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Prevalence and Associated Factors of Malnutrition in Under Five Children in Eastern Nepal: A Hospital Based Study

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Abstract

Introduction: Malnutrition among children remains one of the most important causes of morbidity and mortality in the developing countries like Nepal. Multiple interrelated determinants are involved in causing malnutrition that needs to be catered. This study aims to assess the prevalence and associated factors of malnutrition among under-five children in eastern Nepal.

Methods: This is a hospital-based correctional study. The enrolment occurred between Jan 2018 and Dec 2019 among children who visited nutrition clinic in our hospital. The data analyses were performed using Logistic regression and 95% confidence interval along with p-value. A p-value < 0.05 was considered statistically significant.

Results: A total of 310 children were analyzed for malnutrition. Among them, the prevalence of underweight, stunting and wasting was 34.10, 32.45, 17.54 % respectively. Among them, majority of the mother belonged to young age group between 18- 25 years, 216 (69.68%) were females and 120 (38.71%) and Majority of malnutrition fell in the age group of 12 – 23 months. Mother's age, mother's education, family size, economic status, child's age and sex, exclusive breast, ethnicity, mother's occupation and total family size were found to be significantly associated with malnutrition.

Conclusions: This study highlights serious concern of malnutrition among under five years old children in eastern part of Nepal. Multiple hierarchically interrelated determinants associated with child, mother and the social environmental factors were found significant in malnutrition among the children.

Introduction

Malnutrition is a major public health concern for children under five in many low and middle-income countries and is a leading cause of child mortality.[1,2] The effects of malnutrition can be categorized into being underweight, stunting, wasting with or without edema, and eventually death and has been associated with 50% of all child deaths and 11% of the total global disability-adjusted life years worldwide.[3,4]

Globally, 462 million are underweight, with its prevalence in children under five in South Asia being 27.4%.[5,6] Around 70–80% of undernourished children worldwide live in lower and middle-income countries, including Nepal.[4] Half of the cases of mortality in children under five years of age (54 per 1000 live births) are associated with malnutrition.[6,7]

The prevalence of underweight, stunting, and wasting was 36.8%, 37.5%, and 14.6% respectively, according to a study in a rural mountainous area of Nepal among which 5.8% were severely malnourished.[8,9] Although the nutritional status of children in Nepal has improved significantly over the past 15 years, progress towards the Sustainable Development Goal targets on stunting and wasting is not advancing at the speed, scale or equity required. Poor maternal nutrition, suboptimal feeding practices along with socio-economic, cultural, and geographic inequalities in access to resources and services are hindering the progress of child nutrition.[6] The aim of this study was to study the prevalence and associated factors of malnutrition among children visiting a tertiary care hospital in eastern Nepal.

Methods

This is a hospital- based, cross-sectional study conducted in tertiary care Teaching Hospital, BP Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal. Data were obtained from 310 cases enrolled in a hospital-based nutritional outpatient clinic during the study period. Enrollment occurred between Jan 2018 and Dec 2018. All children aged six to 59 months old and their mothers were included in the study. Children who were seriously ill, children with mothers who were difficult to communicate with, and children with physical deformities, chronic disease, malignancies and undergone any surgical procedures that hinder height measurements the time of data collection. For example, children who have undergone hip and spine surgeries were excluded from the study. Ethical approval was taken from Institutional Review Committee of BP Koirala Institute of Health Sciences (BPKIHS), IRC ref no. 273/077/078-IRC. The sample size 385 was estimated by using formula n = z^2pq/d^2 at 95% Confidence interval (Z), with an assumption of prevalence (p) of underweight children 50% and allowable error or precision (d) of 5% with addition of 10% non-response rate. Of the total 385 participants, 310 participated and were included in the final data analysis. A structured-interviewer-administered questionnaire was used to collect the data from mothers of children six to 59 months of age. Verbal and written informed consent were obtained from the participants before collecting data. The data was collected using a structured-interviewer-administered questionnaire that covered various factors such as socioeconomic and demographic factors, child feeding and caring practices, maternal health factors, environmental health related characteristics, and anthropometrics measurements. Anthropometric measurements, such as weight and height of children, were taken using standard procedures outlined in a measurement guide prepared by the Food and Nutrition Technical Assistance project. Body weight was measured using a calibrated portable scale while height was measured using a portable stadiometer with no shoes, and the head in Frankfurt's position. The Mid Upper Arm Circumference (MUAC) was measured by marking midway between the shoulder tip and the elbow tip on the vertical axis of the upper arm with the arm bent at a right angle and between the lateral and medial surface of the left arm. The data collected was then converted using the 2006 WHO Anthro 3.2.1 software[2] into height-for-age (HAZ), weight-for-age (WAZ), and weight-for-height (WHZ) Z-scores to assess malnutrition, taking into consideration the child's sex. The outcome variables for this study were weight-for-height (wasting), height-for-age (stunting), and weight-for-age (underweight). These variables were recorded in the collected data and were analyzed to assess the prevalence of malnutrition among the study population. The data analyses were performed using logistic regression and 95% confidence interval along with p-value. Relationships were considered significant if $p < 0.05$. All analyses were performed using the Statistical Package for the Social Sciences SPSS v 24.0.

