Nutritional status and morbidity pattern among governmental primary school children in the Eastern Nepal

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Abstract

Objective: To assess the nutritional status and morbidity pattern of primary school children.
Methods: Descriptive, cross-sectional study was administered in the five governmental schools located in Dhankuta town (Dhankuta district) and Ineruwa town (Sunsari district). The schools were selected using simple random sampling technique. From these selected schools, a total number of 818 students studying from Grade I to V were enumerated in the study using census survey method. **Results**: Among 818 students, 61% of the students were found to be malnourished. The students were more stunted (21.5%) than wasted (10.4%). Only 5.4 % of the students were found to be both wasted and stunted. The collected blood and stool samples from the students revealed parasitic infestation of 65.8% and anaemia of 58%. The most common diseases in those schools were: skin diseases (20%), dental caries (19.8%), and lymphodenopathy (10.5%). Among skin diseases, pediculosis was more common among girls while ringworms and scabies were common among boys. **Conclusion:** The study revealed that high percentage of primary school students was malnourished. It was found that there was a high prevalence of parasitic infestation and anaemia. The study result revealed the urgent need for initiation of school health program with specific emphasis on prevention of diseases, improvement of personal hygiene and nutritional status with the collaboration of governmental and non-governmental institutions.

Key Words: Nepal, school health, nutritional status, malnutrition, anaemia, pediculosis.

Introduction

It is estimated that out of 625 million children of primary school age group, 79% were in school and about 70% of children in developing world complete at least four years schooling.[1] About 27% (6.23 million) of total population (23.15 million) of Nepal comprises of children age 5 to 15 years.[2] School children constitute a sizable portion of this age group. The age group is non-earning, depended to family and easily accessible for the health assessment, care, and education through teachers, books. They are more vulnerable to accident, injuries, contagious infections and malnutrition.

On the other hand, this group is on the threshold of adulthood on whom the progress and welfare of the community depends. Therefore it is necessary to provide targeted services to improve their health status. This study is an attempt to determine the nutritional status and morbidity of primary school children of Hill and *Terai* region of Eastern Nepal.

Materials and methods

The study design was descriptive cross sectional type and the study period was during July 2002 to July 2003. The study population was all the students of randomly selected 5 governmental primary schools

and the place of study was Dhankuta and Ineruwa towns of the Eastern Nepal.

The purpose of the study was explained to the school Principals and they provided the written consent for conducting the study on their respective schools. The district health offices were informed about the study.

Sampling:

A simple random sampling technique (lottery method) was used to select five schools from two Dhankuta and Ineruwa towns. Two schools are selected from Dhankuta and three were taken from Ineruwa. The school children from Grade I to V were enumerated on the pre-assigned days whoever were present. For the absentees, two visits were done to locate them in the school. If sickness was the reason for not attending school, it was recorded.

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Tools:
The structured questionnaire was developed and the pre testing was done at nearby school. The necessary changes were made after pre test of questionnaire. The questionnaire consisted of demographic information, anthropometric data, morbidity patterns and personal hygiene related to the school children.

Techniques:
A brief health education session was given to the class teachers and students after completion of the study. Deworming was done to all students and teachers with a single dose of tablet albendazole 400 mg orally.

Anthropometry:
Each child was identified by name, age, sex and ethnicity/ caste. Date of birth was obtained from the school records in order to ensure the data quality.

A bathroom scale was used to measure the weights in kilograms. The scale was calibrated against known weights regularly. Zero error was checked for and removed everyday if present. Cloths were not removed, as adequate privacy was not available. As the study was conducted in the summer, the students wore only light cloths. The weights were recorded to the nearest 100 gm.

Height in centimetres was marked on wall in school with help of a measuring tape. The students were asked to remove their shoes and with heels together and head positioned in such a way that the line of vision was perpendicular to the body. A scale was brought down to the topmost point on the head of students standing against the wall where the calibration was done. The heights were measured to the nearest 0.5cm.

