

Original Research Article

Factors associated with nutritional status of children under-five in Pipara rural municipality, Mahottari district

Abishek Jha^{1*}, Paras Pokhrel¹, Raj Kumar Sangroula²

¹Little Buddha College of Health Science, Purbanchal University, Mid-Baneshwor, Kathmandu, Nepal

²Nepal Public Health Research and Development Center, Kathmandu, Nepal

Received: 06 July 2026

Accepted: 15 September 2026

*Correspondence:

Abishek Jha,

E-mail: akj4746@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Poor nutritional status among children under five remains a pressing problem in Nepal and is particularly prevalent in Madhesh Province. Poor educational status and culturally influenced community affect the nutritional intake and poses serious problems in under-five children. The objective of this study was to determine the prevalence of stunting, underweight and wasting along with the factors associated with it in Pipara rural municipality, Mahottari district.

Methods: An analytical cross sectional study design was employed among children aged 6 to 59 months with the sample size of 300. All seven wards of Pipara Rural Municipality were included in the study, and eligible participants were selected using systematic random sampling within each ward. Face to face interview and anthropometric measurement technique was used by using semi-structured questionnaire, dietary diversity questionnaire, weighing machine and stadiometer. Data was collected using kobo toolbox and analyzed using World Health Organization (WHO) Anthro Survey Analyzer, Microsoft Excel and statistical package for the social sciences (SPSS) v23.

Results: The prevalence of stunting, underweight and wasting was found 39.7%, 24.7%, and 12.3% respectively. Minimum dietary diversity was found 59%. However, stunting and wasting had significant association with ethnicity and parental education.

Conclusions: Under-five children nutritional status was still found as the issue needs to be addressed, higher stunting and underweight rate shows about the collective outcome of combination of several socio-demographic, socio-economic and childhood-feeding related determinants. Therefore, it reflects about the essence of having closer scrutiny on the policies or implementation gaps.

Keywords: Stunting, Under-five children, Underweight, Wasting

INTRODUCTION

Nutrition is a critical part of health and development; it is a prerequisite for the optimal health and growth, cognitive development, productivity and quality workforce for the nation in future.¹ The Nepal Demographic and Health Survey (NDHS) 2022 showed the national prevalence of stunting, underweight and wasting are 25%, 19% and 8% respectively. In comparison, Madhesh Province reports slightly higher burdens of stunting and wasting than the national average.²

Parental education, ethnicity, exclusive breastfeeding practice are the major factors associated with the nutritional status of under-five.³ Poor dietary diversity was found to have association with children being in undernutrition.⁴ This study aimed to assess the factors associated with nutritional status of children aged 6-59 months in Pipara rural municipality of Mahottari district and prevalence of stunting, underweight and wasting in them.

METHODS

Study design, study population, sampling and sample size

This analytical cross-sectional study was conducted in Pipara rural municipality, Mahottari district of Madhesh Province. Children aged 6-59 months and their mothers were selected.

Sample size was calculated using the formula given, where Z is the value at 95% confidence interval (1.96), p is the prevalence of stunting (29%)², q is the probability of non-occurrence of p (i.e., $1-p$), and d is the estimated error (5% or 0.05), and N is the total population, which was 3345 of under five children in the area found from local authority from health management information system (HMIS).

$$n = \frac{z^2 p(1-p)}{d^2 + \frac{z^2 p(1-p)}{N}}$$

It gave the sample size of 300 with a nonresponse of 4%. There was a total of seven wards in Pipara rural municipality, all seven wards were included and children were selected using systematic random sampling within each ward.

Place and duration of study

This study was conducted in Pipara rural municipality of Mahottari District of Madhesh Province. Data was collected from October 2025 to November 2025.

Instrumentation and data collection

Mothers were asked about the feeding practices and their socio-demographic details through semi-structured questionnaire and anthropometric measurements were taken from children's aged 6 to 59 months with the help of stadiometer and weighing machine. Weight was measured in kilogram and height was measured in the unit cm nearest to 0.1 cm. Dietary diversity questionnaire of food and agriculture organization of the United Nations. The questionnaires were pretested and weighing machine was calibrated before collecting the data. Children's age was calculated from their date of birth and by tallying it to the date of data collection. Quality monitoring of the data was done each day after the collection.

