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Prevalence of Malnutrition among Under-Five Children in Lumbini Province, Nepal: Evidence from Community-Based Screening Program

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ABSTRACT

Background: Malnutrition affects physical and cognitive growth and increases the risk of morbidity and mortality. This study assessed the prevalence of malnutrition among children under five years of age in Lumbini Province.

Methods: This retrospective cross-sectional study analyzed secondary data collected in a screening program from March to July 2025. Nutritional indicators were measured by using WHO classification. The association between predictor variables was assessed by multivariate logistic regression using SPSS v. 25 software and odds ratio with 95% confidence interval.

Results: Among 78,652 screened children under five years of age, 48% had at least one form of malnutrition, including stunting (40%), underweight (22%), wasting (7.5%), and overweight (4.6%). Muslim (AOR=2.36; 95% CI: 2.16-2.57) and Madhesi (AOR=2.17; 95% CI: 1.99-2.36) ethnicity, rural residence (AOR=1.05; 95% CI:1.01-1.09), mountainous (AOR=1.82; 95% CI:1.68-1.98) and hill (AOR=1.44; 95% CI:1.38-1.50) zones showed higher odds of stunting, while female sex was protective. Similarly, higher odds of wasting were observed in Muslim (AOR=1.30; 95% CI: 1.15-1.48), Madhesi (AOR=1.28; 95% CI: 1.13-1.45), Janjati (AOR=1.28; 95% CI: 1.19-1.38) and Dalit (AOR=1.18; 95% CI: 1.01-1.29) whereas female sex and hills/mountain zones were protective. Likewise, the higher odd of being overweight was reported in Muslims (AOR=2.25; 95% CI: 1.85-2.72), hill (AOR=2.62; 95% CI:2.36-2.92) and mountainous (AOR=2.13; 95% CI: 1.72-2.63) zones but age below 24 months and rural residence were protective.

Conclusion: This study demonstrated a high burden of chronic undernutrition together with the presence of overweight among children under five years of age, indicating a double burden of malnutrition in Lumbini Province. Targeted nutrition interventions focusing on disadvantaged ethnic groups, rural communities, and food insecurity are needed.

Key words: Stunting, wasting, underweight, overweight, undernutrition.

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BACKGROUND

Malnutrition is a critical public health issue across the globe among children under five that affects physical and cognitive growth as well as increases risk of morbidity and mortality (1). Globally, 23.2% (150.2 million) children under five suffer from stunting, 6.6% (42.8 million) from wasting and 5.5% (35.5 million) from overweight (1). Nearly half of the mortality among under five children is associated with undernutrition, mostly from low and middle income countries (2).

Nepal is one of the ten countries in the world where more than half of children under five suffer from malnutrition (3). National trend data also show encouraging progress: the prevalence of stunting and underweight among children under five decreased from 57% to 25% and from 42% to 19%, wasting declined from 15% in 1996 to 8% in 2022, respectively between 1916

and 2022, while the prevalence of being overweight has remained constant around 1% (4).

Despite these improvements, Nepal still faces considerable challenges in achieving the Sustainable Development Goal (SDG) 2.2 targets, which aim to end all forms of malnutrition by 2025 (5,6). Unlike other provinces, the Lumbini Province carries the highest burden of acute malnutrition, twice as high as national prevalence (wasting 16% vs 8%) that exceeds the WHO threshold for public health significance (wasting 15% or above) (4,7). However, the recently published Annual Health Report in 2025 showed that only 2.6% (provincial level) and 2.1% (National level) underweight children aged < 24 months were reported among registered for growth monitoring (8,9). Therefore, Ministry of Health, Lumbini Province initiated special program to detect early and manage acute malnutrition in timely through health workers at community level in eight out of twelve districts (10).

National surveys and district-based small-scale studies are conducted periodically to estimate the prevalence of malnutrition; however, as per our knowledge, no prior studies have been conducted in the context of real-world service delivery from government health facilities. To address this gap, this study analyzed secondary data from a nutrition screening program conducted through government health system. The study aimed to assess the prevalence and associated factors of stunting, underweight, wasting, and overweight in children under five years of age in Lumbini Province. The findings provide practical and tangible evidence from operational and routine public health service delivery that can be utilized in policy, planning, prioritizing, and strengthening child nutrition services within the public health system.