Health Examination:
Each child underwent a thorough physical and systemic examination including a careful clinical history. The personal and domestic hygiene were recorded by assessing the students and by interviewing them. If diseases were found then appropriate advices were given with prescribing medication. The parents were invited and given information about their children's health condition and if needed suggested to contact the nearest health institution.

Laboratory test:
Blood test for haemoglobin was done among 112 randomly selected students by help of trained laboratory assistants with cyanmethaemoglobin method. The results were correlated with the signs of anaemia like pallor of palms, conjunctives and tongues. Stool test for parasites and urine for protein/ sugar were done in same 13% sub sample.

Nutritional Status:
Nutritional status was assessed in terms of anthropometric parameters like height and weight using weight for age, height for age and weight for height.[3] Undernutrition (low weight for age), stunting (low height for age) and wasting (low weight for height) were detected as per Indian Academy of Paediatrics (IAP) classification and Waterlow classification.[4] Head to heal examination were done to detect vitamin and mineral deficiencies.

Statistical Analysis:
Data was entered in the Microsoft Excel. Analysis was done with the help of SPSS and test of significance (p value, Chi-square test).

Results
The total number of the primary school children in 5 selected schools of both towns was 863. Among them 818 were interviewed and examined for this study. The response rate was 94.8%. The boys were 424 (51.8%) and girls were 394 (48.2%). The ratio of boy and girl was 1.07:1. (Table-1).

Table 1. Distribution of School Children by Grade and Gender

Grade	Gender				Total		Test	
	Boys		Girls					
	No.	%	No.	%	No.	%	χ^2	p Value
I	80	50.6	78	49.4	158	19.3		
II	85	49.4	87	50.6	172	21.0		
III	81	53.0	71	47.0	153	18.7	0.83	0.93
IV	94	52.5	85	47.5	179	21.9		
V	84	53.2	73	46.8	156	19.1		
Total	424	51.8	394	48.2	818	100	d. f. 4	Not Significant

The study showed that the percentage of Major Hill caste/ethnicity was the highest (40.8%) followed by hill natives (25.3%) and *Terai* occupational and trader (22.9%) in Fig.1. Statistically the distribution of caste/ ethnicity was highly significant (χ^2=473.04, d.f.=4, p=0.00001).

Fig 1. Distribution of Caste/ Ethnicity among School Children
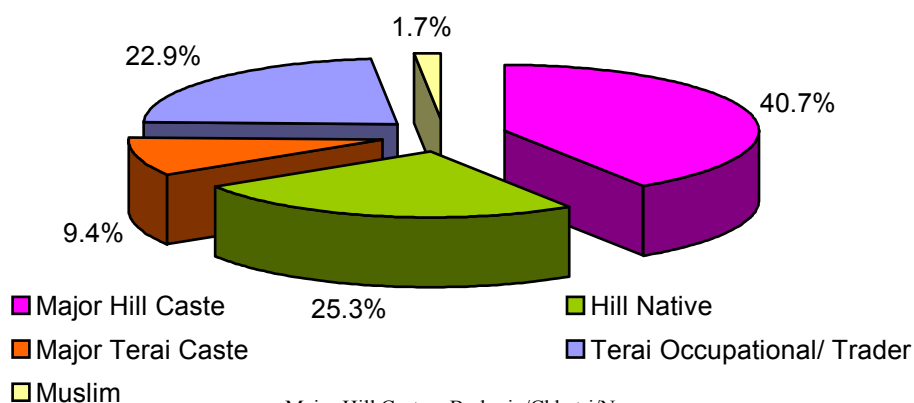
Major Hill Caste – Brahmin/Chhetri/Newar
Hill Natives – Rai, Limbu, Gurung, Sherpa, Tamang, Magar
Major Terai Caste – Tharu, Brahmin, Rajbanshi, Yadav
Terai Occupational/Trader Caste – Musahar, Meheta, Shah (Teli), Chamar, Poddar, Paswan, Pandit, Prasad, Gupta, Kayastha, Marwadi

Blood test for haemoglobin

Blood test for haemoglobin was done on 112 students (Table 2). Among them a total of 65(58%) were anaemic (i.e. haemoglobin <12gm%). Most of them 36.6% were mild anaemic. There were 63.4% of girls and 53.3% of boys were suffering from anaemia. Students from Ineruwa were more anaemic than from Dhankuta (χ^2 = 4.63, d.f.=1, p=0.03).

