Determinants of Nutritional Status of School Children - A Cross Sectional Study in the Western Region of Nepal

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Abstract: Under-nutrition continues to be a primary cause of ill health and mortality among children in developing countries. Besides poverty, there are other factors that directly or indirectly affect the nutritional status of children. In the present study, an attempt was made to find the prevalence of under-nutrition among school children in 4 – 14 year age group and the role of socio-demographic characteristics of mother on child nutrition. Methods: Descriptive, cross-sectional study was conducted in schools of Kaski district of Western Nepal from January 2007 to June 2007. A total of 786 students were randomly selected from six schools in the study area and nutritional status of the children was assessed by anthropometric measurements. Results: Among 786 students, 26% of the students were found to be undernourished and 13% stunted, 12% wasted and only 1% both stunted and wasted. The present study shows highly significant association ($p<0.005$) of maternal factors like literacy, occupation, diet knowledge and monthly per-capita income respectively with child nutrition. Conclusion: Maternal education status, socio-economic status, occupation and dietary knowledge are important determinants of nutritional status of school children.

Key words: Malnutrition, School children, Anthropometry

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INTRODUCTION: Malnutrition continues to be a primary cause of ill health and mortality among children in developing countries. It is a major public health problem and accounts for about half of all child deaths worldwide[1]. About 150 million children in developing countries are still malnourished and more than half of underweight children live in South East Asia Region (SEAR) [1]. The high levels of under nutrition in children in South Asia pose a major challenge for child survival and development. Besides poverty, there are other factors that directly or indirectly affect the nutritional status of children. Several studies showed that maternal education emerges as a key element of an overall strategy to address malnutrition [2].

The best global indicator of children's well being is growth. Poor growth is attributable to a range of factors closely linked to overall standards of living and the ability of populations to meet their basic needs, such as access to food, housing and health care. Assessment of growth is the single measurement that best defines the nutritional and health status of children, and provides an indirect measurement of the quality of life of the entire population.

In the present study, an attempt was made to find the prevalence of malnutrition among school children in 4–14 year age group in Kaski district of western Nepal. This age group is on the threshold of adulthood on whom the progress and welfare of the nation depends. The current study further explores the role of socio-demographic characteristics of mother on the nutritional status of the child.

MATERIAL AND METHODS: Nepal is one of the least developed nations in SEAR, which was ranked 140 among 174 countries in the Human Development

Index and 0.44 GDP index in 2002 [3]. It has a total land area of 147, 181 Sq Kms and is bordered by China on north, Bhutan on east and south and in the west by India. According to 2001 census, the total population of Nepal is 23.15 million. The sex ratio is 997 males for 1000 females and 40% of the population comprises children (0 – 14 age group). More than 83% of population resides in rural area. The infant and under five mortality rates are 64.2 and 91 per 1000 respectively [4]. The population growth rate in 2001 is 2.27%. Only 62.7% males and 34.9% females above 14 years of age are literate. 81% of economically active population is employed in the agricultural sector and 42% of the population are below poverty line [5].

Kaski district (An Administrative unit) in the Western Development Region of Nepal constitutes 1.7% of total population in Nepal. The present study was conducted in six schools of Pokhara municipality, which constitutes 32.5% of population in Kaski district.

The study design was descriptive cross sectional type and the study period was January to June 2007. The study was conducted after getting approval from college ethical committee. There were 46 government schools in the study area during this period and about 9000 to 10,000 students in 4–14 years age group were studying in these schools. Assuming a 30% prevalence of malnutrition in this age group (school going) and 33% as worst acceptable, the required sample size was approximately 800 and so the sampling frame was 1600 as every alternate student was being selected. Each school was having 200 to 300 students so six (1600/300) schools were selected by simple random sampling method for getting the above mentioned sample number. Informed consent was taken first from the school principal for conduction of study, than informed consent was also taken from the parents of the school children.
Every alternate student in the age group of 4 -14 years was selected from the registers of the selected schools. Despite repeated visits (3 times) to the schools to include the ones who were absent in the earlier occasions, 11 students could not be recruited (1.4%). Therefore a total of 789 students selected from these six schools, constitute our study subjects. The mother's of the selected students were asked to come to the school in a prefixed time and day according to their convenience. Those who did not turn up were repeatedly asked to come until they participated in the study.