Outcome of study

Prevalence of stunting, underweight and wasting along with the child feeding practice, and 1-day dietary recall was the outcome of the study. WHO Z-score was used to categorize, $-2 < Z < +2$ as normal and $Z < -2$ as stunted, underweight or wasted. Association between the socio-demographic, socio-economic, feeding practice was also assessed in this study. Minimum dietary diversity was assessed on the basis of intake from at least four of the seven main food groups in the previous day.⁵ The seven food groups include grains, roots and tubers, legumes and

nuts, dairy products (milk, yogurt, and cheese), flesh foods (meat, fish, poultry and liver/organ meats), eggs, vitamin A rich fruits and vegetables, and other fruits and vegetables.

Inclusion and exclusion criteria

Children and their mothers having their children aged 6 to 59 months and were permanent resident or one living with greater than 6 months there were included in the study. Children with oedema or recent fractures, congenital disabilities/visible deformities or one who had fell ill within last one week before data collection were excluded from the study.

Ethical consideration

Approval was taken from the Pipara rural municipality office. Approval on collecting data was taken from mother by taking signature on the informed consent form prior to data collection.

Statistical analysis and software used

Data was analyzed using WHO Anthro Survey Analyzer v3.2.2, Microsoft Excel and statistical package for the social sciences (SPSS) v23. WHO Anthro Survey Analyzer was used to measure anthropometric measurement such as stunting, underweight and wasting. Microsoft Excel was used to clean and code collected data and then to determine frequencies and proportion of demographic and socio-economic characteristics of the sample collected whereas SPSS was used to find the association between different variables such as socio-demographic, socio-economic, feeding practice and dietary diversity with the nutritional status of the children aged 6 to 59 months by using bivariate logistic regression and calculating p value.

RESULTS

The graph in Figure 1 illustrates a comparison of child nutritional status between the national, provincial prevalence as per NDHS 2022 with Pipara rural municipality as per study conducted. It shows that the stunting prevalence is way higher than the national and provincial average with being 39.7%, whereas underweight was found similar to provincial prevalence but five percentage points higher than national average, similarly, the prevalence of wasting was found 12.3% in Pipara rural municipality exceeding both provincial and national average.

Table 1 shows, among the study respondents, 187 (62.3%) were male children and 113 (37.7%) were female. The mean age of the children was 30.46 months ($SD \pm 15.90$). Of these, 131 (43.7%) were aged below 24 months, while 169 (56.3%) were aged 24 months or older. The mean age of mothers was 25.64 years ($SD \pm 4.31$). Nearly half of the mothers were aged 24-29 years (45.3%), followed by those aged 18-23 years (33.7%) and 30-47 years (21.0%).

Regarding family structure, 207 (69.0%) respondents belonged to joint or extended families, whereas 93 (31.0%) lived in nuclear families. In terms of ethnicity, Dalit constituted the largest proportion (29.0%), followed by Brahmin/Chhetri (21.3%), Janajati (20.3%), Muslim (16.3%), and Madhesi (13.0%). The majority of respondents practiced Hinduism (83.7%), while 16.3% followed Islam.

With respect to educational status, 29.0% of mothers had no formal education, whereas nearly half (47.4%) had attained secondary education or above. Among fathers, one-third (33.7%) had completed intermediate level education or higher, while 16.7% had no formal education. The mean monthly household income was Nepalese rupee (NPR) 29,110 (SD±20,062.39), with nearly two-thirds of households (64.7%) earning less than NPR 30,000 per month.

Foreign employment was reported as the primary source of household income by almost half of the respondents (49.3%), followed by job or business (29.3%) and labor or agriculture (21.3%). A large proportion of mothers (81.7%) reported having knowledge of exclusive breastfeeding. Most children (95.4%) were introduced to complementary feeding at six months of age or later. In terms of feeding practices, 58.0% of children were fed three to four times per day, and 59.0% met the minimum dietary diversity (MDD) requirement.

Table 2 shows out of 300 children included in the study, 119 (39.7%) were stunted. The associations between socio-demographic, socio-economic, feeding practice, and dietary diversity characteristics and child stunting are presented in Table 2.

Stunting was slightly more common among male children (41.7%) compared to females (36.3%); however, this difference was not statistically significant (OR=1.3, 95% CI: 0.78-2.03; $p=0.352$). Similarly, 43.1% of children aged <24 months were stunted compared to those aged ≥24 months which was 37.3%, but the association was not significant (OR=1.3, 95% CI: 0.80-2.04; $p=0.313$). Family type also showed no significant association with stunting.

Ethnicity showed notable variation in stunting prevalence. Children from Madhesi and Muslim households had significantly higher odds of stunting compared to Brahmin/Chhetri children (OR=2.5, 95% CI: 1.09-5.69 and OR=2.3, 95% CI: 1.05-4.94, respectively), although no statistical significance was observed ($p=0.092$).

