

Nutritional Status of Dalit Children: A Comparative Study with Non-Dalit Children in Eastern Terai of Nepal

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ARTICLE INFO

Article History

Received : 21 March, 2017

Accepted : 21 April, 2017

Published : 30 April, 2017

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Citation

Kafle TK, Singh GP, Singh SP, Kafle TK. Nutritional Status of Dalit Children: A Comparative Study with Non-Dalit Children in Eastern Terai of Nepal. BJHS 2017; 2(1)2: 117-126.

ABSTRACT

Introduction

The poor nutritional status of under five children has been considered a serious problem in Nepal for many years. Children need adequate nutrition for their proper physical, emotional as well as psychological development.

Objective

The objective of this study was to assess and compare the nutritional status of under five children and explore its socio-demographic determinants.

Methodology

An analytical cross-sectional study was conducted in Eastern Terai, acological belt of Nepal. Predesigned, pretested interview schedule was used to collect the information. Information was collected from 720 Dalit as well as Non-dalit mothers about their youngest children. The nutritional status was measured by using anthropometric measurements.

Results

In bi-variate analysis the significant difference were observed among children's nutritional status between castes as well as a number of socio-demographic variables however in multivariate analysis only caste, number of Children Ever Born (CEB) and mother's education were found significant determinants of height for age, mother's education was found significant determinant for weight for height and caste, age of children and mother's education were found significant determinants of weight for age of children.

Conclusion

Dalit children were found much more malnourished than Non-dalit. The castes, age of child, CEB to mother and mothers' education were found as the determinants of nutritional status among under-five children.

KEY WORDS

Children, dalit, height for age, nutritional status

INTRODUCTION

Adequate nutrition is prerequisite for all the individuals to maintain their physical as well as mental health; however, more focus has to be given particularly for women and children who are especially vulnerable to it. Childhood is a stage of active growth in all round aspects of a child. Children need varieties of nutrients in this stage, if the nutrient requirements of children are not met, the consequences can be serious for their physical, psychological as well as social development.

The poor nutritional status of under five children has been considered a serious public health issue in Nepal for many years. The most common forms of malnutrition in the country are protein energy malnutrition (PEM), iodine deficiency disorders (IDD), vitamin A deficiency (VAD), iron deficiency anaemia (IDA) and other micronutrient deficiencies (DoHS/MOPE).¹

Some studies have shown that the nutritional condition of Dalit children is very poor in comparison to general children, in Asian countries; however, there is lack of sufficient evidences in Nepalese context. A study conducted in Kapilvastu district of Nepal reported more than 60% under five children with any kind of malnutrition while measuring by anthropometric measurements. Out of them nearly one-fourth children were in critical condition (below -3SD).² The socio-demographic factors like socio-economic status, mother's age, birth order, exclusive breast feeding, and supplementary foods were associated with child health. Another Study conducted in Rupandehi district reported that 65% children aged between 36 to 59 months were stunted and 46% were underweight and the figure was more serious among the children of uneducated mothers.³ Similarly, the study conducted by Coffey D et al. in India found that the height gap between Scheduled Tribe children and children from general caste, or historically dominant groups were entirely associated with economic wealth and even after accounting for economic differences, an important height shortfall remained for Scheduled Caste.⁴

There is essential to explore the nutritional status of Dalit children along with socio-economic and demographic status. Therefore, the present study has aimed to explore the nutritional status of Dalit children in eastern Terai ecological belt of Nepal along with its comparison to Non-dalit children and also to aims to explore its socio-demographic determinants.

METHODOLOGY

This study is based on cross-sectional study design. Predesigned, pretested semi-structured interview schedule was used to collect the information. The nutritional status

was assessed by the anthropometric measurements: height, weight and Mid-Upper-Arm Circumference (MUAC).

To calculate the sample size a pilot study was conducted among 50 subjects and in an average 30% under five children were found malnourished. Based on the data of pilot study the sample size was obtained by using following formulae:

$$n = Z^2 \times P \times Q / d^2$$

$$= 4 \times 70 \times 30 / (7)^2$$

$$= 164 \text{ and considering design effect } 2$$

$$= 328 \text{ again considering } 10\% \text{ estimated non-responses } \sim 360$$

$$\text{For two groups Dalit and Non Dalit} = 360 \times 2 = 720$$

where, $z = 1.96$, $p = \text{prevalence rate}$, $q = 1 - p$, $d = \epsilon p = \text{relative probable error}$

In total, 720 study subjects were involved in this study.

