boys no.	%	Girls no.	%	Total no.	%	Ratio Boy : girl
6-17	63	55.8	50	44.2	113	18.7	1.3
18-29	68	46.9	77	53.1	145	24.0	0.9
30-41	67	47.9	73	52.1	140	23.1	0.9
42-49	81	57.9	59	42.1	140	23.1	1.4
50-59	35	52.2	32	47.8	67	11.1	1.1
Total	314	51.9	291	48.1	605	100.0	1.1

LGA: Local Government Area

target prevention of acute malnutrition in the study area. As studies have shown that stunting indicates long term malnutrition problems, improving breastfeeding and complementary feeding practices, maternal nutrition, household food security, access to safe drinking and hygiene and maintaining high level coverage of public health interventions would reduce high levels of acute and chronic malnutrition immensely. Community based management of acute malnutrition (CMAM) and in-patient management of acute malnutrition would also provide nutritional support for malnourished children in the study area.

Competing Interests

Authors have declared that no competing interests exist.

Authors' Contributions

This work was carried out in a collaboration between the authors. Authors OSO and BPO designed the study, performed the statistical analysis and wrote the first and the final drafts of the manuscript. All authors read and approved the final manuscript.

References

Pelletier, D.L., Frongillo, E.A., Schroeder, D.G., Habicht, J.P., (1995). The effects of malnutrition on child mortality in developing countries. *Bull World Health Organ*. 73:443-8.

Pelletier, D.L., Frongillo, E.A, Habicht, J.P (1993). Epidemiologic evidence for a potentiating effect of malnutrition on child mortality. *Am J Public Health*. 83:1130-3.

Van de Poel, E. Hosseinpoor, A, Jehu-Appiah C, Speybroeck, N (2007). Malnutrition and Socioeconomic Gap in Malnutrition in Ghana. Mimeo.

FAO. (2008). The State of Food Insecurity in the World 2008. Food and Agriculture Organization, Rome.

NPC. (2009). The Nigeria Demographic and Health Survey 2008: Preliminary Report.

Abuja National Population Commission (NPC), Federal Republic of Nigeria. 22.

UNICEF. State of the World's Children (2008): Basic indicators. Child Survival. New York, NY 10017, USA: The United Nations Children's Fund (UNICEF), 2007.

The United Nations Children's Fund (UNICEF). Summary Findings of Cross Sectional Survey in Northern Nigeria, December, 2010.

Smith, L.C, Haddad, L (1999). Explaining Child Malnutrition in Developing Countries A Cross-Country Analysis. IFPRI FCND 1Discussion Paper No. 60, IFPRI, Washington, D C. USA.

Devi, P.Y, (1994). Geervani P: Determinants of nutritional status of rural pre-school children in Andhra Pradesh, India. Food Nutr. Bull. 15: 335-342.

Habicht, J.P, Martorell, R, Yarbrough, C, Malina, R.M, Klein, R.E (1974). Height and weight standards for preschool children. How relevant are ethnic differences in growth potential. *Lancet*. i: 611–614.

Waterlow, J.C, Buzina, R. Keller, W. Lane, J.M, Nichaman, M.Z, Tanner, J.M. (1977). The presentation and use of height and weight data for comparing the nutritional status of groups of children under the age of 10 years. *Bulletin of the World Health Organization*. 55:489–498.

World Health Organization. Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. Geneva, World Health Organization (Technical Report Series No. 854), 1995.

Jigawa state 2006 national population census.Gunduma Health System Office, Daura road, Kanti, Kazaure, Jigawa State, Nigeria. Unpublished.

Kazaure Local Government Area. Available on http:/en.wikipedia.org/wiki/Kazaure on 10/8/2011

Standardized Monitoring and Assessment of Relief and Transitions (SMART). Measuring Mortality, Nutritional Status, and Food Security in Crisis Situations: SMART methodology. Version 1, April 2006.

World Health Organization. Management of severe malnutrition: a manuel for physicians and other senior health workers. Geneva, 1999.

Buzina-Suboticanec K, Buzina R, Stavljenic A, Farley T.M, Haller J, Bergman-Markovic B, Gorajscan M (1998). Ageing, nutritional status and immune response. *Int J Vitam Nutr Res*. 68:133-41.

Pettigrew, RA, Charlesworth, P.M, Farmilo, R.W, Hill GL. (1984) Assessment of nutritional depletion and immune competence: a comparison of clinical examination and objective measurements. *JPEN J Parenter Enteral Nutr*. 8:21-4.

Wamani, H, Åstrøm, A.N, Peterson, S. Tumwine, J.K, Tylleskär, T. (2007). Boys are more stunted than girls in Sub-Saharan Africa: A meta-analysis of 16 demographic and health surveys. *BMC Pediatrics*. 7: 17-17..

Dutta, A.K, Pant, R., Puthia, Sah A.(2009). Prevalence of undernutrition among children in the Garhwal Himalayas. *Food Nutr. Bull*. 30: 77-81.

Wickramasinghe, V.P., Lamabadusuriya, S.P., Atapattu, N., Sathyadas, G., Kuruparanantha, S., Karunarathne P: Nutritional status of schoolchildren in an urban area of Sri Lanka. *Ceylon Med. J*. 49: 114-118.

Pelletier D (1991) Relationships between child anthropometry and mortality in developing countries. Ithaca, NY, Cornell University (Cornell Food and Nutrition Policy Program, Monograph 12).

Toole, M.F, Malkki, R.M (1992). Famine-affected, refugee, and displaced populations: recommendations for public health issues. *Morbidity and Mortality Weekly Report*. 41:1-25.

Man, W.D, Weber, M., Palmer, A, Schneider, G, Wadda, R, Jaffar, S, Mulholland, E.K, (1998). Greenwood BM: Nutritional status of children admitted to hospital with different diseases and its relationship to outcome in The Gambia, West Africa. *Tropical Medicine and International Health*. 3:678–686.

Pollitt, E., Husaini, M.A, Harahap, H, Halati S, Nugraheni, A., Sherlock, A.O. (1994) Stunting and delayed motor development in rural West Java. *American Journal of Human Biology*. 6:627–635.