Table 2. Distribution of Anaemia among School Children

*Haemoglobin Gram%	Ineruwa		Dhankuta		Boys		Girls		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
<7 (Severe)	-	-	5	9.8	1	1.7	4	7.7	5	4.5
7 to10 (Moderate)	11	18.2	8	15.7	4	6.6	15	28.7	19	16.9
10 to12 (Mild)	30	49.0	11	21.5	27	45.0	14	27.0	41	36.6
<12 Total (anaemia)	**41**	**67.2**	**24**	**47.0**	**32**	**53.3**	**33**	**63.4**	**65**	**58**
>= 12 (No anaemia)	**20**	**32.8**	**27**	**53.0**	**28**	**46.7**	**19**	**36.6**	**47**	**42.0**
Total	**61**	**100**	**51**	**100**	**60**	**100**	**52**	**100**	**112**	**100**

χ^2 = 4.63, d.f.=1, p=0.03 χ^2 = 1.17, d.f.=1, p=0.279
(Significant)   (Not significant)
*according WHO classification (severity of anaemia)

Urine Test

Urine for protein and glucose was examined by Uri stick method and found that all 112 urine samples were free of protein and glucose.

Stool Test

The total numbers of 112 stool samples were examined for parasites. There were 77 (65.8%) samples consisted of parasites (Table 3). The girls (66.0%) and boys (65.6%) were affected equally. The samples from Dhankuta showed more stool parasites (80.6%) than samples from Ineruwa (χ^2 = 15.23, d.f. =1, p=0.00009, statistically significant).

Table 3. Distribution of Parasitic Infestation among School Children

Parasitic Infestation	Ineruwa		Dhankuta		Boys		Girls		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Parasitic Infestation	23	46.0	54	80.6	42	65.6	35	66.0	77	65.8
Normal stool	27	54	13	19.4	22	34.4	18	34.0	40	34.2
Total	**50**	**100**	**67**	**100**	**64**	**100**	**53**	**100**	**117**	**100**

χ^2 = 15.23, d.f.=1, p<0.00002 χ^2 = 0.00, d.f.=1, p=0.963
(Highly significant)   (Not significant)

The highest percentage was roundworm infestation (35.0%) followed by E. histolytica (Table 4). The roundworm infestation and E. histolytica were more common in both towns.

Table 4.Types of Parasitic Infestation among School Children

Stool parasites	Ineruwa		Dhankuta		Boys		Girls		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Entaemoeba histolytica	5	21.7	9	16.7	9	21.4	6	17.2	15	19.5
Giardia lamblia	3	13.3	7	13.0	9	21.4	5	14.3	14	18.2
Ascaris lumbricoides	10	43.4	24	44.4	15	35.7	12	34.3	27	35.0
Ancyclostoma duodenale (Hookworm)	2	8.7	3	5.6	1	2.4	5	14.3	6	7.8

Morbidity Pattern

One of the objectives of this study was to determine common morbidity in school children. The skin disease was the commonest (20%) among all health problems followed by dental caries (19.8%) (Table 5). Skin diseases, lymphadenopathies and gingivitis were common in boys where as anaemia, worm infestation and dental caries in girls.

Table 5. Morbidity Pattern among School Children[#]

Rank	Clinical examination/ observation	Boys (n=424)		Girls (n=394)		Total (n=818)	
		No.	%	No.	%	No.	%
1	Skin Diseases	97	22.9	67	17.0	164	20.0
2	Dental Caries	67	17.8	76	22.6	143	19.8
3	Lymphadenopathy	49	11.5	37	9.4	86	10.5
4	Angular Cheilosis	29	6.8	29	7.3	58	7.0
5	Tonsillitis	17	4.0	16	4.0	33	4.0
6	White Coated Tongue	16	3.7	15	3.8	31	3.7
7	Pain Abdomen	16	3.7	11	2.7	27	3.3
8	Heart/ Lung Diseases	11	2.5	15	3.8	26	3.2
9	Gingivitis	10	3.7	9	2.2	19	2.3
10	Ear discharge	8	1.8	8	2.0	16	1.9