METHODS AND MATERIALS

Data sources and study design

This retrospective cross-sectional study analyzed secondary data collected through a provincial nutrition screening program conducted from March to July 2025 in eight districts of Lumbini Province. The screening program was implemented by the Provincial Health Directorate under the Ministry of Health, Lumbini Province, to identify children with acute malnutrition and facilitate timely referral and management through the public health system. Data were collected during routine community-level outreach screening by trained health workers and Female Community Health Volunteers using the Kobo-Collect application. Height/length in centimeter and weight in kilogram was measured for assessment of nutritional indicators. The Provincial Health Directorate is the custodian of the dataset and granted permission for secondary data analysis. No additional participant interaction was conducted for this study.

Study population

The total entered data in kobo tool was included as a study population. The recorded dataset contains 78652 children under five years of age. Missing records and biologically implausible anthropometric values (according to the WHO criteria) were excluded from the study.

Outcome variables

Stunting, wasting, underweight, and overweight indicators were used to measure malnutrition in children under five years of age. According to the WHO growth standard, stunting was measured based on the height-for-age z-score (HAZ <-2SD), wasting based on the weight-for-height z-score (WHZ <-2SD), underweight based on the weight-for-age z-score (WAZ <-2SD), and overweight based on the weight-for-age z-score (WHZ > + 2 SD) (11,12). The stunting, wasting and underweight are further subdivided into Severe (< - 3SD), Moderate (-3 SD to <-2 SD), and Normal (>= -2 SD) based on z-score value such as Sever acute malnutrition (SAM) <-3 WHZ and Moderate acute malnutrition (MAM) -3 WHZ to <-2 WHZ.11 A composite variable "any malnutrition" was defined as being of at least one anthropometric abnormality, including stunting, wasting, underweight or overweight (11).

WHO-Anthro software v3.2.2 was used to calculate the z-scores. As age was recorded in complete months, the date of birth was estimated using EDATE (fixed date as Survey Date-Age in Month) functions in the Excel sheet. All children were assumed to be non-edematous. The software automatically adjusted the length and height measurements (± 0.7 cm) when the measurement position did not correspond with the child's age therefore, the actual height and length with measurement type were included in the calculation. Biologically implausible z-scores were identified per WHO-recommended flag limits (HAZ <-6 or >+ 6; WHZ <-5 or >+5; WAZ <-6 or >+5) (13,14). Flagged indices were coded as missing value and excluded from the outcome analysis. The final sample size considered-nutritional outcome analysis was 77,050 for stunting, 77,455 for wasting and 77,958 for underweight after excluding missing and biologically impossible values.

Ethical consideration

We obtained permission to use data from the Provincial Health Directorate (Ref. No 380-2025/26) and approval of ethical clearance from the Nepal Health Research Council (Approval No.766-2025). All personal identifiers were removed before the study to ensure data confidentiality. Data quality was maintained by checking for completeness, standardized coding, and verification against original records to minimize errors.

Statistical analysis

Raw data were extracted from the Kobo Toolbox cloud server, which was customized and maintained by the Provincial Health Directorate. The required data wrangling process was performed before analysis. Predictable variables were coded in a manner compatible with WHO Anthro software to calculate the z score. We performed descriptive analyses, such as frequency, percentage, and mean with standard deviations, to summarize the nutritional status of children under five years of age, including the prevalence rate of malnutrition in terms of stunting, wasting, underweight, and overweight. The Chi-square test was applied to analyze the association between stunting, wasting, underweight and overweight with categorical independent variables such as age, sex, ethnicity, urban/rural residence, ecological zone, and districts. Statistical significance was set at $p< 0.05$.

Multivariable logistic regression models were fitted for stunting, wasting, underweight, and overweight using a consistent set of explanatory variables. Variables with $p<0.20$ in bivariate analysis were considered for multivariable modelling. District-level variables were excluded from the final model because of sparse outcomes and collinearity with ecological zones. Multicollinearity among predictor variables was assessed using variance inflation factors before model fitting, and no significant multicollinearity was observed. Adjusted odds ratios (AOR) with 95% confidence intervals were reported.

RESULTS

Characteristics of the study population

Among the 78,652 participants, more than half (53%) were male. The mean age, weight, and height were 31.6 months (SD = 15.86), 11.61 kg (SD = 2.79), and 85.94 cm (SD =11.66), respectively. Nearly half (43%) of the participants were of Janjati ethnicity. Additionally, most participants (65%) were from hill zones and rural areas (56%). The highest number of participants (19%) were from the Bardiya district (Table 1).