Multistage cluster sampling technique was used to select study districts and VDCs. Three districts: Jhapa, Sunsari and Saptari were selected randomly in the first phase among total 5 districts. Again three VDCs: Surunga from Jhapa, Chhitaha from Sunsari and Inarwa Phulbariya from Saptari were also selected randomly. In third stage, equal numbers ($n=240$) of study subjects from each VDC were selected using simple random sampling technique from the list of mothers with under-five children. The sampling frame was prepared based on the newest record available from the local health unit (Health Post or Sub-health Post). Face to face interview was taken from the mothers by researchers themselves. Anthropometric measurements (weight, height and MUAC) of children from both Dalit and Non-dalit communities were measured by using standard measurement tools by following standard criteria. Information was collected from 720 mothers about their children who had under-five years in age. Weight was measured from all children and Height and Mid-Upper Arm Circumference (MUAC) were taken only from those children who were 6 months and above in age. Due to children's absence at home, the researchers were able to measure weight of only 705 children, and height and MUAC of 592 children.

Collected information were entered into MS Excel at first and later exported to the SPSS version 16 for analysis. BMI, Mid-upper-arm circumference, Height for Age, Weight for Height and Weight for Age were categorized according to WHO standard and Mean Z-score were also calculated and then compared between the two caste groups: Dalit and Non-dalit. In addition, the socio-demographic determinants were also explored. Bi-variate analysis was done using Pearson's chi-square test and multivariate analysis was done in binary logistic regression. Significance of the test was considered at 95% confidence interval. The ethical approval was taken from Nepal Health Research Council (NHRC), Kathmandu.

RESULTS

Height for age

Height for age is a nutritional indicator that indicates the growth in height of children according to their age. If the height for age is below - 2 SD from the median value then they are called stunted. Stunting is a widespread problem among Nepalese children.

variables considered, caste, age of children, numbers of CEB to mother, wealth index and mothers' education were found significantly associated with height for age of children in bi-variate analysis ($p < 0.05$). According to the age of children, 50.0 percent children aged 12-23 months were found below -

Table 1: Percentage Distribution of Children according to Height for Age of Children Aged 6-59 Months and Socio-demographic Characteristics.

Characteristics	N	<-3 SD (Severely Stunted)	**<-2 SD (Stunted)	≥-2SD (Normal)	Mean Z Score (SD)	Test of Significance* (χ^2)
Caste						
Dalit	297	21.5	47.4	52.5	-1.98	P = <.001
Non-Dalit	295	14.6	35.3	64.7	-1.54	
Age of Child (Month)						
6-11	99	9.1	20.2	79.8	-0.87	P = <.001
12-23	190	18.9	50.0	50.0	-1.88	
24-47	206	17.0	43.6	56.4	-2.13	
48 – 59	97	15.5	33.0	67.0	-1.63	
No. of CEB						
1	235	16.1	37.7	62.3	-1.59	P=.05
2	226	17.1	35.9	64.1-	1.68	
3	135	19.8	45.5	54.5	-1.81	
4+	109	22.0	54.9	45.1	-2.20	
Birth-Spacing (Month)						
First Child	199	16.6	38.2	61.8	-1.61	P=>.05
<24	86	23.3	41.8	58.2	-1.89	
24-47	208	17.8	44.2	55.8	-1.92	
>48	99	17.2	41.4	58.6	-1.62	
Sex						
Male	310	20.6	43.5	56.5	-1.83	p=>.05
Female	282	15.2	39.0	61.0	-1.68	
Wealth Index						
1st Quartile	189	24.9	50.3	49.7	-2.07	P=<.01
2nd Quartile	118	18.6	43.2	56.8	-1.84	
3rd Quartile	141	17.0	33.3	66.7	-1.57	
4th Quartile	144	9.7	36.1	63.9	-1.46	
Mothers' Education						
No Education	343	20.7	46.6	53.4	-1.83	P=<.05
Primary-Secondary	130	15.4	34.6	65.4	-1.79	
Grade 10 & Above	119	13.4	33.6	66.4	-1.51	
Total	592	18.1	41.4	58.6	-1.76	—

