AN ASSESSMENT OF NUTRITIONAL STATUS OF CHILDREN LESS THAN 3 YEARS IN RURAL AREAS OF MAHOTTARI DISTRICT OF NEPAL

*Yadav DK[1, 2], Gupta N[1], Shrestha N[3]

[1]Faculty of Health Sciences, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, India
[2]School of Health and Allied Sciences, Pokhara University, Nepal
[3]Valley College of Technical Sciences, Mahrajgunj, Kathmandu, Nepal

*Corresponding author email: dipendrayadavph@gmail.com

ABSTRACT

Background: More than one-fourth of under five children (about 150 million) are underweight while about one-third (182 million) are stunted. Geographically more than 70% of protein energy malnutrition children live in Asia, 26% in Africa and 4% in Latin America and the Caribbean[2]. Malnutrition among children is a public health problem in Nepal. Nepal Demography and Health Survey (NDHS, 2011) reported that 29 % children are underweight, 41% stunted and 11% wasted. **Material and Methods:** A base-line data were analyzed and prepared this article with objective was prevalence and its associated factors of stunting, underweight and wasting among children less than 3 years old from the study that was conducted a pre-post with controlled design conducted in Mahottari district of Nepal in 2012. **Results:** In this study, Prevalence of wasting, stunting and underweight was 31.1%, 42.3% and 45% of children less than 3 years respectively. The study found that the prevalence of severe wasted and wasted were 18.2 % and 12.9 % respectively, while the prevalence of stunting and severe stunting status of children were 20.7% and 21.7% and the prevalence of underweight and severely underweight children were 20.2% and 24.9%. **Conclusions:** Present study shows that the prevalence of malnutrition (underweight, stunting, and wasting) is still major health problems among children less than 3 years, particularly in the Central Terai region.

Keywords: Stunting, Wasting, Underweight, Children

INTRODUCTION

Malnutrition in all its forms, either directly or indirectly, is responsible for approximately half of all deaths worldwide. This applies to perinatal and infectious diseases as well as chronic diseases. Malnutrition accounts for 11% of the global burden of disease, leading to long-term poor health and disability and poor educational and developmental outcomes[1].

Good nutrition is a prerequisite for the national development of countries and for the well-being of individuals. Although problems related to poor nutrition affect the entire population, women and children are especially vulnerable because of their unique physiology and socioeconomic characteristics. Adequate nutrition is critical to children's growth and development. The period from birth to age two is especially important for optimal physical, mental, and

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cognitive growth, health, and development. Unfortunately, this period is often marked by protein-energy and micronutrient deficiencies that interfere with optimal growth. Childhood illnesses such as diarrhea and acute respiratory infections (ARIs) also are common[2].

More than one-fourth of under five children (about 150 million) are underweight while about one-third (182 million) are stunted. Geographically more than 70% of protein energy malnutrition children live in Asia, 26% in Africa and 4% in Latin America and the Caribbean[2]. Malnutrition among children is a public health problem in Nepal. Nepal Demography and Health Survey (NDHS-2011) reported that 29 % children are underweight, 41% stunted and 11% wasted.

NDHS 2011 reported nationally, 41 percent of children under age 5 are stunted, and 16 percent are severely stunted. More than half of children whose size at birth was very small or small are stunted. Children in rural areas are more likely to be stunted (42 percent) than those in urban areas (27 percent), and a similar pattern is noted for severe stunting (17 percent in rural areas and 6 percent in urban areas). Also reported overall, 11 percent of children are wasted and 3 percent are severely wasted. Analysis by age group shows that wasting is highest (25 percent) in children age 9-11 months and lowest (7 percent) in children age 36-47 months. Male children are more likely to be wasted (12 percent) than female children (10 percent). The study reported that 29 percent of children under age 5 are underweight (low weight-for-age), and 8 percent are severely underweight.

Maternal and child mortality have declined significantly in Nepal to the extent that Nepal is on track to meet the Millennium Development Goals for maternal and child mortality. Similar improvements have not been seen in general nutrition status of them[5].

MATERIAL AND METHODS

A base-line data were analyzed and prepared this article with objective was prevalence and its associated factors of stunting, underweight and wasting among children less than 3 years old from the study that was conducted a pre-post with controlled design conducted in Mahottari district of Nepal in 2012. Study population was under 3 year's children and their mother.