Parental education was significantly associated with child stunting. Children of mothers with no formal education and those who could only read and write had higher odds of stunting compared to children whose mothers had intermediate education or above (OR=2.6, 95% CI: 1.30-5.19 and OR=5.4, 95% CI: 1.91-14.94, respectively) ($p=0.014$). Similarly, children whose fathers had no education showed substantially higher stunting prevalence (31/50, 62.0%) than those whose fathers had intermediate or higher education (28/101, 27.7%) ($p=0.002$).

Regarding child feeding practices, lack of knowledge on exclusive breastfeeding (EBF) was significantly associated with stunting, with more than half (58.2%) of children whose mothers lacked EBF knowledge being stunted ($p=0.002$). No statistically significant associations were observed between stunting and timing of weaning, food frequency, or with MDD.

Table 3 depicts in the study conducted 24.7% of children were found underweight, various characteristics showed statistically significant association with underweight.

Underweight was slightly more common among male children (25.1%) compared to females (23.9%); however, this difference was not statistically significant (OR=1.1, 95% CI: 0.62-1.84; $p=0.809$). Similarly, 25.4% of children aged ≥24 months were underweight compared to 23.6% of children aged <24 months, but the association was not significant (OR=1.1, 95% CI: 0.65-1.89; $p=0.715$). Family type also showed no significant association with underweight.

Ethnicity showed variation in underweight prevalence. Children from Dalit (31.0%) and Madhesi (30.8%) households had higher odds of being underweight compared to Brahmin/Chhetri children (15.6%), (OR=2.4, 95% CI: 1.07-5.48 and OR=2.4, 95% CI: 0.92-6.25, respectively); however, the overall association was not statistically significant ($p=0.171$).

Children of mother having education of primary level had higher odds of 4.0 times (95% CI: 1.612-9.926, $p=0.003$), 3.9 times odds were found in children of mother who can read and write (95% CI: 1.291-12.005, $p=0.016$), children of mother with no education had 2.3 times higher odds (95% CI: 0.997-5.455, $p=0.051$) of being underweight as compared to those children with mother having intermediate level of education ($p=0.027$). Similarly, children whose fathers had no education showed a higher prevalence of underweight (38.0%) compared to those whose fathers had intermediate or higher education (15.8%), although this association was marginally significant ($p=0.056$).

Regarding child feeding practices, lack of knowledge on EBF was significantly associated with underweight, with 43.6% of children whose mothers lacked EBF knowledge being underweight compared to 20.4% among those with EBF knowledge (OR=3.0, 95% CI: 1.63-5.60; $p<0.001$). Underweight was not found to be statistically significant with the timing of weaning, food frequency, or with MDD.

Table 4 shows among the study sample, 12.3% of the children were found wasted, while 87.7% were not wasted. Age of the child emerged as the main factor associated with wasting. A higher percentage of children aged <24 months were wasted which was 16.3% compared to those aged ≥24 months (9.6%), and this association was statistically significant (OR=1.8, 95% CI: 0.91-3.60; $p=0.008$).

Wasting prevalence differed slightly by sex, with 16/113 (14.2%) of females and 21/187 (11.2%) of males found wasted; however, this difference was not statistically significant. Family type also showed no association with wasting. No statistically significant associations were observed between wasting and ethnicity or religion, although the prevalence ranged from 4/49 (8.2%) among Muslim children to 13/87 (14.9%) among Dalit children.

Parental education status was not significantly associated with child wasting. Wasting prevalence ranged from 1/22 (4.5%) among children whose mothers could read and

write to 8/49 (16.3%) among those whose mothers had primary education. Similar patterns were noted for father's education.

Regarding child feeding practices, wasting was found slightly higher among children whose mothers lacked knowledge of EBF (14.5%) compared to those with such knowledge (11.8%), though this difference was not statistically significant. Timing of weaning, food frequency, and MDD were also not found statistically significant with wasting.

Table 1: Demographic, socio-economic, feeding practice, dietary diversity characteristics of children aged 6-59 months.