*Test of significance taking 3 columns: normal, undernourished and severely undernourished

** Also includes the children below - 3 SD

The height for age of children has been given in table 1. In total, 41.4 percent children were found stunted (<-2SD) and among them 18.1 percent were severely malnourished (<-3SD). The table also reveals whether any socio-demographic factor is associated with the Height for Age. Among the seven

2SD followed by the children 24-47 months (43.6%). Number of children ever born (CEB) was negatively associated with the height for age of children. As the number of ever born children increased the percentage of stunting also increased. Higher proportion (55%) of children were found stunted

(below -2 SD) if mother had four and more live births. The mean Z score (SD) was critical among the children with mothers of four and more live births (-2.20). Birth spacing of children had also influenced the height of children; majority of children (61.8%) of the first birth order had better height than others. Wealth index of family had also significant impact on achieving the height of the children. Children with poor wealth index had more chances to be stunted; 50.3 percent children of 1st quartile wealth index were stunted in comparison to only 36.1 percent children from third quartile

Table 2 describes the result of logistic regression analysis on the determinants of height for age among the children. Age, number of children ever born and mothers' education were found as significant determinants of height for age. The odds of 6-11 month children were two times higher to have normal height than the children of 48 month and above age (AOR:2.08; CI:1.07 -4.04). The children of mothers having two live birth had nearly two times normal height than the children of mothers with four and more live births (AOR :2.02, CI : 1.17 – 3.50). Similarly, the odds of children of mothers with grade 10 & above education having normal

Table 2: Logistic Regression Analysis on Socio-demographic Determinants of Height for Age of Children Aged 6 - 59 Months

Determinants of Height for Age	N	Logistic Regression Analysis	
		AOR	CI
Caste			
Dalit	297	1.00	Ref#
Non-dalit	295	1.36	0.92 - 2.00
Age of Children			
6-11	99	2.08	1.07 – 4.04*
12-23	190	0.46	0.27 – 0.77**
24-47	206	0.53	0.32 – 0.89*
48+	97	1.00	Ref#
No. of CEB			
One	199	1.47	0.83 – 2.60
Two	181	2.02	1.17 – 3.50*
Three	121	1.36	0.77 – 2.41
Four +	91	1.00	Ref#
Mothers' Education			
No Education	343	1.00	Ref#
Primary/Secondary	130	1.35	0.80 – 2.28
Grade 10+	119	1.64	1.03 – 2.61
*Wealth Index			
1 st Quartile	189	1.00	Ref#
2 nd Quartile	118	1.28	0.68 -2.41
3 rd Quartile	141	1.61	0.94 – 2.73
4 th Quartile	144	1.29	0.79 – 2.11

*significant at 95% CI, ** significant at 99%CI

($p < .001$) and above wealth index. Mean Z score (SD) was found critical among families with 1st quartile wealth index. Education also had better impact on achieving the height of children. Higher percent (46.6%) children with non-educated mothers were found stunted in comparison to the children of primary and high educated mothers ($p < .05$). Mean Z score (SD) was also severe among the children of non-educated mother (Table 1).

height were more than one and half times higher than the children of non-educated mothers (AOR :1.64, CI : 1.03 – 2.61).

Weight for Height

Weight for height parameter is close to the body mass index (BMI) for the children. Among the total study children, about 25 percent were found wasted ($< -2SD$) including 9.5 percent severely wasted ($< -3SD$).

Mother's educational status, caste and wealth index were found significantly associated with the weight for height of children ($p < .05$). Higher proportions of children with mothers' some education had normal weight for height as compared to the children with non-educated mothers. Similarly, children from families with upper-middle and highest wealth index were less likely to be malnourished as compared to others. The overall mean Z score SD was -1.23 for weight for height of children in the study area. Slight

differences in the mean Z score SD was observed according to the mother's education, wealth index, caste, number of CEB and age of children.