Sample Size: Desired numbers of participants were selected by using the formula as following:

n = D [(Z1 + Z2)2 * (P1 (1 - P1) + P2 (1 - P2)) /(P2 - P1)2]

A total of 615 sample size was selected for the study. Ethical approval was taken from ethical committee for biomedical research, faculty of health sciences, SHIATS, Allahabad, India and Nepal Health Research Council, Kathmandu, Nepal. Verbal consent was taken from every participant mother and permission was taken from District Health Office, Mahottari to carry out this study.

This study adopted stratified sampling. Unit of study will be selected by applying following stages. First Stage: Mahotarri district was selected purposively and the district (76 VDCs) was divided into three stratums according to geographical location (North, Middle & South Part) in terms of caste, food taboos and health behavior and practices. Second Stage: Names of all Village Development Committee VDCs were recorded alphabetically in separate stratum. 4 VDCs from each stratum were selected randomly. 12 VDCs were selected for study. In the final stage: Each VDC consists of nine wards. Five wards were selected randomly from each VDC and at least 10 respondents were selected from each ward by Expanded Programme on Immunization (EPI) method of household's selection sampling technique. Base-line data collection was collected from February 1, 2012 to May 13, 2012., Excluding 1 municipality because this research was conducted in rural areas only. Only one child aged less than 3 years (0 to 35 months completed age) was recruited for the study from each selected household through randomly if more one children. If in the selected house, there was no child, then the house was skipped and the next house was selected for the study. If for any reason, one selected house could not be surveyed (refusal of the house occupants) then the house was not substituted by another one.

Interview schedule focused on socio-demographic conditions, nutrition and feeding behaviours and child seeking practices were collected from mothers.

Anthropometric measurements: Anthropometric measurements were carried out to assess the degree of malnutrition in children under 3 years of age from all

the study groups from intervention and control areas. Height for weight, weight for age, height for age and Mid-Upper Arm Circumference MUAC were calculated for children. Height was measured using a standard height measuring scale (board) for children under 3 years. Children up to 2 years (23 months or 85 cm) of age are measured on a horizontal measuring board. Shoes should be removed. The child is placed gently onto the board, the soles of the feet flat against the fixed vertical part, the head near the cursor or moving part. The child should lie straight in the middle of the board, looking directly up. The assistant holds the feet firmly against the footboard and places one hand on the knees of the child, while the measurer gently holds the child's head, places the cursor against the crown of the head and reads out the length to the nearest 0.1 cm. Children over 2 years of age (or over 85 cm) are usually measured standing on a horizontal surface against a vertical measuring device. The assistant makes sure that the child stands straight, with the heels, knees, and shoulders against the wall, while the cursor is lowered onto the crown of the head, compressing the hair. The height is read out as before, to the nearest 0.1 cm. Weight of children was measured using a lightweight electronic SECA digital scale (UNICEF Electronic Scale). MUAC of children was measured with UNICEF MUAC tape.

Data were coded and entered in Epi Data 3.1 version software. Anthropometric analysis, such as Z-score value was calculated in Epi Info 3.3.2 version. Epi-Info software was produced tables of frequencies for Z-score classes of 0.5 Z-score intervals and graphs of frequency distributions. All the data from Epidata and EpiInfo were exported to IBM SPSS Statistics 20 software and then analyzed it. Appropriate statistical test was applied wherever required. The result was interpreted in the light of the objectives.

RESULTS

Indicators of the nutritional status of children were calculated using new growth standards published by the World Health Organization (WHO) in 2006. On the following classifications of nutritional status of children are used in the study description. **Stunted:** Children having the index value for height for age below two standard deviation units (<-2SD), **Wasted:** Children having the index value for weight for height

below two standard deviation units (<-2SD). **Underweight:** Children having the index value for weight for height below two standard deviation units (<-2SD), **Severely stunted:** Children having the index value for height for age below two standard deviation units (<-3SD), **Severely wasted:** Children having the index value for weight for height below two standard deviation units (<-3SD) and **Severely underweight:** Children having the index value for weight for height below two standard deviation units (<-3SD).