Multiple responses

Nutritional Status

Weights for age were compared with Indian Academy of Paediatrics (IAP) classification (Table 6). There were 317 (39%) students with normal weight for age followed by grade I (30.6%), grade II (23%), grade III(6%) and grade IV (1.4%) undernutrient or underweight. The girls were more undernutrient than boys. The total percentage of under nutrition as per IAP was 61%.

Table 6. Weight for Age per IAP Classification

Label	Range	Boys		Girls		Total	
		No.	%	No.	%	No.	%
Normal	>80%	171	40.5	146	37.2	317	39.0
Grade I under nutrition	70%-80%	120	28.4	126	32.1	246	30.6
Grade II under nutrition	60%-70%	91	21.6	97	24.7	188	23.0
Grade III under nutrition	50%-60%	32	7.6	20	5.1	52	6.0
Grade IV under nutrition	<50%	8	1.9	3	0.8	11	1.4
Total		**422**	**100.0**	**392**	**100.0**	**814**	**100.0**

$(\chi^2 = 6.40, d.f.=4, p=0.17)$
(Not significant)

Table 7. Wasting Vs Stunting per Waterlow classification

Weight for Height (Wasting)	Height for Age (Stunting)			Test	
	>=90%	<90%	Total	χ^2	P
>=80%	Normal n = 513 (62.7%)	Stunted n = 176 (21.5%)	689 (84.2%)	4.05	0.044
<80%	Wasted n = 85 (10.4%)	Wasted and Stunted n = 44 (5.4%)	129 (15.8%)		
Total	**598 (73.1%)**	**220 (26.9%)**	**818 (100%)**	**1 d. f.**	**Significant**

Table 7 shows the nutritional status as per Waterlow classification (Wasting Vs Stunting). Among the examined students, 513 were normal (62.7%) followed by 176 (21.5%) stunted, 85 (10.4%) wasted and 44 (5.4%) wasted as well as stunned (Table7). Distribution of wasting Vs stunting according to Waterlow was also statistically significant. (χ^2=4.05, p=0.044).

Discussion
School health surveys offer an excellent opportunity to screen a large size of paediatric population with minimum resources. The present study was undertaken to find out growth patterns, morbidity patterns, etc. of primary school children.

Nutritional Status
Among 818 students, boys were 424 (51.8%) and girls were 394 (48.2%). The ratio of boys and girls is 1.07:1. This value is almost same to the ratio of boys & girls in primary school children of Nepal (1.18:1).[5]

According to Waterlow classification the percentage of wasting in our study was 10.5% which is comparable with the wasting percentage (11.5%) of the study by Pradhan E *et al* (1989)[6] done in Nepal.

In our study, it was found that 61% of students were under nutrition while in North India, Anand K. *et al* (1999)[7] found 51% underweight among school children.

Some studies had quite different results. Sebastian M. S. *et al* in Ecuador (1999)[8] found 1.4% of stunting and 1.8% of wasting among school children. In Tanzania, Lwambo N *et al* (2000)[9] detected 42.5% stunted and 43% wasted. Boys were affected predominantly than girls. This variability could be due to difference of environment and socio-economic conditions.

Morbidity pattern
The highest prevalence of diseases in this study was parasites in stool (65.8%) followed by anaemia (58%) and skin diseases (20%). Among skin diseases,

the most common one was pediculosis (21%) followed by ring worms (19.5%), scabies (14%), impetigo (11%) and eczema (10.5%).

Pediculosis was significantly higher in girls (29.8%) than in boys (14.4%) while ringworms and scabies were high in boys. Similar results were obtained in the survey by Negi KS et al (2001)[10] in Garhwal, Uttar Pradesh of India. His study revealed 22.6% of pediculosis, 5.1% of scabies, 22.6% of impetigo and 8.1% of eczema.