Characteristics		Number	%
Sex of child	Male	187	62.3
	Female	113	37.7
Age of child (mean: 30.46, SD: ± 15.90)	<24 months	131	43.7
	≥ 24 months	169	56.3
Age of mother (mean: 25.64, SD: ± 4.31)	18-23 years	101	33.7
	24-29 years	136	45.3
	30-47 years	63	21
Family type	Nuclear	93	31
	Joint/extended	207	69
Ethnicity	Madhesi	39	13
	Dalit	87	29
	Janajati	61	20.3
	Muslim	49	16.3
	Brahmin/Chhetri	64	21.3
Religion	Hindu	251	83.7
	Muslim	49	16.3
Mother's education status	No education	87	29
	Can read and write	22	7.3
	Primary (class 1-8)	49	16.3
	Secondary (class 9-10)	71	23.7
	Intermediate (+2) or above	71	23.7
Father's education status	No education	50	16.7
	Can read and write	22	7.3
	Primary (class 1-8)	55	18.3
	Secondary (class 9-10)	72	24
	Intermediate (+2) or above	101	33.7
Family monthly income (mean: 29,110, SD: ± 20062.39)	<30,000 NPR	194	64.7
	$\geq 30,000$ NPR	106	35.3
Main source of income	Labor/agriculture	64	21.3
	Job/business	88	29.3
	Foreign employment	148	49.3
Knowledge on exclusive breastfeeding (EBF)	Yes	245	81.7
	No	55	18.3
Weaning of child	Before 6 months	14	4.6
	After 6 months	286	95.4
Food frequency in a day	1-3 times	88	29.3
	3-4 times	174	58
	5 or more times	38	12.7
Minimum dietary diversity (MDD)	Met	177	59
	Not met	123	41

Table 2: Association between stunting and other variables.

Characteristics	Stunting status (N, %)		Odds ratio (OR) (95% CI)	P value
	No (n=181)	Yes (n=119)		
Sex of child				
Male	109 (58.3)	78 (41.7)	1.3 (0.777-2.033)	0.352
Female	72 (63.7)	41 (36.3)	1	
Age of child (months)				
<24	70 (56.9)	53 (43.1)	1.3 (0.796-2.036)	0.313
≥24	111 (62.7)	66 (37.3)		
Family type				
Nuclear	52 (55.9)	41 (44.1)	1.3 (0.794-2.143)	0.295
Joint/extended	129 (62.3)	78 (37.7)	1	
Ethnicity				
Madhesi	19 (48.7)	20 (51.3)	2.5 (1.092-5.693)	0.092
Dalit	51 (58.6)	36 (41.4)	1.7 (0.843-3.317)	
Janajati	41 (67.2)	20 (32.8)	1.1 (0.542-2.463)	
Muslim	25 (51)	24 (49)	2.3 (1.047-4.937)	
Brahmin/Chhetri	45 (70.3)	19 (29.7)	1	
Religion				
Hindu	156 (62.2)	95 (37.8)	1	0.147
Muslim	25 (51)	24 (49)	1.6 (0.852-2.917)	
Mother's education status				
No education	47 (54)	40 (46)	2.6 (1.304-5.196)	0.014*
Can read and write	8 (36.4)	14 (63.6)	5.4 (1.917-14.947)	
Primary (class 1-8)	28 (54.9)	23 (45.1)	2.5 (1.155-5.466)	
Secondary (class 9-10)	46 (64.8)	25 (35.2)	1.6 (0.799-3.459)	
Intermediate (+2) or above	52 (75.4)	17 (24.6)	1	
Father's education status				
No education	19 (38)	31 (62)	4.2 (2.074-8.724)	0.002*
Can read and write	12 (54.5)	10 (45.5)	2.2 (0.844-5.593)	
Primary (class 1-8)	34 (61.8)	21 (38.2)	1.6 (0.802-3.233)	
Secondary (class 9-10)	43 (59.7)	29 (40.3)	1.7 (0.926-3.340)	
Intermediate (+2) or above	73 (72.3)	28 (27.7)	1	
Knowledge on EBF				
Yes	158 (64.5)	87 (35.5)	2.5 (0.218-2.320)	0.002*
No	23 (41.8)	32 (58.2)	1	
Weaning of child (months)				
Before 6	6 (42.9)	8 (57.1)	2.1 (0.710-6.220)	0.180
After 6	175 (61.2)	111 (38.8)	1	
Food frequency in a day				
1-3 times	55 (62.5)	33 (37.5)	1.2 (0.520-2.561)	0.599
3-4 times	101 (58)	73 (42)	1.4 (0.667-2.898)	
5 or more times	25 (65.8)	13 (34.2)	1	
Minimum dietary diversity				
Met	104 (59.1)	72 (40.9)	1.1 (0.708-1.817)	0.600
Not met	77 (62.1)	47 (37.9)	1	

1-Reference; *significant; p value <0.05, CI-confidence interval at 95%

Table 3: Association between underweight and other variables.