Table 1: Prevalence of wasting, stunting and underweight among children.

Measurement	Nutritional Status	Frequency	%
Weight For Height	Severe Wasted	112	18.2
	Wasted	79	12.9
	Normal	424	68.9
	Total	**615**	**100.0**
Height For Age	Severe stunted	133	21.6
	Stunted	127	20.7
	Normal	355	57.7
	Total	**615**	**100.0**
Weight for Age	Severely Underweight	153	24.9
	Underweight	124	20.1
	Normal	338	55.0
	Total	615	100.0

A total 615 participants were selected for the study of them 284 (46.2%) were female and 331 (53.8%) were male. The mothers mean age was 25.21 for with ± 4.15 SD and children mean weight was 9.05 for with ± 2.76 SD.

Study found that the prevalence of severe wasted and wasted were 18.2 % and 12.9 % respectively while prevalence of stunting and severe stunting status of children were 20.7% and 21.7% and prevalence of underweight and severely underweight children were 20.1% and 24.9%.

Study shows the highest number of children were not-stunted that those sources of family income were job 26 (78.8%) and Business 25 (65.8%) that the significant association between stunted and not-stunted children to source of family income and p value is 0.01. There were direct relationship between highest family income and not-stunted children and significant association between family income and not-stunted children and p value is 0.02.

Table 2: Comparison between normal (Non-Stunted) and Stunted children based on characteristics

Characteristics	Normal	Stunted	p-value based on χ^2	OR	95% CI
Children Sex					
Female	158 (55.6)	126 (44.4)			
Male	197 (57.7)	134 (40.5)	0.33	0.853	0.619 - 1.176
Family Type					
Nuclear	145 (60.7)	94 (39.3)			
Joint	210 (55.9)	166 (44.1)	0.23	1.219	0.877 - 1.696
Educational Status of mother					
Illiterate	274 (57.2)	205 (42.8)			
Literate	81 (59.6)	55 (40.4)	0.62	0.908	0.616 - 1.337
Children had Diarrhoea					
Yes	246 (56.7)	188 (43.3)			
No	109 (60.2)	72 (39.8)	0.41	0.864	0.607 - 1.230
Sources of income					
Agriculture	175 (58.1)	126 (41.9)			
Animal husbandry	8 (38.1)	13 (61.9)			
Casual wages of labour	41 (46.6)	47 (53.4)			
Foreign employee	80 (59.7)	54 (40.3)			
Business	25 (65.8)	13 (34.2)			
Government employee	26 (78.8)	7 (21.2)	0.01		
Family Income Nepali Rupees (Monthly)					
Less than 4999	26 (44.8)	32 (55.2)			
5000 – 9999	276 (57.6)	203 (42.4)			
10000 & above	53 (67.9)	25 (32.1)	0.026		

Table 3: Comparison between normal (Non-Underweight) and Underweight children based on characteristics

Characteristics	Normal	Underweight	p-value based on χ^2	OR	95% CI
Children Sex					
Female	155 (54.6)	129 (45.4)			
Male	183 (55.3)	148 (44.7)	0.86	0.972	0.707 - 1.336
Family Type					
Nuclear	132 (55.2)	107 (44.8)			
Joint	206 (54.8)	170 (45.2)	0.914	1.018	0.735 - 1.410
Educational Status of mother					
Illiterate	259 (54.1)	220 (45.9)			
Literate	79 (58.1)	57 (41.9)	0.406	0.849	0.578 - 1.248
Children had diarrhea					
Yes	235 (54.1)	199 (45.9)			
No	103 (56.9)	78 (43.1)	0.531	0.899	0.630 - 1.268
Family Income Nepali Rupees (Monthly)					
Less than 4999	28 (48.3)	30 (51.7)			
5000 – 9999	263 (54.9)	216 (45.1)			
10000 & above	47 (60.3)	31 (39.7)	0.381		

Table 4: Comparison between normal (Non-Wasted) and Wasted children based on characteristics

