



# Nutritional Status and Its Associated Factors among Under-Five Children in Bidur Municipality, Nuwakot District, Nepal: A Secondary Data Analysis

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## ABSTRACT

**Background:** Undernutrition among under-five children is a major public health problem in Nepal. The study's main objective was to assess the nutritional status and its associated factors among under-5 children of Bidur Municipality, Nuwakot district using secondary data analysis.

**Methods:** We analyzed the data of 667 under-five children from 3183 households collected from the Community Health Diagnosis 2023 program database stored in the Kobo toolbox. Nutritional status indicators were measured by using the WHO classification. The chi-square test was applied to find out the association of nutritional status with independent variables such as maternal age at marriage, age at first child, antenatal, delivery, and post-natal care, exclusive breastfeeding, complementary feeding practices, and immunization status.

**Results:** Nearly 32% (95%CI: 28.3-35.8) of the children were stunted, 12.1% (95%CI: 9.7-14.7) wasted, and 13.9% (95%CI: 11.4-16.6) were underweight. Early age at marriage, less than four ANC visits by the mother, history of substance use during pregnancy, and not exclusively breastfeeding were significantly associated with different forms of undernutrition.

**Conclusion:** Promotion of exclusive breastfeeding and a higher number of ANC visits and discouraging early-age marriage and substance use during pregnancy are necessary to prevent undernutrition in under-five children.

**Keywords:** Malnutrition, Nepal, under-five children

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## BACKGROUND

The nutritional status of under-five children is a critical indicator of a population's health and well-being(1,2). Malnutrition among children poses significant challenges to individual health, impairing physical growth, cognitive development, and long-term well-being such as diabetes, cardiovascular disease, and obesity late in life (3). Malnutrition among under-five children is a major public health issue in Nepal, with significant implications for child health, development, and overall

well-being. According to Nepal Demographic Health Survey 2022, 25% of the children under five were stunted, 8% were wasted, and 19% were underweight. This figure indicates that a considerable proportion of Nepal's children are affected by acute and chronic malnutrition (4). Dietary practices, access to health care services, and socioeconomic determinants are the major factors associated with malnutrition among children(3).The municipalities of hilly districts like Nuwakot are likely to face similar challenges related to malnutrition, given their potential socio-economic

disparities (5). Understanding the specific nutritional needs and challenges faced by under-five children in these settings is essential for designing targeted interventions that address the root causes of malnutrition. By investigating factors such as dietary practices, access to healthcare services, and socioeconomic determinants, we can tailor interventions to meet the unique needs of the local population. This study aims to investigate the current status of nutrition among under-five children and its associated factors in selected wards of Bidur Municipality, Nuwakot district of Nepal by analyzing secondary data.

## METHODS

This was a cross-sectional study with secondary data analysis. The study population consisted of children under five years old in different wards of Bidur Municipality. The Bidur Municipality was established in 2073 as an urban municipality of Nepal as per the new Constitution of Nepal 2072. The headquarters of Bidur Municipality is located in Bidur, Nuwakot district of Nepal (6). The total population of this municipality was 54351 living in 15234 households as per the 2021 National Census (7). We analyzed the data collected in the Community Health Diagnosis Program in Bidur Municipality.

### Sampling method

We utilized all the data collected in Community Health Diagnosis (CHD) conducted between 19th Jan 2024 to 18th Feb 2024. For primary data collection, 10 wards out of 13 wards in Bidur municipality were chosen purposively. A convenient sampling approach was used to collect data, selecting approximately 25% of the total households in each selected ward as a sample. If the household had children under 5 years of age, the mother was interviewed and necessary measurements were taken of the children to assess the nutritional status. For this study, we conducted a secondary data analysis of 667 under-five children out of 3183 households.

### Study variables

Dependent variables: Malnutrition was assessed by anthropometric measurements such as height, and weight, and nutritional indices such as stunting, wasting and underweight were calculated. Anthropometric measurements such as weight and height were recorded following the World Health Organization (WHO) guidelines. Indicators based on weight, height, and age were further assessed and compared with the WHO growth reference standards (2006) (8). The participant's weight was measured in kilograms (Kg) with a weighing scale to assess their growth and nutritional status using the standard technique to the nearest 0.5 kg. If the child was less than two years old or was unable to stand, tared weighing was performed, and if the child was two years or older, the child was weighed

alone using a standardized, recently calibrated analog weighing machine. Using the standard technique, the participant's height was measured using a stadiometer/infantometer to the nearest 0.1 cm. If a child was less than two years of age, recumbent length (lying down) was measured using an infantometer; however, if the child was two years or older and could stand, standing height was measured using a stadiometer (9).