Results

A total of 310 mothers meeting inclusion criteria with their children aged six to 59 months were included in the study. Various findings have been depicted in the subsequent tables as follows.

Table 1. Demographic and socioeconomic characteristics of the participants (N = 310)

Character-istics	Categories	Frequency (%)	Percent (%)
Mother's age in years	18 - 25	120	38.71
	26 - 30	80	25.81
	31 - 35	65	20.97
	36 - 40	45	14.51
Mother's marital status	Married	286	92.26
	Divorced	09	2.90
	Widowed	15	4.84
Mother's ethnicity	Hindu	140	45.16
	Buddhist	97	32.29
	Muslim	37	11.94
	Christian	19	6.13
	Others	17	5.48

Mother's education	Illiterate	36	11.61
	Primary	186	60
	Secondary	68	21.94
	Higher second-ary	20	6.45
Mother's occupation	Housewife	218	70.32
	Employee	92	29.68
Total family size	< 5	112	36.13
	> 5	198	63.87
E c o n o m i c Status	Upper	12	38.71
	Middle upper	19	61.29
	Lower upper	43	13.87
	lower	138	44.52
	Lower Middle	98	31.61
	Lower		

Table 2. Characteristics and caring practices of under-five children (N = 310)

Characteristics	Categories	Frequency (N)	Percent (%)
Sex	Male	94	30.32
	Female	216	69.68
Age in months	6 - 11	35	11.29
	12 - 23	120	38.71
	24 - 35	87	28.06
	36 - 47	47	15.16
	48 - 59	21	6.77
Birth order	1	37	11.94
	2 - 3 > 3	76	21.52
		197	63.55
Initiation of breast-feeding	Within an hour	78	25.16
	Hours later	135	43.55
	Days later	97	31.29
Received prelacteal feeding	Yes	69	22.26
	No	241	77.74
Exclusive breastfeed-ing	Yes	89	28.71
	No	221	71.29
Currently breastfeed-ing	Yes	125	41.32
	No	185	59.68
Complementary feeding started on time	Yes	89	28.71
	No	221	71.29
Child immunization	Yes	248	80
	No	62	20

Table 3. Maternal and environmental health characteristics of respondents (N = 310)

Characteristics	Categories	Frequency (N)	Percent (%)
Antenatal care (ANC) follow-up (index child)	Yes	255	82.26
	No	55	17.74
Place of delivery for (index child)	Home	17	5.48
	Home assisted	98	31.61
	Health institution	195	62.90
Hand washing practice of mother	After latrine use	300	96.77
	Before preparing food	223	71.94
	Before serving food	253	81.61
Source of drinking water	Unprotected source	263	84.84
	Protected source	47	15.16
Presence of latrine	Yes	289	93.23
	No	21	67.74

Table 4. Overall prevalence of malnutrition among under-five children (N = 310)

Anthropometric indices	Frequency (N)	Percent (%)
Weight for age Z Score (Under-weight)	08	2.5
< -3.00 WAZ (Severe underweight)	67	21.61
-3.00 to -2.01 WAZ (Moderate underweight)	35	11.29
-2.00 to 1.01 WAZ (Mild under-weight)	110	35.48
Height for age Z score (Stunting)	11	3.5
< -3.00 HAZ (Severe stunting)	59	19.03
-3.00 to -2.01 HAZ (Moderate stunting)	28	9.03
-2.00 to 1.01 HAZ (Mild stunting)	98	31.61
Weight for height Z score (Wasting)	04	1.2
< -3.00 WHZ (Severe Wasting)	33	10.6
-3.00 to -2.01 WHZ (Moderate Wasting)	16	5.1
-2.00 to 1.01 WHZ (Mild Wasting)	53	17.10

Table 5. Factors associated with underweight among under-five children (N = 110)