Table 1. Sociodemographic characteristics of participants

Characteristics	Level	Frequency	Percentage
Age group (month)	0-23	28149	35.8
	24-59	50503	64.2
Age group (month)	0-6	2124	2.7
	7-11	8458	10.8
	12-23	17567	22.3
	24-35	17003	21.6
	36-47	16412	20.9
	48-59	17088	21.7
Sex of children	Male	41875	53.2
	Female	36777	46.8
Ethnicity	Dalit	15349	19.5
	Janjati	33831	43.0
	Madhesi	2851	3.6
	Muslim	2612	3.3
	Brahmin Chettri	21785	27.7
	Others	2224	2.8
Residence Type	Urban	34468	43.8
	Rural	44184	56.2
Ecological belts	Terai	24741	31.5
	Hill	50873	64.7
	Mountain	3038	3.9
Districts	Arghakhanchi	7358	9.4
	Banke	10197	13.0
	Bardiya	14544	18.5
	Gulmi	12220	15.5
	Palpa	8781	11.2
	Pyuthan	9374	11.9
	Rolpa	13140	16.7
	RukumEast	3038	3.9
Total		**78652**	**100.0**

History of previous anthropometric measurement

Almost half (49%) of the participants had a history of previous anthropometric measurements. Among them, 2.3% (1.9% MAM and 0.4% SAM) had a previous history of malnutrition (Table 2).

Table 2. Previous history of anthropometric measurement

Characteristics	Level	Frequency	Percentage
Anthropometric Measurement ever taken	Yes	38517	49.0
	No	35451	45.1
	Unknown	4684	6.0
Previous status of acute Malnutrition	Normal	37648	97.7
	MAM	727	1.9
(n= 38517)	SAM	142	0.4

Prevalence of nutritional status

Nearly half (48%) of the children suffered from at least one form of malnutrition in the Lumbini Province. Among them about 40% of children were stunted, 7.5 % wasted, 22 % underweight, and 4.6 % overweight (Table 3).

Table 3. Prevalence of malnutrition in Lumbini Province

Indicator	Category	n	%
Stunting (HAZ)	Severe (< −3 SD)	11233	14.6
	Moderate (−3 to < −2 SD)	19369	25.1
	Total stunted (< −2 SD)	30602	39.7
	Normal (≥ −2 SD)	46448	60.3
Wasting (WHZ)	Severe (< −3 SD)	1041	1.3
	Moderate (−3 to < −2 SD)	4803	6.2
	Total wasting (< −2 SD)	5844	7.5
	Normal (≥ −2 SD)	71611	92.5
Underweight (WAZ)	Severe (< −3 SD)	3586	4.6
	Moderate (−3 to < −2 SD)	13581	17.4
	Total underweight (< −2 SD)	17167	22.0
	Normal (≥ −2 SD)	60791	79.0
Overweight (WHZ)	WHZ> +2 SD	3907	4.6
Any Malnutrition	At least one (WHZ, HAZ, WAZ 2<-SD & WHZ>2 SD)	37573	48.2

Bivariate analysis of factors associated with nutritional outcomes

In the bivariate analysis, the participants age group, sex, ethnicity, ecological zone, residence type, and district; all the explanatory variables were significantly associated with wasting and underweight (p<0.05). However, age group with stunting and sex and residence type with overweight status were not statistically significant (p>0.05) (Table 4).

Factors associated with stunting

In a multivariate logistic regression model, female children had 12% lower odds of stunting than males (AOR=0.88; 95% CI:0.86-0.91; p< 0.001). However, in the ethnic groups, Muslim and Madhesi had more than two times higher odds of stunting (AOR=2.36; 95% CI: 2.16-2.57; p< 0.001) and (AOR=2.17; 95% CI: 1.99-2.36; p< 0.001), respectively. Rural children had higher odds of stunting than urban children (AOR=1.05; 95% CI:1.01-1.09; p= 0.007). Children living in the hill zone had 1.4 times the odds of stunting (AOR=1.44; 95% CI:1 .38-1.50; p< 0.001), and similarly, children living in the mountainous zone had about two times higher odds of stunting (AOR=1.82; 95% CI:1.68-1.98; p<0.001) as compared to those living in the Terai Terai Although the age group of less than 24 months showed a positive direction, the association was not statistically significant.

Factors associated with wasting

In this analysis, female children had approximately 15% lower odds of wasting (AOR=0.85; 95% CI: 0.81-0.90; p< 0.001) compared to males. Comparing within ethnic groups, Muslim, Madhesi, Janjati, and Dalit had higher odds of wasting (AOR=1.30; 95% CI: 1.15-1.48; p< 0.001), (AOR=1.28; 95% CI: 1.13-1.45; p< 0.001), (AOR=1.28; 95% CI: 1.19-1.38; p< 0.001) and (AOR=1.18; 95% CI: 1.01-1.29; p< 0.001) respectively. However, the hilly children had about 77% lower odds of wasting (AOR=0.23; 95% CI: 0.21-0.25; p< 0.001) and mountainous children had 75% lower odds of wasting (AOR=0.25; 95% CI:0.21-0.30; p<0.001) as compared to the Terai zone. After adjusting for potential confounders, age group was not significantly associated with wasting in children.