Nutritional deficiency dermatoses were angular cheilosis (7%), white coated tongue (3.7%), gingivitis (2.3%), ulcer tongue (1.5%) in this study where as Negi KS et al (2001)[10] found 1.4% angular cheilosis and others.

The prevalence of vitamin 'A' deficiency (Bitot's spot - 0.6%, corneal opacity - 0.2%) was less in the present study than the findings surveyed by Nepal Blindness Survey in 1981 (Bitot's spot = 2.2%). In few studies vitamin 'A' deficiency syndromes were 34.7% and 8.1% in rural primary school children from South Africa[11] and in the schoolgirls of Mumbai by Agrawal M et al (1999)[12] respectively showed high prevalence. This could be due to successful implementation of vitamin A distribution program in Nepal.

Prevalence of anaemia
The overall prevalence of anaemia in our study was 58% with 4.5% severe, 16.9% moderate and 36.6% mild anaemia. Girls were affected more than boys (63.7% Vs 53.4%).

Similar types of high prevalence of anaemia were found in Tanzania (62.6%) by Lwambo N et al (2000)[9], in Benin, Africa (50.5%) surveyed by Frongia O et al[13] and in Sri Lanka (80%) surveyed by Fornando S D. et al (2000)[14].

The 1998 Nepal Micronutrient Status Survey reported 78% of anaemia in preschool children while Baidhya P. et al[15] found 30% of pallor among school children of Grade IV and Grade V from Gorkha, Kathmandu and Chitwan. Verma M. et al (1998)[16] in primary schools of Punjab, and Anand K. et al (1999)[7] in the rural north Indian primary schools found 51.5% and 48.8% of anaemia respectively. These similar results once again support the high percentages of anaemia in developing countries/areas where poor nutrition, hygiene and sanitation were present.

Prevalence of Parasitic Infestation
In this study the percentage of stool infestation in boys and girls were 65.6% and 66% respectively. Ascariasis was found in 35% followed by E. hystolytica (19.5%), G. lamblia (18.2%), tapeworm (10.4%) and hookworm (7.8%) in our study.

Similarly, higher prevalence of worm infestation was found by Jinabhai C. C. et al in South Africa (2001)[11] and by Waikagul S et al in Northern Thailand (2002)[17]. For instance, 53.9%, 27.3% and 24.3% of 579 primary school children were infested with whipworm, Ascaris and Schistosoma haematobium respectively in South Africa where as 21.7% had ascariasis followed by 18.5% hookworm and 16.3% whipworm infestation in Northern Thailand.

Overall 65.8% of the school children were found infested with one or more of the parasites. Similarly 65% of the children in Ecuador[8] were found to be infested worms. The high prevalence of stool parasites could be related to behavioural factors such as poor hygiene, walking bare foot or lack of safe drinking water supply and open field defecation.

The 80% of students from Dhankuta town and 46% of students from Ineruwa were infested with stool parasites. The soil of Dhankuta is soft, humid where ova, larvae of worms can live longer. Another reason could be use of more green leafy vegetables (Rayo Sag) by the people in the Dhankuta than Ineruwa. These vegetables were grown in such type of soil and not properly washed before cooking.

Conclusion
The health and nutritional standards of school children in this study were found to be unsatisfactory. Boys were more stunted and girls were more wasted.

Among different morbidities, parasitic infestation (65.8%), anaemia (58%), skin diseases (20%), dental caries (19.8%) and lymphadenopathy (10.8%) were found to be the commonest. Ascariasis was the commonest among worm infestation. Pediculosis was more predominant in girls, while scabies was more common in boys. Mild anaemia was more predominant in students of Ineruwa town than in students of Dhankuta town. Severe anaemia was more common in girls.

This study highlighted the need for initiation of school health program in the schools with more emphasis on improving personal hygiene of the students, control and prevention of diseases like: parasitic infestations and anaemia to ensure overall improvement of their nutritional well being with the

collaboration of governmental and non-governmental agencies.

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