In multivariate analysis only mother's education was found significant determinant of weight for height. The odds of children with mothers' education as primary and some secondary were 2.36 times higher (CI: 1.39 – 4.10) and 1.79 times higher (CI: 1.08 – 2.98) as compared to the children of non-educated mothers (table 4).

Table 3: Percentage Distribution of Weight for Height of Children Aged 6-59 Months by Socio-demographic Characteristics

Characteristics	N	<-3 SD (Severely wasted)	**<-2 SD (wasted)	≥-2SD (Normal)	Mean Z Score (SD)	Test of Significance* (χ^2)
Caste						
Dalit	297	11.8	29.0	71.0	-1.32	P = <.05
Non-Dalit	295	7.1	20.3	79.7	-1.14	
Age of Child (Month)						
6-11	99	14.1	24.2	75.7	-1.20	P = >.05
12-23	190	9.5	24.2	75.8	-1.09	
24-47	206	6.3	22.2	77.7	-1.17	
48 – 59	97	11.3	33.9	69.1	-1.66	
No. of CEB						
1	235	8.0	25.1	74.9	-1.09	P=>.05
2	226	9.4	23.8	76.2	-1.32	
3	135	9.9	22.3	77.7	-1.18	
4+	109	12.1	28.6	71.4	-1.44	
Birth-Spacing						
First Child	199	8.5	25.6	74.4	-1.14	P=>.05
<24	86	8.1	29.0	70.9	-0.98	
24-47	208	11.5	25.0	75.0	-1.40	
>48	99	8.1	18.2	81.8	-1.27	
Sex						
Male	310	9.4	23.5	76.5	-1.17	p=>.05
Female	282	9.6	25.9	74.2	-1.30	
Wealth Index						
1st Quartile	189	9.5	27.1	73.0	-1.31	P=<.05
2nd Quartile	118	9.3	31.3	68.6	-1.39	
3rd Quartile	141	12.8	23.4	76.6	-1.29	
4th Quartile	144	6.2	17.3	82.6	-0.94	
Mothers' Education						
No Education	343	12.0	30.0	70.0	-1.37	P=<.001
Primary-Secondary	130	4.6	15.4	84.6	-1.01	
Grade 10 & Above	119	7.6	19.4	80.6	-1.08	
Total	592	9.5	24.7	75.3	-1.23	—

*Test of significance taking 3 columns: normal, undernourished and severely undernourished

** Also includes the children below - 3 SD.



Table 4: Logistic Regression analysis on Socio-demographic Determinants of Weight for Height of Children Aged 6 - 59 Months

Determinants of Height for Age	N	Logistic Regression Analysis	
		AOR	CI
Caste			
Dalit	297	1.00	Ref#
Non-dalit	295	1.37	0.89 - 2.10
Education of Mother			
No Education	343	1.00	Ref #
Primary/Secondary	130	2.36	1.39 - 4.01**
Grade 10+	119	1.79	1.08 - 2.98*
*Wealth Index			
1 st Quartile	189	1.00	Ref#
2 nd Quartile	118	1.08	0.64 – 1.82
3 rd Quartile	141	1.11	0.64 – 1.91
4 th Quartile	144	1.76	0.92 – 3.37

*significant at 95% CI, ** significant at 99%CI

Weight for Age

Weight for age is one of the most common indicator to measure nutritional status of children has given in table no. 5. Among 705 children measured successfully, 38.6 percent were found underweight (<-2SD) and 13.6 were severely underweight (<-3SD).

Education, wealth Index, caste, age of children and numbers of children ever born were significantly associated with the weight for age ($p < .05$). About one and half times higher proportion of Dalit children (46.4%) were underweight as compared to Non-dalit (30.7%) and children of aged 2 years

and above were more vulnerable to be underweight than those below 2 years.

Higher proportion of first (64.3%) and second (66.4%) order live births had better weight than the forth order and more (46.8%). Mother's education was highly significant in maintaining the normal weight; underweighted children without mother's education were nearly two times higher than the children of educated mothers'. Similarly, the variation is also found in mean Z score (SD) of weight for age according to the socio-demographic status. Children of age below 6 months had better (-1.02) mean Z score than the children aged 24-47(-2.03) and 48-59 months (-2.10), (Table 5).