Factors associated with underweight

Children in the age group less than 24 months had higher odds of underweight (AOR=1.35; 95% CI:1.32-1.42; p< 0.001). Female children had 8% lower odds of being underweight than male child (AOR=0.92; 95% CI:0.89-0.96; p< 0.001). Muslim ethnicity had 1.6-time higher likelihood of underweight (AOR=1.65; 95% CI: 1.50-1.80; p< 0.001) than Brahmin/Chettri. Similarly, Rural children had higher odds of underweight (AOR=1.06; 95% CI:1.02-1.11; p=0.005). Mountainous children were 43% less likely to be underweight (AOR=0.57; 95% CI: 0.52-0.62; p< 0.001), and hill children had about 51% less likelihood of being underweight (AOR=0.49; 95% CI: 0.46-0.51; p< 0.001) than Terai children.

Factors associated with overweight

The age group less than 24 months had protective effects of overweight (AOR=0.49; 95% CI: 0.46-0.52; p< 0.001) as compared to the 24–49-month age groups. However, Muslims had 2.25 times the likelihood of being overweight (AOR=2.25; 95% CI: 1.85-2.72; p< 0.001) compared to the Brahmin/Chettri ethnic groups. Rural children had protective effects of being overweight (AOR=0.76; 95% CI:0.7-0.82; p< 0.001) than urban children Hilly living children had 2.62 times higher likelihood of overweight (AOR=2.62; 95% CI:2.36-2.92; p< 0.001) and 2.13 times higher odds of being overweight (AOR=2.13; 95% CI: 1.72-2.63; p< 0.001) in mountainous children as compared to Terai children. However, female children were not significantly associated with overweight (Table 5).

Table 4. Association of malnutrition with sociodemographic variables

Characteristics	Stunting		Wasting		Underweight		Overweight	
	n (%)	P	n (%)	p	n (%)	p	n (%)	p
Age group (m)								
0-23	10859 (39.3)	0.091	2300 (8.3)	<0.001	5459 (19.4)	<0.001	1827 (6.6)	<0.001
24-59	19743 (39.9)		3544 (7.1)		11708 (23.5)		1718 (3.5)	
Sex								
Male	16814 (41.0)	<0.001	3317 (8.0)	<0.001	9383 (22.6)	<0.001	1902 (4.6)	0.594
Female	13788 (38.2)		2527 (7.0)		7784 (21.4)		1643 (4.5)	
Ethnicity								
Dalit	6270 (41.6)	<0.001	986 (6.5)	<0.001	3404 (22.3)	<0.001	714 (4.7)	<0.001
Janjati	12384 (37.3)		2713 (8.1)		6933 (20.7)		1418 (4.3)	
Madhesi	1398 (51.3)		442 (16.1)		1130 (40.7)		106 (3.9)	
Muslim	1335 (53.6)		404 (16.0)		1008 (39.4)		153 (6.1)	
Brahmin/Chettri	8501 (39.8)		1198 (5.6)		4343 (20.1)		1047 (4.9)	
Others	714 (32.8)		101 (4.6)		349 (15.9)		107 (4.9)	
Ecological Zone								
Terai	8558 (35.9)	<0.001	3690 (15.4)	<0.001	7594 (31.4)	<0.001	726 (3.0)	<0.001
Hill	20633 (41.1)		2021 (4.0)		8966 (17.7)		2695 (5.3)	
Mountain	1411 (46.8)		133 (4.4)		607 (20.0)		124 (4.1)	
Residence Type								
Urban	12528 (37.4)	<0.001	3526 (10.5)	<0.001	8564 (25.2)	<0.001	1505 (4.5)	0.202
Rural	18074 (41.5)		2318 (5.3)		8603 (19.5)		2040 (4.7)	
Districts								
Arghakhanchi	2915 (40.7)	<0.001	513 (7.1)	<0.001	1667 (22.9)	<0.001	296 (4.1)	<0.001
Banke	4001 (41.0)		1089 (11.1)		2902 (29.1)		474 (4.8)	
Bardiya	4557 (32.3)		2601 (18.3)		4692 (32.9)		252 (1.8)	
Gulmi	4587 (38.0)		340 (2.8)		1808 (14.8)		732 (6.0)	
Palpa	2918 (33.6)		302 (3.5)		1381 (15.8)		293 (3.4)	
Pyuthan	3813 (41.2)		403 (4.3)		1520 (16.2)		696 (7.5)	
Rolpa	6400 (49.2)		463 (3.5)		2590 (19.7)		678 (5.2)	
RukumEast	1411 (46.8)		133 (4.4)		607 (20.0)		124 (4.1)	

DISCUSSION

In this study, we found that almost half of the children under five years of age had at least one form of malnutrition, with a very high level of stunting, medium level of wasting as per WHO prevalence threshold and remarkable proportions of overweight children (1). This pattern indicates coexistence of undernutrition and emerging overnutrition problems in the study area.