Nutritional status of the children was assessed by anthropometric measurements. Under nutrition that is Wasting and stunting were defined according to Waterlow's classification[6]. Data on children's growth status was obtained by measuring weight and height. Information on age of the child, socio-demographic characteristics, birth interval, history of infectious diseases and diet history was collected from the mother of the selected students using a structured questionnaire.

Statistical Analysis: Data were entered and analyzed using statistical software SPSS 10.0 for windows (SPSS Inc., Chicago, IL, USA). The Chi-square test was used for testing the significance of association between the socioeconomic characteristics of mother and child malnutrition. The variables studied were mother's literacy, occupation, monthly per capita income of the family and mothers knowledge on diet. Mother's literacy was classified as being literate or illiterate. Those who could read and write the local language were considered as literate and others as illiterate. Mother's knowledge regarding the dietary intake of child was assessed by interviewing them about the diet requirements of the child and the nutritional values of the food items. Based on this, mother's dietary knowledge was classified as adequate and inadequate.

RESULTS: Out of 789 students, 387 (49%) were males and 402 (51%) females. According to Waterlow's classification, there were 584 (74%) normal and 205 (26%; 95% CI 23% - 29%) undernourished children. Figure 1 gives the sex distribution among normal and undernourished children.

Among undernourished children, males dominate the females while the reverse in the case of normal

children. Nutritional status according to age is given in Table I.

Table I. Nutritional Status According to Age

Age group in years	Normal (%)	Under Nourished (%)	Total (%)
4 – 5	118 (20.2)	8 (3.9)	126 (16.0)
6 – 10	310 (53.1)	129 (62.9)	439 (55.6)
11 – 14	156 (26.7)	68 (33.2)	224 (28.4)
Total	584 (100)	205 (100)	789 (100)

More than 50% of the children were in 6–10 age group. The prevalence of malnutrition in 6–10 and 11–14 age groups were almost same (29.4% and 30.4% respectively).

Figure 2 gives the percentage of wasting, stunting and both in 789 children. More than one fourth of the children were undernourished.

Fig.1 Sex Distribution of Normal and Undernourished Children

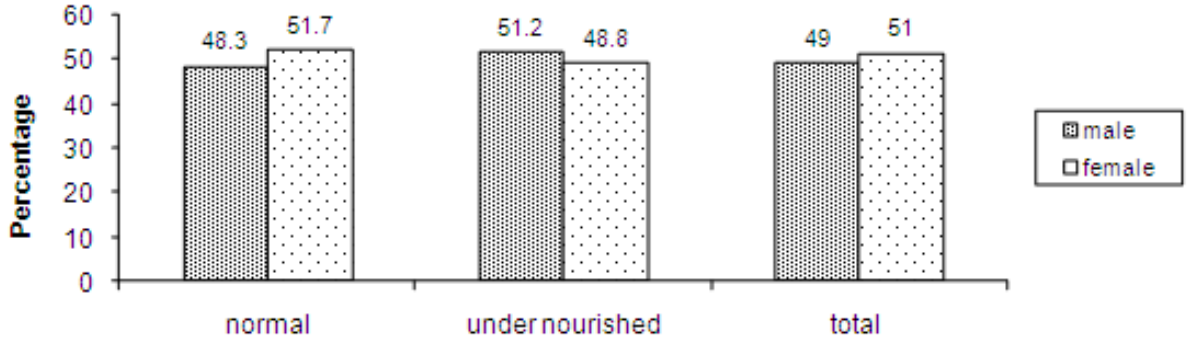
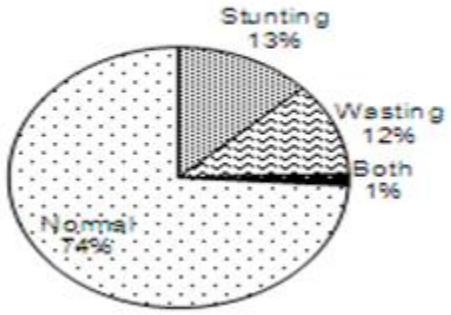


Fig.2. Percentage of Wasting, Stunting and Both in 789 School Children According to Waterlow Classification.