Table 5: Percentage Distribution of Children according to Weight for Age and Socio-demographic Characteristics

Characteristics	N	<-3 SD (Severely underweight)	**<-2 SD (Under weight)	≥-2SD (Normal)	Mean Z Score (SD)	Test of Significance*(χ^2)
Caste						
Dalit	353	18.1	46.4	53.5	-1.90	P = <.001
Non-Dalit	352	9.1	30.7	69.3	-1.55	
Age (in Month)						
< 6	111	5.4	16.2	83.8	-1.02	P = >.001
6-11	100	13.0	37.0	63.0	-1.44	
12-23	190	13.7	38.4	61.6	-1.73	
24-59	207	16.4	47.3	52.7	-2.03	
48-59	97	17.5	47.4	52.6	-2.10	

No. of CEB						
1	235	11.1	35.7	64.3	-1.54	P=<.01
2	226	14.2	33.6	66.4	-1.66	
3	135	11.1	40.0	60.0	-1.78	
4+	109	21.1	53.2	46.8	-2.15	
Birth-Spacing						
First Child	235	11.5	36.2	63.8	-1.58	P=>.05
<24 Month	108	14.8	43.5	56.5	-1.61	
24-47 Month	245	16.3	40.0	60.0	-1.92	
48 & Above	117	11.1	35.9	64.1	-1.72	
Wealth Index						
1 st Quartile	189	17.3	42.7	57.3	-1.95	P=<.05
2 nd Quartile	118	15.2	43.7	56.3	-1.77	
3 rd Quartile	141	14.3	39.8	60.2	-1.78	
4 th Quartile	144	6.9	27.7	72.3	-1.32	
Sex						
Male	355	13.8	38.3	61.7	-1.73	p=>.05
Female	350	13.4	38.9	61.1	-1.72	
Mothers' Education						
No Education	410	18.0	45.1	54.9	-1.90	P=<.001
Primary-Secondary	153	7.2	32.7	67.3	-1.50	
Grade 10 & Above	142	7.7	26.1	73.9	-1.45	
Total	705	13.6	38.6	61.4	-1.72	—

*Test of significance taking 3 columns: normal, undernourished and severely undernourished

** Also includes the children below - 3 SD.

Table 6 : Logistic Regression analysis on Socio-demographic Determinants of Weight for Age of Children

Determinants of Height for Age	N	Weight for Age	
		AOR	CI
Caste			
Dalit	353	Ref #	—
Non-dalit	352	1.55	1.09 – 2.21*
Age of Child (Month)			
< 6	111	5.08	2.63 – 9.81***
6-11	100	1.59	0.89-2.85
12-23	190	1.44	0.87 - 2.39
24-47	207	0.98	0.60 - 1.62
48+	97	1.00	Ref#
No. of CEB			
1	235	1.44	0.80 - 2.56
2	226	1.98	1.14 – 3.44*
3	135	1.33	0.75 – 2.37
4 +	109	1.00	Ref#
Education			
No Education	410	1.00	Ref#
Primary/Secondary	153	1.87	1.16 – 3.02**
Grade 10+	142	1.62	1.07 – 2.45*
Decision - Making			
No	401	1.00	Ref#
Yes	304	1.31	0.95 - 1.82

*significant at 95% CI, ** significant at 99%CI, ***significant at 99.9% CI



The result of multivariate analysis confirmed that the caste, age of children, numbers of ever born children and education of mothers were significant determinants of weight for age of the children. The remarkable variation is that the odds of having normal weight in children less than 6 months was 5.08 (CI: 2.63 – 9.81) times higher than the children of 48 months & above. Similarly, the odds of Non-dalit children gaining normal weight was 1.55 (CI: 1.09 - 2.21) times higher than the Dalit children. Education was also another significant determinant of weight for age. Children of educated mothers had higher chances of getting normal weight as compared to the children of not-educated mothers. The children with mothers' primary-secondary education had 1.87 (CI: 1.16 – 3.02) times higher and with mothers' education grade 10 & above had 1.62 (CI: 1.07 – 2.45) times higher odds than the children of

not-educated mothers to gain better weight for age. The decision-making capacity of mothers also had some influence for gaining normal weight of children (table 6).