Characteristics	Underweight status (N, %)		OR (95% CI)	P value
	No (n=226)	Yes (n=74)		
Sex of child				
Male	140 (74.9)	47 (25.1)	1.1 (0.621-1.843)	0.809
Female	86 (76.1)	27 (23.9)	1	

Continued.

Characteristics	Underweight status (N, %)		OR (95% CI)	P value
	No (n=226)	Yes (n=74)		
Age of child (months)				
<24	94 (76.4)	29 (23.6)	1	0.715
≥24	132 (74.6)	45 (25.4)	1.1 (0.646-1.890)	
Family type				
Nuclear	67 (72)	26 (28)	1.3 (0.737-2.242)	0.376
Joint/extended	159 (76.8)	48 (23.2)	1	
Ethnicity				
Madhesi	27 (69.2)	12 (30.8)	2.4 (0.921-6.255)	0.171
Dalit	60 (69)	27 (31)	2.4 (1.077-5.481)	
Janajati	49 (80.3)	12 (19.7)	1.3 (0.525-3.332)	
Muslim	36 (73.5)	13 (26.5)	1.2 (0.772-4.923)	
Brahmin/Chhetri	54 (84.4)	10 (15.6)	1	
Religion				
Hindu	190 (75.7)	61 (24.3)	1	0.741
Muslim	36 (73.5)	13 (26.5)	1.1 (0.560-2.258)	
Mother's education status				
No education	67 (74.7)	22 (25.3)	2.3 (0.997-5.455)	0.027*
Can read and write	14 (63.6)	8 (36.4)	3.9 (1.291-12.005)	
Primary (class 1-8)	31 (63.3)	18 (36.7)	4.0 (1.612-9.926)	
Secondary (class 9-10)	54 (76.1)	17 (23.9)	2.2 (0.894-5.263)	
Intermediate (+2) or above	62 (87.3)	9 (12.7)	1	
Father's education status				
No education	31 (62)	19 (38)	3.3 (1.490-7.117)	0.056
Can read and write	16 (72.7)	6 (27.3)	2.0 (0.677-5.864)	
Primary (class 1-8)	41 (74.5)	14 (25.5)	1.8 (0.808-4.071)	
Secondary (class 9-10)	53 (73.6)	19 (26.4)	1.9 (0.901-4.025)	
Intermediate (+2) or above	85 (84.2)	16 (15.8)	1	
Knowledge on EBF				
Yes	195 (79.6)	50 (20.4)	1	<0.001*
No	31 (56.4)	24 (43.6)	3.0 (1.629-5.595)	
Weaning of child (months)				
Before 6	10 (71.4)	4 (28.6)	1.2 (0.375-4.059)	0.729
After 6	216 (75.5)	70 (24.5)	1	
Food frequency in a day				
1-3 times	68 (77.3)	20 (22.7)	1.6 (0.575-4.283)	0.274
3-4 times	126 (72.4)	48 (27.6)	2.0 (0.799-5.166)	
5 or more times	32 (84.2)	6 (15.8)	1	
Minimum dietary diversity				
Met	132 (75)	44 (25)	1.0 (0.612-1.782)	0.873
Not met	94 (75.8)	30 (24.2)		

1-Reference; *significant; p value <0.05, CI-confidence interval at 95%

Table 4: Association between wasting and other variables.

Characteristics	Wasting status (N, %)		OR (95% CI)	P value
	No (n=263)	Yes (n=37)		
Sex of child				
Male	166 (88.8)	21 (11.2)	0.77 (0.382-1.540)	0.456
Female	97 (85)	16 (14.2)	1	
Age of child (months)				
<24	103 (83.7)	20 (16.3)	1.8 (0.914-3.6)	0.008*
≥24	160 (90.4)	17 (9.6)	1	
Family type				
Nuclear	81 (87.1)	12 (12.9)	1.3 (0.737-2.242)	0.376

Continued.