The percentage of stunting was slightly more compared to wasting and only one percent had both stunting and wasting. Figure 3 gives the percentage of wasting, stunting and both wasting and stunting among malnourished children. Among the 205 malnourished children, 50.2% were stunted, wasting 44.4% and 5.4% both stunting and wasting. Wasting is more common among under 6 children while stunting more among children above 6 years of age. Table II gives the association of maternal factors and malnutrition among children. More than 68% of mother's of malnourished children were illiterate compared to 56% of normal children. The percentage of mother's of undernourished children in the low income category was more than double that of normal children. Literacy, occupation, monthly per capita income and diet knowledge of mother were found

to have highly significant association (p<0.005) with malnutrition among children.

Fig.3. Percentage of wasting, stunting and both among 205 malnourished children.

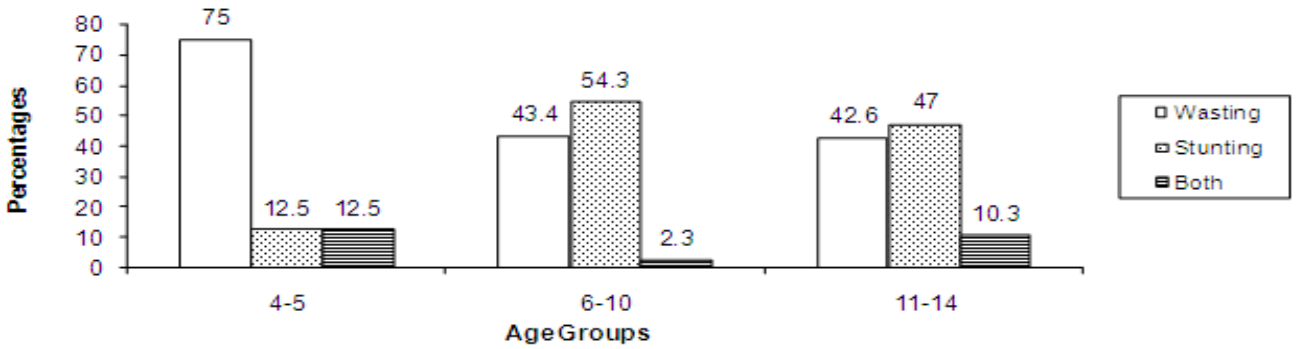


Table II. Association of Maternal Factors and Malnutrition Among Children.

Maternal Factors	Malnourished N=205 (%)	Normal N=584 (%)	Odds Ratio (95% CI)	Significance Test
Literacy				
Illiterate	141 (68.8)	328 (56.2)	1.72 (1.2, 2.5)	$\chi2$ = 10.02 p<0.001
Literate	64 (31.2)	256 (43.8)	1	
Occupation				
House Wife	71 (34.6)	388 (66.4)	1	$\chi2$ =66.89 p<0.0001
Laborer	90 (43.9)	113 (19.3)	4.35 (2.9, 6.5)	
Service	44 (21.5)	83 (14.2)	2.90 (1.8, 4.6)	
Monthly Per-capita Income (Rupees)				
<150	105 (51.2)	136 (23.3)	10.8 (4.8, 25.1)	$\chi2$ =68.80 p<0.0001
150-299	63 (30.7)	199 (34.1)	4.43 (1.9, 10.4)	
300-499	29 (14.1)	137 (23.5)	2.96 (1.23, 7.4)	
≥500	8 (3.9)	112 (19.2)	1	
Diet Knowledge				
Inadequate	119 (58)	277 (47.4)	1.53 (1.1, 2.14)	$\chi2$ =6.84 p<0.005
Adequate	86 (42)	307 (52.6)	1	

DISCUSSION: Malnutrition is associated with about half of all child deaths worldwide. Malnourished children have lowered resistance to infection; they are more likely to die from common childhood ailments like diarrheal diseases and respiratory infections; and for those who survive, frequent illness saps their nutritional status, locking them into a vicious cycle of recurring sickness, faltering growth and diminished learning ability. Most of the studies on malnutrition are done among children under five. In the present study, an attempt was made to find the prevalence of malnutrition among school children in 4 – 14 year age group in Kaski district of western Nepal and the role of socio-demographic characteristic of mother on child malnutrition. Nepal registers one of the highest child malnutrition rates in SEAR.