This study reported that 39.7% of children suffered from stunting, 22% were underweight, 7.5% were wasting and 4.6% were overweight. These findings were higher than the national and provincial malnutrition prevalence recently reported by the Multiple Indicator Cluster Survey (MICS) 2024-25 in Nepal (13). The survey revealed that the prevalences of stunting was 28.9 %, underweight was 17.1%, wasting was 6.8% and overweight was 2.7% in Lumbini Province (13). However, this study found a low prevalence of wasting and underweight in comparison with the study done in 2022 by Nepal Health Demographic Health Survey (NDHS) that depicted wasting was 16%, and underweight was 28% at Lumbini Province (4). Additionally, in comparison with study done at Dhulikhel, Nepal, depicted near about similar prevalence of stunting and underweight but very high prevalence of overweight (14).

Table 5. Multivariate logistic regression analysis of factors associated with under-five nutritional outcomes

Variables	Stunting		Wasting		Underweight		Overweight	
	AOR (95% CI)	P	AOR (95% CI)	P	AOR (95% CI)	P	AOR (95% CI)	P
Age group (m)								
24-49	1		1		1		1	
0-23	1.02 (0.99–1.05)	0.303	0.96 (0.91–1.02)	0.160	1.37 (1.32–1.42)	<0.001	0.49 (0.46–0.52)	<0.001
Sex								
Male	1		1		1		1	
Female	0.88 (0.86–0.91)	<0.001	0.85 (0.81–0.90)	<0.001	0.92 (0.89–0.96)	<0.001	0.98 (0.92–1.05)	0.646
Ethnicity								
Brahmin/Chetrri	1		1		1		1	
Dalit	1.08 (1.03–1.13)	<0.001	1.18 (1.08–1.29)	<0.001	1.15 (1.10–1.21)	<0.001	0.95 (0.86–1.05)	0.343
Janjati	0.93 (0.90–0.96)	<0.001	1.28 (1.19–1.38)	<0.001	0.97 (0.93–1.01)	0.167	0.93 (0.85–1.00)	0.065
Madheshi	2.17 (1.99–2.36)	<0.001	1.28 (1.13–1.45)	<0.001	1.71 (1.56–1.86)	<0.001	1.42 (1.14–1.76)	0.002
Mushlim	2.36 (2.16–2.57)	<0.001	1.30 (1.15–1.48)	<0.001	1.65 (1.50–1.80)	<0.001	2.25 (1.85–2.72)	<0.001
Others	0.80 (0.73–0.88)	<0.001	0.54 (0.44–0.67)	<0.001	0.62 (0.55–0.69)	<0.001	1.20 (0.98–1.48)	0.079
Residence								
Urban	1		1		1		1	
Rural	1.05 (1.01–1.09)	0.007	1.06 (0.99–1.13)	0.115	1.06 (1.02–1.11)	0.005	0.76 (0.70–0.82)	<0.001
Eco-Zone								
Terai	1		1		1		1	
Hills	1.44 (1.38–1.50)	<0.001	0.23 (0.21–0.25)	<0.001	0.49 (0.46–0.51)	<0.001	2.62 (2.36–2.92)	<0.001
Mountain	1.82 (1.68–1.98)	<0.001	0.25 (0.21–0.30)	<0.001	0.57 (0.52–0.63)	<0.001	2.13 (1.72–2.63)	<0.001

Other study conducted in south and southeast Asian countries also highlights the very high prevalence threshold of stunting and underweight in India, Bangladesh, Pakistan, Cambodia and Timor-Leste (15). These differences may be due to variations in the study setting, population characteristics, geographical coverage, timing of data collection, and local socioeconomic conditions with emerging dietary transitions in certain communities.