For the calculation of underweight, the child's weight was recorded and compared to the median values; alternatively, the participant's weight was plotted against age on a graph for comparison with the standard curve. A low weight-for-age is termed as underweight, defined as a weight-for-age Z-score (WAZ) of less than -2. Severely underweight was classified if WAZ was less than -3 of the WHO (2006) reference values [8]. Wasting is an indicator of acute malnutrition and is defined as a weight-for-height Z-score (WHZ) of less than -2. A Z-score between -2 and -3 was classified as moderate wasting. Severe wasting was classified if WHZ was less than -3 according to the WHO (2006) reference standards (8). Low height for age indicates stunting and depicts early chronic exposure to undernutrition. Stunting is a height-for-age Z-score (HAZ) of less than -2. A Z-score between -2 and -3 was considered moderate stunting, and severe stunting was classified if HAZ was less than -3 of the WHO (2006) reference standards. Anthropometric data was entered into the WHO Anthro software (WHO, Geneva, Switzerland) for analysis and the prevalence of stunting, wasting and underweight were determined using the WHO Z-scoring system. Children with WAZ, WHZ, and HAZ between +2 to -2 were considered adequately nourished or normal (1,9).

The independent variables considered in this study were the child's age (months), age at marriage (years) and first pregnancy (years), substance use during pregnancy (yes/no), antenatal care (ANC) practices (visits to antenatal clinic), health-seeking behavior, delivery care (health facility vs home delivery), post-natal care (PNC) (yes/no), exclusive breastfeeding (present/absent), complementary feeding practices (followed correct method of preparation of Sarbottam Lito or not), and immunization status (complete/incomplete according to child's age).

### Data collection of primary data

As a part of the CHD field program, MBBS first-year students were provided in-depth 5-day training and orientation on the CHD questionnaire before primary data collection for tool validity. A standard CHD questionnaire developed by the Department of Community Medicine and Public Health was used for primary data collection. The tool was validated by the subject matter experts and has been updated

every academic year. The students were also trained in standard measurement of height, and weight, and calculation of nutritional status indicators. The tool was pre-tested among mothers of under-five children in Tokha municipality. The data collection was done under the direct supervision of the faculties of the Department of Community Medicine and Public Health.

The Nepali-translated questionnaire was administered to the mothers of under five children using a face-to-face interview technique. The data collection was done by using the Kobo toolbox, which is a freely available data collection and management software that supports both Android and iOS platforms. All the collected data was stored in a cloud server of the Kobo toolbox. The quality of data and any errors in data entry were monitored by the research team of the Department of Community Medicine and Public Health. We utilized the data collected for nutritional status in the CHD program for this study. We included the data of all the children under five years in a given household. For households with more than one child under five, the data of children were merged with the mother's data.

### Statistical analysis

Since this study is a secondary data analysis, we extracted the data from the cloud server of the Kobo toolbox as an MS Excel file and used it for further analysis. We performed descriptive analyses like frequency, percentage, and mean with standard deviations to summarize the nutritional status of under-five children, including prevalence rates of malnutrition in terms of stunting, wasting, and underweight. The Chi-square test was applied to analyze the association between stunting, wasting and underweight with categorical independent variables like ANC visits, place of delivery, exclusive breastfeeding, and PNC visits. The p-value of less than 0.05 was considered statistically significant. Statistical Package for Social Sciences (SPSS) software was used for data analysis. Any missing data was adjusted by deletion or imputation after consultation with a statistical expert.

### Ethical considerations

This cross-sectional study involved secondary data analysis which posed no direct harm to the participants. Researchers ensured the confidentiality and anonymity of the participants' data during secondary data analysis for this study. We obtained ethical clearance for secondary data analysis from the Institutional Review Committee of the Institute of Medicine, Tribhuvan University (Ethical clearance reference number: 643/080/081).

## RESULTS

A total of 667 under-five children were surveyed in this study. About 55% were male and 44% were female. The mean age, weight, and height of the children were 27

months (SD=17.25), 11.49 kg (SD=3.32), and 82.94 cm (SD=13.75) respectively. Nearly 32% (95%CI: 28.3-35.8) of the children were stunted, 12.1% (95%CI: 9.7-14.7) wasted, and 13.9% (95%CI: 11.4-16.6) were underweight. About 40% of the mothers were married for the first time and 20% had their first child at less than 20 years of age. All the mothers had visited ANC clinics during the last pregnancy with 91% completing four or more visits. Most deliveries were conducted at health facilities (93.3%) and nearly 48% of the mothers had post-natal checkups. Most mothers exclusively breastfed their babies (72%) and fed colostrum (93%). Among those who could not exclusively breastfeed, the main reason was insufficient milk production (80%). The majority of the mothers (89%) had heard of Sarbottam Lito (Super Flour Porridge) and were able to correctly explain its preparation (94%). Immunization status was incomplete for 31% of the children according to their age (Table 1).