Characteristics	Normal	Wasted	p-value based on χ^2	OR	95% CI
Children Sex					
Female	196 (69.0)	88 (31.0)			
Male	228 (68.9)	103 (31.1)	0.97	1.00	0.71 - 1.34
Family Type					
Nuclear	162 (67.8)	77 (32.2)			
Joint	262(69.7)	114 (30.3)	0.62	0.91	0.64- 1.29
Educational Status of mother					
Illiterate	328 (68.5)	151 (31.5)			
Literate	96 (70.6)	40 (29.4)	0.63	0.90	0.59 - 1.37
Children had diarrhea					
Yes	296 (68.2)	138 (31.8)			
No	128 (70.7)	53 (29.3)	0.53	0.88	0.60 - 1.29
Family Income Nepali Rupees (Monthly)					
Less than 4999	43 (74.1)	15 (25.9)			
5000 – 9999	328 (68.5)	151 (31.5)			
10000 & above	53 (67.9)	25 (32.1)	0.66		

Female children were at an increased risk of stunting and underweight compared to male children probably due to the feeding and caring more focused on male children. Female and male children were at same increased risk of wasting compared to gender. There was no association between the level of stunting, wasting and underweight and sex of the children all p value of > 0.05.

DISCUSSION

Health and nutritional status are two crucial and interlinked aspects of human development, which in turn interact with demographic variables in important ways. In children, the three most commonly used anthropometric indices are weight-for-height, height-for-age, and weight-for-age. Deficit in height-for-age is called stunting and indicates chronic malnutrition. Deficit in weight-for-height is called wasting and indicates acute malnutrition. Deficit in weight-for-age is often referred to as underweight and reflects low weight-for-height, low height-for-age, or both (global malnutrition). Weight-for-age is thus not a good indication of recent nutritional stress in the population[8].

In this study, Prevalence of wasting, stunting and underweight was 31.1%, 42.3% and 45% of children less than 3 years respectively. According to Nepal NDHS 2011 report, Prevalence of wasting, stunting and underweight were 11%, 41% and 29% respectively children below five years, which is lesser as compared to this study. This difference could be due to a smaller sample size of our study.

Study found that the prevalence of severe wasted and wasted were 18.2 % and 12.9 % respectively which are higher prevalence than the Central Terai that severely wasted and wasted among the children are 10.4% and 3.2% respectively reported in NDHS, 2011.

Present study revealed that prevalence of stunting and severe stunting status of children were 20.7% and 21.7% which are lesser and greater the prevalence of stunting, severe among the children in Central Terai that are 40.5% and 19.5% respectively reported in NDHS, 2011.

Study found prevalence of underweight and severely underweight children were 20.1% and 24.9% which are higher prevalence than the Central Terai that underweight, severely and underweight among the children are 32% and 10.7% respectively reported in NDHS, 2011.

Female children were at an increased risk of stunting and underweight compared to male children probably due to the feeding and caring more focused on male children. Female and male children were at same

increased risk of wasting compared to gender. There was no association between the level of stunting, wasting and underweight and sex of the children all p value of > 0.05. A nutritional assessment study done by *Bloss, E.*et al,[6] they found that Male children were at an increased risk of stunting and underweight compared to female children. Female children were at an increased risk of wasting compared to male children. This difference could be due to regional differences.

Study shows the highest number of children were not-stunted that those sources of family income were job 26 (78.8%) and Business 25 (65.8%) that the significant association between stunted and not-stunted children to source of family income and p value is 0.01.

There were direct relationship between highest family income and not-stunted children and significant association between family income and not-stunted children and p value is 0.02. A similar study done by **Sapkota, V. and C. Gurung** [7] and reported the economic status is a strong predictor of the underweight and stunting status of children. Comparatively, the risk of being underweight in the children from the poor economic status of family is almost four times as much as in the children from the rich economic status. Similarly, in the poor economic group, the risk of getting stunted is three times as much as in rich economic group.

CONCLUSION

From the findings of the study: It shows that prevalence of malnutrition (underweight, stunting, and wasting) is still major health problems among children less than 3 years, particularly in Central Terai region. Effective strategies such as community-based regular growth monitoring, nutritional counseling and referral mechanism will adopt by health workers to control these problems.

Literate mothers had less number of Stunted, wasted and underweight children in comparison with illiterate mothers. Basis of present findings, the idea that educating the primary child-caretakers (mothers) that improving women's awareness of appropriate feeding practices can improve the nutritional status of children.

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