Moreover, the findings of the current study showed significant associations across sex, urban-rural residence, ethnicity, and ecological distribution. In our study, male children were significantly more stunted, wasted, and underweight than female children. A similar result was observed in another study conducted in Dhulikhel, and Kapilvastu, Nepal (14,16). Similarly, the Joint Child Malnutrition Estimate report revealed that males were more stunted than females in all UN and sub-Saharan regions (1). Similarly, in the MICS survey, male children were slightly more wasted than females, but other indicators, such as stunting, underweight, and being overweight, had similar prevalence in both sexes (6). Gender differences in nutritional outcomes have been widely documented and may be associated with biological and sociocultural factors. Males have a weaker immune system and are more vulnerable to infection as well as high metabolic demands in early age than female children (17,18).

This study demonstrated significant differences in stunting, underweight, and overweight across urban and rural residences. Children living in rural areas were more stunted and underweight but less overweight and a similar disparity was observed in the MICS 2024-25 survey (6). However, in contrast, a study conducted in Kapilvastu District showed that children living in rural areas had protective effects on stunting (16). Similarly, NDHS (2022) survey study supported the finding indicating higher stunting and underweight in rural residence however wasting was more prevalent in urban children (4). Differences in access to health care, food security, water and sanitation, exposure to infection, mother education and care contribute to the observed discrepancy.

The nutritional outcomes of children differed significantly across ecological differences. Children from the Terai zone had higher wasting and underweight problems whereas mountainous children had higher stunting. These findings were like those of NDHS 2022 survey and aligned with other studies conducted in Nepal (19). The topographical variation may influence disease burden, crop production, food security, socioeconomic status and access to the market. Mountainous zones may have long-term food insecurity resulting chronic growth failure but in Terai zones may be highly prone to disease, inequalities in access and food diversity resulting in acute malnutrition.

Disparity in malnutrition was significantly associated across ethnic groups. Among other ethnicities, Muslims and Madhesis were adversely affected by all forms of malnutrition. The study conducted in Kapilvastu among the Muslim community also supports the finding that there is higher prevalence of stunting, underweight and wasting (16). Ethnicity variation may have behavior differences that influence parenting, caring, and feeding practices resulting in the health and nutritional status of children.

The study depicted higher underweight but lower overweight in the < 24 months age group. A similar finding of underweight was also observed in the Kapilvastu district study (16) but different results were observed in the NDHS survey, which presented less prevalence in children aged < 24 months (4). Other study conducted in Nepal showed that underweight prevalence increased with age (3). However, stunting and wasting did not show significant association in this study. These discrepancies may be due to differences in study design and seasonal and temporal variations.

The very high prevalence of stunting observed in this study reflects the persistent problem of chronic food insecurity in many parts of Lumbini Province. Although Lumbini Province includes agriculturally productive Terai districts, many vulnerable households continue to experience seasonal food shortages, low household income, unemployment, and dependence on low-diversity staple foods (20). In disadvantaged rural communities, limited purchasing capacity and unequal food distribution may further restrict access to protein-rich and micronutrient-rich diets essential for optimal child growth and development (21,22). In addition, recurrent childhood illnesses, inadequate sanitation and hygiene practices, unsafe drinking water, and limited access to quality health and nutrition services may contribute to chronic undernutrition and impaired linear growth (23). Geographic disparities within the province, particularly in hilly and mountainous districts, can also create barriers to transportation, health service utilization, and regular access to nutritious foods (24). Maternal undernutrition and limited nutrition awareness among caregivers may further perpetuate the intergenerational cycle of malnutrition (25,26). Chronic nutritional deprivation during the first 1,000 days of life therefore likely contributes to the high burden of stunting observed in this study and may result in long-term consequences for physical growth, cognitive development, educational achievement, and future productivity. At the same time, the coexistence of overweight among a smaller proportion of children suggests an emerging nutritional transition in some communities, possibly related to increased consumption of calorie-dense but nutrient-poor foods (27,28). These findings highlight the need for integrated community-based interventions focusing on household food security, dietary diversity, maternal and child nutrition, poverty reduction, sanitation and hygiene improvement, and targeted support for socially and geographically vulnerable populations.

The study has various strengths, including the estimation of multiple forms of malnutrition burden estimated from real-world service delivery within the public health system and the large number of participants screened through trained health workers following national and WHO-recommended protocols. However, the cross-sectional nature of the study limits causal relationships, and the limited potential covariates as the data were originally collected for early detection of acute malnourished children, selection bias across the communities, and missing or biologically implausible values that were excluded may lead to bias estimation of prevalence rate. Furthermore, district inclusion was determined by program implementation rather than probabilistic sampling (eight out to the twelve districts of Lumbini Province), the generalizability of the findings to non-participating districts should be interpreted with causation.