**Table 1. Antenatal, delivery, post-natal characteristics and feeding practices of the mothers of under-five children (n=667)**

Characteristics	Frequency	Percentage
<b>Number of ANC visits during previous pregnancy</b>		
Less than four	60	9.0
Four or more	607	91.0
<b>Substance abuse during pregnancy</b>		
Yes	11	1.6
No	656	98.4
<b>Complications during previous pregnancy</b>		
Yes	118	17.7
No	549	82.3
<b>Place of delivery</b>		
Government Health Institution	600	90.0
Home	32	4.8
Private Health Institution	22	3.3
Others	13	1.9
<b>PNC visit done after previous delivery</b>		
Yes	318	47.7
No	349	52.3
<b>Complications in Postnatal period</b>		
Yes	78	11.7
No	589	88.3
<b>Fed colostrum to the baby</b>		
Yes	622	93.3
No	45	6.7
<b>Explained the method of Sarbottam Lito preparation correctly (n=593)</b>		



Yes	558	94.1
No	35	5.9
<b>Immunization status</b>		
Complete	460	69.0
Incomplete	207	31.0

About 6.9% of the children were moderately wasted and 7.4% of the children were severely wasted. Nearly 16% of the children were moderately stunted and 17.7% of the children were severely stunted. The proportion of children who were moderately and severely underweight was 11% and 3.3% respectively. Children whose mothers were married before 20 years of age had a significantly higher prevalence of moderate (14% vs 9.1%) and severe

underweight (4.7% vs 2.3%) compared to those whose mothers were married at 20 years of age or later. Children with mothers who had less than four ANC visits had a significantly higher prevalence of severe wasting (16.4%) compared to those with four or more ANC visits (6.5%). Mothers with a history of substance abuse during pregnancy had a significantly higher prevalence of moderately stunted (45.5%) children compared to mothers with no such history (15.3%). Children who were not exclusively breastfed had significantly higher severe stunting (23.6%) compared to children who were exclusively breastfed (15.4%) (Table 2).

**Table 2. Nutritional status of under-five children (n=667)**

Variables	Weight for Height Z (%)			Height for Age Z (%)			Weight for Age Z (%)		
	Normal	Moderate	Severe	Normal	Moderate	Severe	Normal	Moderate	Severe
<b>Age (months)</b>									
0-23	86.1	5.5	8.4	69.4	16.4	14.2	87.4	9.4	3.2
24-59	85.4	8	6.7	64.4	15.3	20.3	84.4	12.3	3.3
	p value=0.414			p value=0.139			p value= 0.495		
<b>Sex</b>									
Male	85.1	8.6	6.3	67.6	13.8	18.6	85.1	11	3.9
Female	86.3	4.8	8.8	65.1	18.3	16.5	86.5	11.1	2.4
	p=0.132			p=0.279			p=0.556		
<b>Mother's age at marriage</b>									
Less than 20	84.7	5.9	9.5	63.6	17.4	19	81.4	14	4.7
20 or more	86.3	7.6	6.1	68.4	14.7	16.8	88.6	9.1	2.3
	p=0.264			p=0.452			p=0.030		
<b>Mother's age at first pregnancy</b>									
Less than 20	86.7	7.1	6.2	61.8	19.5	18.7	81.7	12.7	5.6
20 or more	85.4	6.8	7.8	67.6	14.9	17.5	86.7	10.6	2.7
	p=0.851			0.381			0.20		
<b>Number of ANC visits</b>									
Less than four	78.2	5.5	16.4	72.7	10.9	16.4	85.7	11.9	3.4
Four or more	86.5	7.1	6.5	65.9	16.3	17.8	85.8	10.9	3.2
	p=0.047			p=0.516			p=0.902		
<b>Substance abuse during pregnancy</b>									
Yes	100	0	0	36.4	45.5	18.2	90.9	0	9.1
No	85.4	7	7.6	67	15.3	17.7	85.6	11.2	3.2
	p=1.00			p=0.023			p=0.231		
<b>Place of delivery</b>									
Health Institution	85.9	6.6	7.4	66.8	15.7	17.4	86	10.7	3.3
Home and others	82.1	10.3	7.7	61.9	16.7	21.4	81.8	15.9	2.3
	p=0.557			p=0.796			p=0.496		
<b>Fed colostrum to the baby</b>									
Yes	85.8	6.8	7.4	66	16.2	17.8	85	11.5	3.5
No	84.2	7.9	7.9	73.8	9.5	16.7	95.3	4.7	0
	p=0.816			p=0.47			p=0.201		