Characteristics	Categories	Underweight N (%)			P value
		Yes	No	Total	
Mother's age in years	18 - 25	12 (10.00)	108 (90.00)	120	0.012
	26 - 30	41 (51.25)	39 (48,75)	80	
	31 - 35	35 (53.84)	30 (46.25)	65	
	36 - 40	15 (31.91)	32 (68.08)	45	
Mother's education	Illiterate	13 (50)	13 (50)	26	0.031
	Primary	58 (31.18)	128 (68.82)	186	
	Secondary	23 (33.82)	45 (66.18)	68	
	Higher secondary	09 (45)	11 (55)	20	
Total family size	< 5	37 (33.04)	75 (66.96)	112	0.024
	> 5	66 (33.33)	132 (66.67)	198	
Economic Status	Upper	02 (16.67)	10 (33.33)	12	0.037
	Middle upper	04 (21.05)	15 (78.95)	19	
	Lower upper lower	15 (34.88)	28 (65.12)	43	
	Lower Middle	35 (25.36)	103 (74.64)	138	
	Lower	47 (47.96)	51 (52.04)	98	
Child age in months	6 - 11	17 (48.57)	18 (51.43)	35	
	12 - 23	35 (29.17)	85 (70.83)	120	
	24 - 35	23 (26.44)	64 (73.56)	87	0.011
	36 - 47	18 (38.30)	29 (61.70)	47	
	48 - 59	10 (47.62)	11 (52.38)	21	
Exclusive breastfeeding	Yes	48 (53.93)	41 (46.07)	89	0.022
	No	55 (25.82)	158 (74.18)	213	
Source of drinking water	Unprotected source	71 (27.84)	184 (72.16)	255	0.041
	Protected source	32 (68.09)	15 (31.91)	47	

Significant at p < 0.05

Table 6. Factors associated with stunting among under-five children for stunting (N = 98)

Characteristics	Categories	Stunting n%		Total	P value
		Yes	No		
Mother's ethnicity	Hindu	41 (29.29)	99 (70.71)	140	
	Buddhist	32 (32.99)	65 (67.01)	97	
	Muslim	8 (21.62)	29 (78.38)	37	0.011
	Christian	3 (15.79)	16 (84.21)	19	
	Others	8 (47.06)	9 (52.94)	17	
Mother's education	Illiterate	29 (80.56)	07 (19.44)	36	
	Primary	47 (25.27)	89 (74.73)	186	
	Secondary	21 (30.88)	47 (69.12)	68	0.043
	Higher secondary	01 (5)	19 (95)	20	

Mother's occupation	Housewife	63 (29.58)	155 (70.42)	218	0.033
	Employee	35 (38.04)	57 (61.96)	92	
Total family size	< 5	47 (41.96)	65 (58.04)	112	0.037
	> 5	51 (25.76)	147 (74.24)	198	
Birth order	1	12 (32.43)	25 (67.57)	37	0.043
	2-3	34 (44.74)	42 (55.26)	76	
	> 3	52 (26.40)	145 (73.60)	197	
Timely complementary feeding started	Yes	57 (64.04)	32 (35.96)	89	0.045
	No	41 (18.55)	180 (81.45)	221	

Significant at p < 0.05

Table 7. Factors associated with wasting among under-five children (N = 53)

Characteristics	Categories	Wasting n%			P value
		Yes (N = 53)	**No (N = 302)**	**Total**	
Child's sex	Male	14 (14.89)	80 (85.11)	94	0.034
	Female	39 (18.06)	177 (81.94)	216	
Child age in months	6 - 11	04 (11.43)	31 (88.57)	35	
	12 - 23	22 (18.33)	98 (81.67)	120	
	24 - 35	14 (16.09)	73 (83.91)	87	0.045
	36 - 47	08 (17.02)	39 (82.98)	47	
	48 - 59	03 (14.29)	18 (85.71)	21	
Mother's occupation	Housewife	37 (16.97)	181 (83.03)	218	0.013
	Employee	18 (19.57)	74 (80.43)	92	
Total family size	< 5	23 (20.54)	89 (79.46)	112	0.034
	> 5	30 (15.15)	168 (84.85)	198	
Exclusive breastfeeding	Yes	27 (30.34)	62 (69.66)	89	0.045
	No	26 (12.21)	187 (87.79)	213	
Currently breastfeeding	Yes	38 (30.4)	87 (69.60)	125	0.047
	No	15 (8.11)	170 (91.89)	185	
Source of drinking water	Unprotected source	17 (7.20)	246 (92.80)	263	0.018
	Protected source	36 (76.60)	11 (26.40)	47	

Significant at p < 0.05

Discussion

Malnutrition is a leading cause of child mortality in low - and middle-income countries accounting for half of the cases of mortality in children under five.[2,7] Although the nutritional status of children in Nepal has improved significantly over the past 15 years, poor nutrition, suboptimal feeding practices along with socio-economic, cultural, and geographic inequalities in access to resources and services have been a major factor in under-five child nutrition.[6] This study thus tries to identify the prevalence and associated factors of malnutrition among under five children visiting a tertiary care hospital in eastern Nepal.