Characteristics	Wasting status (N, %)		OR (95% CI)	P value
	No (n=263)	Yes (n=37)		
Joint/extended	182 (87.9)	25 (12.1)		
Ethnicity				
Madhesi	35 (89.7)	4 (10.3)	1	0.822
Dalit	74 (85.1)	13 (14.9)	1.5 (0.467-5.056)	
Janajati	53 (86.9)	8 (13.1)	1.3 (0.369-4.721)	
Muslim	45 (91.8)	4 (8.2)	0.8 (0.182-3.331)	
Brahmin/Chhetri	56 (87.5)	8 (12.5)	1.3 (0.350-4.462)	
Religion				
Hindu	218 (86.9)	33 (13.1)	1.7 (0.575-5.046)	0.337
Muslim	45 (91.8)	4 (8.2)	1	
Mother's education status				
No education	76 (87.4)	11 (12.6)	0.9 (0.352-2.216)	0.633
Can read and write	21 (95.5)	1 (4.5)	0.3 (0.035-2.407)	
Primary (class 1-8)	41 (83.7)	8 (16.3)	1.2 (0.433-3.269)	
Secondary (class 9-10)	64 (90.1)	7 (9.9)	0.7 (0.239-1.864)	
Intermediate (+2) or above	61 (85.9)	10 (14.4)	1	
Father's education status				
No education	42 (84)	8 (16)	1	0.341
Can read and write	20 (90.9)	2 (9.1)	0.5 (0.102-2.702)	
Primary (class 1-8)	52 (94.5)	3 (5.5)	0.3 (0.706-1.213)	
Secondary (class 9-10)	60 (83.3)	12 (16.7)	1.0 (0.395-2.791)	
Intermediate (+2) or above	89 (88.1)	12 (11.9)	0.7 (0.269-1.862)	
Knowledge on EBF				
Yes	216 (88.2)	29 (11.8)	1	0.582
No	47 (85.5)	8 (14.5)	1.3 (0.545-2.948)	
Weaning of child (months)				
Before 6	12 (85.7)	2 (14.3)	1.2 (0.257-5.565)	0.820
After 6	251 (87.8)	35 (12.2)	1	
Food frequency in a day				
1-3 times	80 (90.9)	8 (9.1)	1	0.267
3-4 times	148 (85.1)	26 (14.9)	1.8 (0.760-4.060)	
5 or more times	35 (92.1)	3 (8.1)	0.9 (0.215-3.424)	
Minimum dietary diversity				
Met	155 (88.1)	21 (11.9)	1	0.801
Not met	108 (87.1)	16 (12.9)	1.1 (0.546-2.192)	

1-Reference; *significant; p value <0.05, CI-confidence interval at 95%

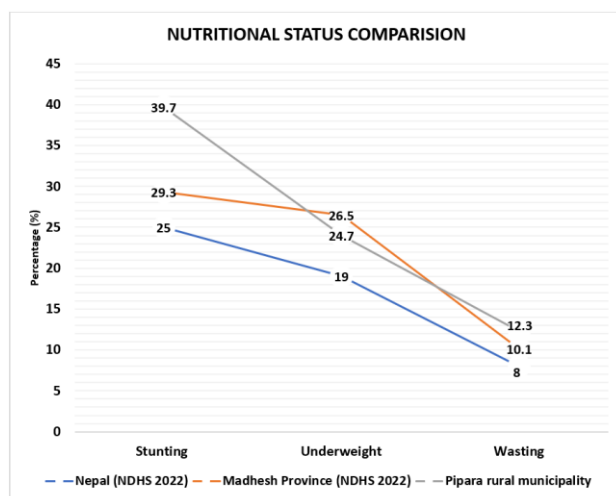


Figure 1: Comparative nutritional status prevalence.

DISCUSSION

Malnutrition continues becoming a major public health concern in developing countries, including Nepal, where resources limitations and socio-economic disparities persist consistently 33. This study which was conducted in Pipara rural municipality of Mahottari District revealed a higher prevalence of stunting (39.7%), underweight (24.7%) and wasting (12.3%) compared to the both national and provincial figure as per the national level study conducted as per NDHS 2022, which showed national prevalence of stunting, underweight and wasting at 25%, 19%, and 8% respectively whereas Madhesh Province reported at 29.3%, 26.5%, and 10.1% respectively.² Findings from this study indicates that male children had higher odds of being stunted and underweight compared to female children. This pattern has been observed in several studies conducted in Nepal, suggesting

biological vulnerability of male children to growth faltering and infections.^{6,7} However, some studies have reported contrasting patterns, particularly for wasting, where female children were more affected. Which is contrasting to this study finding.⁸