CONCLUSION

This study identified a substantial burden of malnutrition among children under five years of age in Lumbini Province, particularly stunting and underweight, together with the presence of overweight. Children from Muslim and Madhesi ethnic groups, rural areas, and mountainous regions were disproportionately affected by several forms of malnutrition. The findings suggest the need for targeted interventions focusing on food insecurity, dietary diversity, maternal and child nutrition, and improved access to nutrition services in high-risk communities. Strengthening community-based nutrition screening and timely referral mechanisms may help reduce the burden of malnutrition among vulnerable populations. Further longitudinal and community-based studies are recommended to better understand causal pathways and barriers to nutrition service utilization.

Conflict of Interest

The authors declare no conflicts of interest.

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REFERENCES

1. WHO, UNICEF, World Bank Group. Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group joint child malnutrition estimates: key findings of the 2025 edition [Internet]. 2025 Jul [cited 2026 Jan 31]. p. 24. Available from: https://www.who.int/publications/i/item/9789240112308

2. World Health Organization. Malnutrition | Knowledge Action Portal on NCDs [Internet]. 2024 [cited 2026 Jan 31]. Available from: https://www.knowledge-action-portal.com/en/content/malnutrition

3. Adhikari RP, Shrestha ML, Acharya A, Upadhaya N. Determinants of stunting among children aged 0–59 months in Nepal: findings from Nepal Demographic and health Survey, 2006, 2011, and 2016. BMC Nutr. 2019 Dec;5(1):37. doi:10.1186/s40795-019-0300-0

4. Ministry of Health and Population [Nepal], New ERA, ICF. Nepal Demographic and Health Survey 2022 [Internet]. Kathmandu, Nepal: Ministry of Health and Population; 2023. Available from: https://www.dhsprogram.com/pubs/pdf/FR379/FR379.pdf

5. Government of Nepal, National Planning Commission. Nepal's Sustainable Development Goals Status and Roadmap: 2016-2030 [Internet]. Singha Durbar, Kathmandu, Nepal: Ministry of Nepal; 2017 Dec. p. 98. Available from: https://un.org.np/sites/default/files/doc_publication/UNDP_NP-SDG-Status-and-Roadmap.pdf

6. Government of Nepal, National Planning Commission. Multi-Sector Nutrition Plan III Nepal (2023-2030) [Internet]. Singha Durbar, Kathmandu, Nepal: Government of Nepal; 2024 Feb. Available from: https://giwmscdntwo.gov.np/media/pdf_upload/MSNP%20III%20Report-Nepali-final%20(2)_gxx7rqt.pdf

7. De Onis M, Borghi E, Arimond M, Webb P, Croft T, Saha K, et al. Prevalence thresholds for wasting, overweight and stunting in children under 5 years. Public Health Nutr. 2019 Jan;22(1):175–9. doi:10.1017/S1368980018002434

8. Department of Health Service. Annual Health Report 2080/81 [Internet]. Kathmandu, Nepal: Department of Health Services, Ministry of Health and Population, Government of Nepal; 2025 May [cited 2026 Feb 21]. Available from: https://dohs.gov.np/content/2/annual-health-report-2080-81/

9. Health Directorate. Annual Health Report 2080/81 [Internet]. Deukhuri (Rapti Valley), Dang, Nepal: Health Directorate, Ministry of Health, Lumbini Province; 2025 Dec [cited 2026 Feb 21]. Available from: https://hd.lumbini.gov.np/content/13277/annual-counter-counter-2080-81/

10. Ministry of Health Lumbini Province. Special Grant Implementation Guideline for Improving the Health and Nutrition of Women, Children and Adolescent girls [Internet]. Deukhuri (Rapti Valley), Dang, Nepal: Ministry of Health Lumbini Province; 2024 [cited 2026 Feb 21]. Available from: https://hobardiya.lumbini.gov.np/policies/4

11. WHO, UNICEF. Recommendations for data collection, analysis and reporting on anthropometric indicators in children under 5 years old [Internet]. Geneva; 2019 [cited 2026 Feb 3]. Available from: https://www.who.int/publications/i/item/9789241515559

12. World Health Organization. WHO Child Growth Standards [Internet]. Onis M de, editor. Geneva: WHO Press; 2006. 312 p. (WHO child growth standards). Available from: https://www.who.int/publications/i/item/924154693X

13. National Statistics Office (NSO). Nepal Multiple Indicator Cluster Survey 2024-25, Survey Findings Report.Nepal and UNICEF Nepal [Internet]. Kathmandu; 2026 Feb [cited 2026 Feb 17]. p. 693. Available from: https://nsonepal.gov.np/content/13439/nepal-multiple-indicator-cluster-survey-2024-25/