About 27% (6.23 million) of total population (23.15 million) of Nepal comprises of children age 5 to 15

years and more than 81% of children in this age group goes to school[7.] The age group is non-earning, depended on family and easily accessible for the health assessment, care, and education through teachers, books etc. They are more vulnerable to accident, injuries, contagious infections and malnutrition. Out of 789 students randomly selected 387 (49%) were males and 402 (51%) females giving male to female ratio 0.96:1. This ratio is almost similar to that of male to female ratio (0.97:1) of children in 5–15 age groups in the Kaski district [5]. According to Waterlow classification 26% of students were found to be undernourished in 4 to 14 age group.

Even though girls predominate boys in number, the proportion of undernourished is slightly more among males than females. 27% (95% CI 23% - 31%) of boys and 25% (95% CI 21% - 29%) girls were malnourished in the selected 789 students. Studies conducted in Ecuador in 1999[8] and in Tanzania in 2000[9] shows boys were more commonly affected than girls. The female children from very poor families do not attend school and this could be the reason for low prevalence of malnourishment among girls compared to male children.

According to Waterlow classification the percentage of wasting in our study was 12% (95% CI 10% - 14%), which is comparable with the wasting percentage 10.5% of the study by Shakya SR et al.[10] and 11.5% of the study by Pradhan E et al.[11] done in Nepal. For stunting and both wasting and stunting, the results were different from that of the above two studies. In our study the overall percentage of undernourished children was 26% (95% CI 23% - 29%), stunting 13% (95% CI 11% - 15%) and both wasting and stunting 1% (95% CI 0.3% - 1.7%). These prevalence were less compared to the results obtained in the above two studies (37%, 21% and 5.4% respectively). The Human Development Index of Kaski district is higher than that of other districts of Nepal[5]. The decline in the prevalence of stunting and both wasting and stunting as observed in the present study compared to the previous two studies is due to the higher socioeconomic status of the people in the study area.

There are many factors that directly or indirectly cause malnutrition among children. Women's educational and social status, national per capita, food availability, and access to safe water are important underlying determinants of child malnutrition[12]. Some studies suggested that high prevalence of low birth weight, poor hygiene, inadequate child care and feeding practices, and the low status of women in society are key factors that explain high rates of child malnutrition[13]. The present study shows highly significant association of maternal literacy, occupation, income and diet knowledge on child malnutrition. Economic status of the household is associated with the general health and development status of the family.

Literate mothers adopt many improved behaviors related to maternal and child health care, feeding and eating practices which ultimately affect the nutritional status of children. The present study shows that 58% of mothers of malnourished children did not have adequate knowledge regarding the diet requirements of the child and the nutritional value of food items. This finding is also similar to the findings from other studies such as NMIS (Nepal Multiple Indicator Surveillance) from Nepal[14, 16] and NFHS (National Family Health Survey) from India[15].

Some of the findings of this study cannot be generalised to the mountainous and terai (plain land) regions of Nepal due to socio-economic and cultural differences between them, which is the limitation of the study. The socio-economic status of the people in our study area is better than that of other parts of Nepal therefore the prevalence of malnutrition among 4–14 year age group would be less than that expected in other areas of the country.

CONCLUSION: Malnutrition among children is a major public health problem in Nepal. Besides poverty, there are other factors that directly or indirectly affect the nutritional status of children. Literacy and social status of mother are key factors contributing to malnutrition in children. The present study highlights the minimum prevalence of malnutrition among school going children in Nepal

and the prevalence can be reduced by increasing awareness in mother regarding the nutritional intake of the child. Also, there is a great need to focus the attention of policy-makers on the nutritional status of children as one of the main indicators of development and as a precondition for the socioeconomic advancement of societies in the long term.

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