Child age showed a statistically significant association with wasting ($p=0.008$) in this study. Children aged <24 months had higher odds of wasting compared to those aged ≥ 24 months, indicating a critical vulnerability during early complementary feeding periods. This finding resembles with previous studies conducted in Nepal, which have also reported higher prevalence of wasting among children below two years of age, where 27.8% below 24 months were wasted and 23.8% were above 24 months of age.⁹ As this period is marked as a critical window period which corresponds as transition from EBF to complementary feeding, during which inadequate feeding practices and increased exposure to infections may contribute to acute malnutrition. Although underweight was more prevalent among children aged ≥ 24 months, the association was not statistically significant, a finding supported by a study among Sukumbasi children in Kanakai Municipality with 35.9% were aged more than 24 months and 24.5% were below 24 months of age.¹⁰

In the present study, stunting, wasting, and underweight were found slightly more prevalent among children from nuclear families compared to those living in joint/extended families. Reasons could be due to low caregiving support or economic pressure in nuclear households. Similar type of findings has been reported in studies conducted in Inaruwa-7 and Kolati Bhumulu, where higher prevalence of undernutrition was observed among children from nuclear families, particularly for stunting and underweight.^{11,12} However, these variations across studies suggests that family structure can link with other socio-economic and cultural factors.

Ethnicity appeared to be an important factor related to nutritional status of children in this study, with a higher percentage of stunting, underweight and wasting observed among children from disadvantaged ethnic groups compared to those from advantaged groups. Terai dalit had 2.4 times higher odds of having their children being underweight as compared to Terai Brahmin/Chhetri. Similarly, children from Madhesi ethnic group had 2.5 times higher odds of being their children stunted as compared to Terai Brahmin/Chhetri. These findings are supported by several studies conducted in different parts of Nepal, which similarly reported higher levels of malnutrition among disadvantaged ethnic populations. Religion of the respondent was not found to be associated with the nutritional status of children.^{13,14}

Maternal education was significantly associated with child nutritional status in this study. Children of mothers with no formal education were more likely to be stunted and underweight compared to those whose mothers had attained secondary or higher education. This finding is

consistent with studies conducted in rural mountainous regions of Nepal and other low- and middle-income countries, which emphasize the protective role of maternal education in improving child feeding practices, healthcare utilization, and overall child care.^{2,13,15} Educated mothers are more likely to possess knowledge regarding appropriate infant and young child feeding practices, thereby reducing the risk of malnutrition.

Similarly, paternal education showed a significant association with stunting and underweight. Children whose fathers had lower educational attainment were more vulnerable to undernutrition. This may be explained by the role of fathers in household decision-making, income generation, and access to health and nutrition-related information. These findings are supported by evidence from national surveys and studies conducted in Nepal, which highlight the influence of paternal education on household socio-economic status and child nutrition outcomes.^{2,15}

Knowledge on EBF among mothers was found to be significantly associated with stunting ($p=0.002$) and underweight ($p\leq 0.001$). Children of mothers who lacked knowledge of EBF were more likely to be stunted. This underscores the importance of maternal knowledge in shaping early feeding practices and long-term growth outcomes. Similar associations have been reported in studies conducted in Bhadrapur, Darchula, and Pune-Maharashtra, where inadequate knowledge on breastfeeding practices increased the risk of undernutrition.^{3,16,17}

Early weaning practice (weaning before 6 months) and low food frequency practice were associated with higher odds of stunting, wasting, and underweight in this study. Children who were introduced to complementary foods early, and those fed less frequently, exhibited poorer nutritional outcomes. These findings align with evidence from studies conducted in Nepal and other developing countries, which emphasize that timely introduction of complementary feeding and adequate meal frequency are crucial for preventing both acute and chronic malnutrition.^{3,18} MDD did not show a statistically significant association with stunting or underweight in the present study; however, children who did not meet the MDD criteria had higher odds of wasting. This suggests that inadequate dietary diversity may contribute more strongly to acute malnutrition. Similar findings have been reported in studies from Tanzania and sub-Saharan Africa, where lack of diverse diets was associated with increased risk of wasting.^{4,5}

The cross-sectional design of this study limits the ability to establish causal relationship between dependent and independent variables. Conducting study in only one municipality of Mahottari district of Madhesh Province led restricting external validity of the findings. Dietary information was collected using dietary recall questionnaire which subject to recall and reporting bias.

This study relied on self-reported data from the participants using semi-structured questionnaire which can led to information bias.

CONCLUSION

Nutrition is a fundamental component of child health and development, particularly among children under five years of age. The prevalence of stunting, underweight and wasting found was 39.7%, 24.7%, and 12.3% respectively, which was higher than the national and provincial figure. Which reflects coexistence of both acute and chronic undernutrition. The study conducted demonstrated that parental education, maternal knowledge on EBF was significantly associated with stunting. Similarly, maternal educational status and knowledge on EBF with underweight, and age of child with wasting. These findings suggest that more studies should be conducted in such settings. focus should be centered on improving parental education and enhancing child feeding practices. Additionally, age specific intervention should be prioritized, addressing critical window period.