<b>Exclusive breastfeeding</b>									
Yes	85	7.8	7.2	68.8	15.8	15.4	86	10.1	3.9
No	87.4	4.6	7.9	60.7	15.7	23.6	85	13.3	1.7
		p=0.430			p=0.046			p=0.205	
<b>Heard about Sarbottam Lito</b>									
Yes	85.9	7.2	7	66.7	15.9	17.5	85.5	11.4	31
No	83.9	4.8	11.3	65.3	15.3	19.4	87.5	8.3	4.2
		p=0.384			0.917			0.611	
<b>Immunization status</b>									
Complete	86.3	7.2	6.4	65.2	16	18.8	86.2	10.4	3.4
Incomplete	84.3	6.2	9.6	69.4	15.3	15.3	84.7	12.3	3
		p=0.401			p=0.519			p=0.754	
<b>Total</b>	<b>85.7</b>	<b>6.9</b>	<b>7.4</b>	<b>66.5</b>	<b>15.8</b>	<b>17.7</b>	<b>85.7</b>	<b>11</b>	<b>3.3</b>

## DISCUSSION

This study assessed the nutritional status of under-five children in Bidur municipality, an urban municipality in Nepal. Compared to the national figures as reported in the Nepal Demographic and Health Survey 2021 (Stunting 36%, underweight 27%, and wasting 10%), this study reported comparable prevalence for stunting (32%), wasting (12.1%) but a lower prevalence of underweight (13.9%).(4) Stunting indicates chronic or recurrent undernutrition and wasting is a key indicator of acute malnutrition due to recent weight loss. Underweight represents both acute and chronic malnutrition which can be affected by many contributing factors like low birth weight, dietary diversity, exclusive breastfeeding, complementary diet, family income, and poor immunization status (10). This could have contributed to the difference in prevalence in our study.

The Criminal Code Act 2017 of Nepal has declared 20 years as the minimum age of marriage for both girls and boys (11). Girls who marry early experience higher rates of anemia and malnutrition than those who marry late, as a result, children born to these mothers are likely to suffer from malnutrition as well (12). In this study, children of mothers who married early (less than 20 years) had a higher prevalence of moderate and severe underweight. ANC visits have shown a significant impact on reducing the likelihood of malnutrition among children in Bangladesh (13). In the same manner, children whose mothers had less than four ANC visits during pregnancy had a significantly higher prevalence of wasting (16.4%) in our study. Mothers with a history of substance use during pregnancy such as tobacco and alcohol had a higher prevalence of moderately stunted children. Other studies have also reported that fetuses exposed to substances during gestation showed stunted growth and deficits in other growth parameters (14). Various studies have established the relationship between exclusive breastfeeding and stunting. Exclusive breastfeeding has been found to protect children against stunting especially in low-income contexts as breast

milk contains vital nutrients that reduce the factors that cause stunting (15,16). Children not exclusively breastfed had a higher prevalence of severe stunting in this study.

Ending all forms of malnutrition is a target of Sustainable Development Goals as nutrition is a critical part of health and development. Multisector Nutrition Plan (MSNP) of Nepal focuses on using nutrition-specific and nutrition-sensitive services to enhance maternal and child nutritional status (17). Local governments are responsible for creating an enabling environment and policy drive for the smooth implementation of MSNP (18). Evidence on the burden of undernutrition from studies like this can be utilized by the local governments for effective planning and implementation of nutrition-related programs.

This study had a few limitations. The cross-sectional nature of the study design is not enough to show a strong cause-effect relationship between dependent and independent variables. Mothers had to recall events from the past which is likely to introduce recall bias in the data. Since this study was based on an academic field activity, we could not include all the social, economic, biological, and environmental variables that could have affected the nutritional status. Also, this study has not analyzed overweight and obesity which are also considered as malnutrition.

## CONCLUSION

The prevalence of stunting, wasting, and being underweight among under-five children were 32%, 12.1%, and 13.9% respectively in Bidur municipality. Early age at marriage, less than four ANC visits by the mother, history of substance use during pregnancy, and not exclusively breastfeeding were associated with different forms of malnutrition.

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### Conflict of Interest

The authors declare no conflict of interest.

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