Among total of 310 mothers with their children belonging to age group of six to 59 months, our study showed that demographic characteristics similar to other studies from Nepal.[7,20,21]

Among the children who participated in our study, majority were females 16 (69.68%), among which half belonged to age group six to 23 months 155 (50%) and were of birth order more than three 197 (63.55%). In similar studies by Adhikari et al[12] and Karki et al,[20] majority of the participants were male children which contradicts our study and could have created discrepancy in the results between our study and others. Among these children, only 78 (25.83%) initiated breastfeeding within an hour and majority did not receive pre-lacteal feeds 241 (78.15%). Only 89 (29.47%) were exclusively breastfed and timely complementary feeding was started in 89 (28.71%). This is in contrast to another similar study where 76.15% of total respondents introduced breast feeding with one hour and 91.79% had introduced exclusive breast feeding for up to six months.[21] Majority of the children {248 (80%)} were immunized and similar findings were seen in other studies.[21]

Our study revealed that the prevalence of underweight, stunting and wasting was 35.48%, 31.61% and 17.10% respectively. This is in concordance with similar study by Chataut J et al.[8] However, in the context of Nepal, according to NDHS 2022, the prevalence of underweight (19%), stunting (25%) and wasting (8%) has declined as compared to the data in 1996. The discrepancy in the results of our study which has higher rates as compared to this data may have been resulted due to the timing of the study which was four years before the NDHS 2022 and also because NDHS data is the average of participants from all the geographical

regions from Nepal, whereas our finding is only from eastern Nepal.[9] The prevalence of underweight was lower and stunting was higher in our study as compared to a similar study in rural mountainous area of Nepal.[10] This may be due to disparity in the geographical region involved in the study whereas other study showed comparable results.

The prevalence of underweight 110 (35.48%) found in this study is higher than the estimated rate in Asia and other parts of Nepal as well as other countries in the world.[5] However, other studies conducted in Nepal show higher rates of underweight.[7,10-14] There was significant association of children being underweight and stunted who belonged to lower economic status. Many studies support this finding whereas no significant association between economic status and malnutrition is seen in others.[7,21] Large family size was significantly associated with underweight, stunting and wasting. Increased economic burden for food consumption might have resulted in poor nutritional status of the children. This association has been proved in other studies as well.[7,21] Unprotected drinking water source was significantly associated with underweight. In a study done by Adhikari et al,[12] the study reported that children of families who consumed water without treatment had higher odds of being underweight than those who consumed boiled water.

Mother's ethnicity, occupation, total family size, economic status and timely complementary feeding status were found to be statistically significant. Mother's education was also significantly associated, where illiterate mothers and those with education upto primary level had children with underweight and stunting but not wasting. Several studies from different countries including Nepal, India, Pakistan, Ethiopia, Bangladesh have also reported significant association between mother's education status and malnutrition.[24-29] However, the results of study by Karki et al[20] contradicts this finding. This discrepancy may have resulted due to different geographic regions of the research.[20]

Child's gender, age, mother's occupation, total family size, exclusive breast feeding, current breast-feeding status and source of drinking water were found to have significant association. This finding is also supported by many other studies.[14,19,22-28] However, Nepali et al reported similar prevalence of wasting in male (9.5%) and female (9.7%) aligning with another study stating no significant association of sex with wasting.[30]

The present study comes with its own limitations. A study conducted in Eastern Nepal cannot be generalized to the communities in other parts of the country with different geographical distribution, economic status, social as well as different health practices. Also, because the type of study conducted is cross-sectional, no interferences regarding cause of malnutrition could be done. Moreover, this is a hospital-based study and includes only the children who visited nutrition clinic. Nevertheless, the findings of this provide for a baseline information for further more inclusive studies in future with larger sample.

Conclusions

Our study showed that malnutrition still remains a serious issue in Eastern part of Nepal. Multiple factors such as mother's age, economic status, mother's education, mother's occupation, child's sex and age, habit of exclusive breast feeding, total family size of more than five and source of water in the locality were found to be significantly associated with malnutrition.

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