ACKNOWLEDGEMENTS

Authors would like to acknowledge the supervisor for his consistent guidance, support in technical and non-technical aspect. They also extend gratitude to the Pipara rural municipality office for granting the permission and all the respondents for their smooth cooperation in the conduct.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Bhusal CK, Bhattarai S, Chhetri P, Myia SD. Nutritional status and its associated factors among under five years Muslim children of Kapilvastu district, Nepal. PLoS One. 2023;18(1):e0280375.
2. Ministry of Health and Population. Nepal Demographic and Health Survey. DoHS; 2022. Available at: <https://dhsprogram.com/pubs/pdf/FR379/FR379.pdf>. Accessed on 19 July 2026.
3. Sangroula RK, Uprety S. Factors associated with nutritional status of under five children among Satar Community of Bhadrapur Municipality, Jhapa, Nepal. Int J Community Med Public Health. 2020;7(6):2059.
4. Aboagye RG, Seidu AA, Ahinkorah BO, Arthur-Holmes F, Cadri A, Dadzie LK, et al. Dietary diversity and undernutrition in children aged 6-23 months in Sub-Saharan Africa. Nutrients. 2021;13(10):3431.
5. Khamis AG, Mwanri AW, Ntwenya JE, Kreppel K. The influence of dietary diversity on the nutritional status of children between 6 and 23 months of age in Tanzania. BMC Pediatr. 2019;19(1):518.
6. Dhungana GP. Nutritional Status and the Associated Factors in Under Five Years Children of Lamjung, Gorkha and Tanahun Districts of Nepal. Nepal J Stat. 2017;1:15-8.
7. Sultana P, Rahman MM, Akter J. Correlates of stunting among under-five children in Bangladesh: a multilevel approach. BMC Nutr. 2019;5(1):41.
8. Paudel A, Bhandari TR, Dangi NB. Household food security and nutritional status of under-five-year children: A case study of Nepal. J Nutr Food Secur. 2021;6(2).
9. Kayastha B, Rai S, Lakhe D, Pradhan R, Sainju S. Prevalence of malnutrition among under-five children residing in Kamal Gaupalika, Jhapa. Nepal Med Coll J. 2022;24(2):113-20.
10. Timsina SK. Assessing the Factor Associated with Nutritional Status of Sukumbasi Children Aged 6-59 Months in Kanakai Municipality. Jhapa. B.Sc. Dissertation. 2018.
11. Amita K, Bohara R. Assessment of Nutritional Status of Under Five Years Children in Kolati Bhumlu of Kavrepalanchok District. J Adv Acad Res. 2023;10(2):79-91.
12. Shrestha B. Study on Nutritional Status of 6-59 Months Children in Inaruwa-7, Sunsari. Dissertation. 2018.
13. Chataut J, Jonchhe S. Prevalence and associated factors of malnutrition in under five children in a rural mountainous area of Nepal: a community based cross sectional study. Kathmandu Univ Med J. 2020;18(4):407-13.
14. Bloss E, Wainaina F, Bailey RC. Prevalence and predictors of underweight, stunting, and wasting among children aged 5 and under in western Kenya. J Trop Pediatr. 2004;50(5):260-70.
15. Vollmer S, Bommer C, Krishna A, Hartgen K, Subramanian SV. The association of parental education with childhood undernutrition in low- and middle-income countries: comparing the role of paternal and maternal education. Int J Epidemiol. 2017;46(1):312-23.
16. Joshi O, Bist SK. Feeding Practice and Nutrition status of Under-five Year's Children in Dalit Community in Darchula. Shiksha Shastra Saurabh. 2024;24:70-9.
17. Naik AR, Patil SV. Assessment of the Feeding Practices in Infants and Young Children and its Association with Nutritional Status in Urban Areas. Int J Child Heal Nutr. 2023;12(4):129-35.
18. Chaudhary P, Malla R, Thapa JK, Sangroula RK. Factors associated with nutritional status of under five children in Rara Chhayanaath Municipality, Mugu district. Int J Community Med Public Health. 2022;9(8):3101.

Cite this article as: Jha A, Pokhrel P, Sangroula RK. Factors associated with nutritional status of children under-five in Pipara rural municipality, Mahottari district. Int J Sci Rep 2026;12(10):336-44.