14. Acharya I, Acharya A, Pant S, Pradhan PMS. Nutritional Status of Under-five Children and its Associated Factors in Dhulikhel Municipality, Kavrepalanchok, Nepal: Nutritional Status in Children of Dhulikhel Municipality. NJPH. 2025 Jun 9;2(1):21–6. doi:10.70280/njph(2025)v2i1.29

15. Rahut DB, Mishra R, Bera S. Geospatial and environmental determinants of stunting, wasting, and underweight: Empirical evidence from rural South and Southeast Asia. Nutrition. 2024 Apr;120:112346. doi:10.1016/j.nut.2023.112346

16. Bhusal CK, Bhattarai S, Chhetri P, Myia SD. Nutritional status and its associated factors among under five years Muslim children of Kapilvastu district, Nepal. Sagtani RA, editor. PLoS ONE. 2023 Jan 17;18(1):e0280375. doi:10.1371/journal.pone.0280375

17. Mitul MT, Kastenschmidt JM, Sureshchandra S, Wagoner ZW, Sorn AM, Mcllwain DR, et al. Tissue-specific sex differences in pediatric and adult immune cell composition and function. Front Immunol. 2024 May 15;15. doi:10.3389/fimmu.2024.1373537

18. Muenchhoff M, Goulder PJR. Sex Differences in Pediatric Infectious Diseases. J Infect Dis. 2014 Jul 15;209(Suppl 3):S120–6. doi:10.1093/infdis/jiu232 PubMed PMID: 24966192; PubMed Central PMCID: PMC4072001.

19. Budhathoki SS, Bhandari A, Gurung R, Gurung A, Kc A. Stunting Among Under 5-Year-Olds in Nepal: Trends and Risk Factors. Matern Child Health J. 2020 Feb;24(S1):39–47. doi:10.1007/s10995-019-02817-1

20. Sharma AK, Rijal R, Thapa S, Thapa S, Shah A, Neupane P, et al. Food Security Challenges in Nepal: Assessing the Existing Situation and Policy-level Strategies for Mitigation and Resilience. Eur J Nutr Food Saf. 2025 Jul 23;17(7):329–46. doi:10.9734/ejnfs/2025/v17i71789

21. De Paiva LO, De Oliveira JPL, Da Rocha Mariano K, Da Silva PS, De Aguiar Toloni MH. Childhood at Risk: Nutritional Conditions of Children Living Under Food Insecurity. Curr Nutr Rep. 2025 Sep 19;14(1):107. doi:10.1007/s13668-025-00699-0

22. Yusriadi Y, Cahaya A. Food security systems in rural communities: A qualitative study. Front Sustain Food Syst. 2022 Sep 20;6:987853. doi:10.3389/fsufs.2022.987853

23. Wolf J, Hubbard S, Brauer M, Ambelu A, Arnold BF, Bain R, et al. Effectiveness of interventions to improve drinking water, sanitation, and handwashing with soap on risk of diarrhoeal disease in children in low-income and middle-income settings: a systematic review and meta-analysis. The Lancet. 2022 Jul;400(10345):48–59. doi:10.1016/S0140-6736(22)00937-0

24. Karki DK, Lall BS, Paul V. Study on nutritional status of children under 5 years in palpa district, nepal: speacial reference to baal vita. Journal of Lumbini Medical College [Internet]. 2013 Dec;1(2):99–101. Available from: https://jlmc.edu.np/index.php/JLMC/article/view/31

25. Marphatia AA, Wells JCK, Reid AM, Bhalerao A, Yajnik CS. Like mother like daughter, the role of low human capital in intergenerational cycles of disadvantage: the Pune Maternal Nutrition Study. Frontiers in Global Women's Health. 2025;Volume 5-2024. doi:10.3389/fgwh.2024.1174646

26. Sathe NJ. Intergenerational Cycle Of Malnutrition & Ill Health » RRJoFST [Internet]. 2025 Jan 7 [cited 2026 Jun 2]. Available from: https://journals.stmjournals.com/article/article=2026/view=195728/

27. Mameli C, Mazzantini S, Zuccotti G. Nutrition in the First 1000 Days: The Origin of Childhood Obesity. IJERPH. 2016 Aug 23;13(9):838. doi:10.3390/ijerph13090838

28. Soofi SB, Khan GN, Ariff S, Ihtesham Y, Tanimoune M, Rizvi A, et al. Effectiveness of nutritional supplementation during the first 1000-days of life to reduce child undernutrition: A cluster randomized controlled trial in Pakistan. The Lancet Regional Health - Southeast Asia. 2022 Sep;4:100035. doi:10.1016/j.lansea.2022.100035