Mid-Upper-Arm Circumference (MUAC)

Mid-Upper-Arm circumference of children determines the muscle volume in the body. In the present study, in total, 21.4 percent children had MUAC below -2SD indicating malnutrition. While observing by socio-demographic backgrounds, the figure was worse among the Dalit caste than Non-dalit ($p < .001$); children of age group 6-11 months had better MUAC than children of older ages. As the age of children increasing, proportion of normal MUAC ($p < .001$) was observed decreasing (Table 7).

Table 7: Percent Distribution of Children according to Mid-Upper-Arm circumference (MUAC) by Socio-demographic Characteristics

Characteristics	N	<-3 SD (Severely Malnourished)	*<-2 SD (Malnourished)	≥-2SD (Normal)	Test of Significance (χ^2)
Caste					
Dalit	297	4.7	29.3	70.4	P=<.001
Non-Dalit	295	1.4	13.6	84.4	
Age of Child (Month)					
6-11	99	0.0	9.1	90.9	P=<.001
12-23	190	2.6	20.5	79.5	
24-47	206	3.9	23.3	76.7	
48-59	97	5.2	32.0	68.0	
Birth Spacing (Month)					
First Child	199	1.5	18.6	81.4	P=<.001
<24	86	0.0	23.3	76.7	
24-47	208	4.8	23.1	76.9	
>48	99	5.1	22.3	77.8	
Sex					
Male	310	2.9	20.0	80.0	p=.00
Female	282	3.2	23.1	77.0	
Wealth Index					
Low	9.5	31.2	67.2	1.6	P=<.001
Lower-middle	11.0	29.6	66.9	3.4	
Upper-middle	14.2	29.1	70.2	0.7	
High	8.3	19.4	79.2	1.4	
Mother's Education					
No Education	343	4.7	27.4	67.9	P=<.001
Primary- some Secondary	130	0.8	13.9	83.1	
Grade 10 & Above	119	0.8	12.6	84.9	
Total	592	3.0	21.4	78.6	—

*Also includes the children below -3 SD

Birth spacing of children was also significantly associated with MUAC ($p < .001$). The first child had better MUAC status as compared to others. Higher percentage of female children had MUAC thinner as compared to male children. Education of mother again has significant impact on the MUAC status of children. Twenty seven (27.4%) percent children with non-educated mother had MUAC below $-2SD$ and 4.7 percent had below $-3SD$, however the same figure was better among the children of educated mothers ($p < .001$).

The multivariate logistic regression analysis was done and only wealth index was found significant determinant of Mid-Upper Arm Circumference. The odds of children from the family of highest and second highest wealth index were 3.05 (CI: 1.75 – 5.29) and 3.12 (CI: 1.82 – 5.35) times higher times higher for obtaining normal MUAC than the children of lowest wealth index (table 8).

stunted, 9.5 percent were severely wasted and 13.6 percent were severely underweight. Mean Z score was also calculated to find out the severity of malnutrition. The average Z score was $-1.76 SD$ for height for age, $-1.72 SD$ for weight for age and $-1.23 SD$ for weight for height. Similarly, 21 percent children had MUAC below $-2SD$ and the Mean MUAC was found 13.7 cm. While observing according to the socio-demographic characteristics caste, mother's education and wealth index of family were strongly associated with all three indicators i.e. height for age, weight for height and weight for age. In addition, age, number of children ever born (CEB) and birth spacing also positively associated with height for age and age and number of CEB with weight for height.

While adjusting with caste, age, sex, birth spacing, number of CEB, wealth index, mother's education and mother's decision making capacity in multivariate analysis, only caste, number of CEB and mother's education were found as

Table 8: Logistic Regression analysis on Socio-demographic Determinants of MUAC of Children

Determinants of Height for Age		N	Logistic Regression Analysis	
			AOR	CI
Wealth Index	1 st Quartile	189	1.00	Ref#
	2 nd Quartile	118	2.06	1.26 – 3.37 **
	3 rd Quartile	141	3.16	1.82 – 5.35***
	4 th Quartile	144	3.05	1.75 – 5.29***

*significant at 95% CI, ** significant at 99%CI, ***significant at 99.9% CI

DISCUSSION

Adequate nutrition is prerequisite for all the individuals to maintain their health; however, more focus has to be given particularly women and children who are especially vulnerable to it. Problems related to malnutrition affect the population of all ages and areas; women and children are especially vulnerable because of their unique physiology and socioeconomic backgrounds.⁵ Women's nutrient needs increase during pregnancy and lactation. If the requirements are not met, the consequences can be serious particularly for their infants.⁶ The poor nutritional status of children has been considered a serious issue in Nepal for many years. The malnutrition status has been trying to assess by anthropometric measurements in this study to understand the real situation among Dalit children along with its comparison with Non-dalit. The height for age, weight for height, weight for age, mid-upper-arm circumference (MUAC) and mean Z score (SD) were obtained and compared between groups according to the WHO standard.

In total, 41 percent children were found stunted ($<2SD$), 24.7 percent wasted and 38.6 percent underweight. Moreover, the prevalence of severe malnutrition was also high in children. Eighteen percent children were severely ($<-3SD$)

significant determinants of height for age. Mother's education was found significant predictor (determinant) for weight for height. Similarly, Caste, age of children and mother's education were found as significant determinants of weight for age.

The finding of NDHS 2011 is similar with present finding except wasting, they indicated that 39 percent children were stunted, 29 percent underweight and 11 percent were wasted. Wasting found higher in present study. They also found that the problem was deeper among the Dalit, low income households and non-educated mothers' children.⁶ Later Panday JP et al (2013) further analysed NDHS 2011 data and found almost similar results. They found that caste/ethnicity, age of child and wealth index were significant predictors of weight of age of the children along with delivery by an SBA.⁷ Another study by Shah N (2004) also reported similar finding as the present study. They analyzed the final survey of Child Nutrition Program 2003 data and found that older children (above 36 month) and children whose mothers were illiterate were more likely to be underweight and stunted.⁸

Girma et al (2002) conducted further analysis of DHS 2000 data, Ethiopia and found in a multivariate analysis that religion, education of mother and father, economic status of household, age of child, birth order (only first), and birth interval as significant predictor variables of stunting among the children.⁹ Pongou et al. (2006) analyzed the Demographic Health Survey of 1991 and 1998 data from Cameroon. They found average weight for age (Weight for Age Z score) and height for age (Height for Age Z score) declined between 1991 and 1998. This decline occurred mostly among boys, children over 12 months of age, and those with low socio-economic status. Maternal education and maternal health seeking behaviour were associated with better child nutrition. Household economic status had an overall positive effect but it had little effect in children less than 6 months of age.¹⁰

The caste, age, wealth index and education of mothers were found significantly associated with the MUAC of children in this study. More proportion of children between 6-11 months, the first birth and children with mothers' some education had better MUAC. Dalit caste Children of not educated mothers, from lowest and second lowest wealth index and older age-group were more vulnerable to be undernourished.

Among all variables, the education of mother was found to be the most significant determinant for all parameters of child nutrition and the effect of wealth index of the family

had also significant effect. This result is closely similar with a study conducted by Mishra SK et al in Kanti Children Hospital Kathmandu, Nepal. They revealed that the children of literate mothers had better anthropometric measurements than children of illiterate mothers.¹¹

Though there are many efforts have been made to improve the nutritional status of children, the problem of malnutrition is still very high in Nepalese children and it needs a special focus of family, communities as well as the government authorities.

LIMITATION OF THE STUDY

This study has not covered all components of nutrition; only anthropometric measurements were taken and socio-demographic determinants were explored.

The anthropometric measurements could not be obtained from all children as some of them were absent during data collection

ACKNOWLEDGEMENT

Researchers are thankful to the Nepal Health Research Council, ethical review board for the approval of this study. We also thankful to participants of eastern Terai, Nepal as well as enumerators Tejika Adhikari and Indu Yadav.

CONFLICT OF INTEREST

No conflict of interest

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