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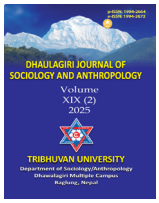

Trends in Nutritional Status among Children under Five in Nepal : Findings from the Nationally Representative Surveys 1996-2022

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Abstract

Malnutrition among children which includes stunting, wasting, and underweight remains a serious public health concern in Nepal. It exists despite tremendous progress since 1996, especially for children from the poorest households, those born to mothers with lower levels of education, and those living in rural areas. To achieve SDG 2.2, which calls for the eradication of all forms of malnutrition by 2030, it is crucial to understand trends and disparities in nutritional status to guide targeted interventions. The study examines trends in stunting, wasting, and underweight among children under five years old, using data from the Nepal Demographic and Health Surveys (NDHS) and other national surveys. The analysis focuses on variations by residence (urban/rural), gender, mother's education level, child's age, and household wealth quintile. Child malnutrition has been found to have significantly declined, as per analysis of NDHS data for the period 1996 to 2022. The rate of underweight decreased from 42.3% to 18.7%, wasting decreased from 14.8% to 7.7%, and stunting decreased from 56.6% to 24.8%. However, the prevalence of malnutrition is found to be higher among the children from the lowest wealth quintile, children of uneducated mothers, in rural areas. Also, there is some level of gender variations in malnutrition, which peaks between the ages of 18 and 35 months. Despite the substantial nationwide improvements in child nutrition from 1996 to 2022, inequalities persist in terms of rural-urban residence, mothers' education, wealth quintile, and the period of 18–35 months as a vulnerable period. It demands targeted, equity-focused interventions to sustain progress and achieve national and global nutrition targets.

Keywords: child nutrition, demographic and health survey, stunting; undernutrition; underweight, wasting

Introduction

Child malnutrition, manifested as stunting (low height-for-age), wasting (low weight-for-height), and underweight (low weight-for-age), remains a critical public health issue in low- and middle-income countries, including Nepal (Black et al., 2013; UNICEF, WHO, & World Bank, 2023). Stunting reflects chronic nutritional deprivation and repeated infections, wasting signals acute undernutrition often linked to recent food shortages or illness, and underweight is a composite indicator capturing both acute and chronic malnutrition (World Health Organization [WHO], 2021). These conditions are associated with impaired cognitive and physical development, increased susceptibility to infectious diseases, higher child mortality, and long-term

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economic consequences that reinforce intergenerational cycles of poverty (Grantham-McGregor et al., 2007; Victora et al., 2008).

In Nepal, significant progress has been made since 1996, when 56.6% of children under five were stunted, 14.8% wasted, and 42.3% underweight. By 2022, these figures had declined to 24.8%, 7.7%, and 18.7%, respectively (Ministry of Health, Nepal et al., 2023). Despite this progress, malnutrition remains inequitably distributed. Children in rural areas, those born to mothers with no formal education, and those in the lowest household wealth quintile consistently exhibit higher prevalence rates across all indicators (Ministry of Health, Nepal et al., 2023). The risk of malnutrition also peaks between 18–35 months of age, highlighting a critical window for intervention.

This article analyzes longitudinal trends in the nutritional status of Nepalese children under five, using nationally representative data from the NDHS conducted between 1996 and 2022. The study examines disparities across key sociodemographic variables, including urban/rural residence, child's sex, maternal education, child's age, and household wealth quintile, to identify persistent inequities and inform targeted policy responses. These findings support evidence-based programming aligned with Nepal's Multi-Sector Nutrition Plan III (MSNP III, 2023–2030) (National Planning Commission, 2024) and global targets under Sustainable Development Goal (SDG) 2.2, which aims to end all forms of malnutrition by 2030 (United Nations, 2015).

Methods

This study followed a quantitative approach to analyze trends over time, drawing on publicly available data from the nationally representative demographic and health surveys conducted in 1996, 2001, 2006, 2011, 2016, and 2022 in collaboration with the Government of Nepal and the Measure DHS program. Each survey followed ethical guidelines to ensure the reliability of the data sound for secondary analysis (Ministry of Health Nepal et al., 2017; Ministry of Health and Population Nepal et al., 2023).

The analytical sample comprises children aged 0–59 months (under five years) for whom anthropometric measurements (height-for-age, weight-for-height, and weight-for-age) were recorded using WHO Child Growth Standards (World Health Organization, 2006). Children were classified as stunted (height-for-age Z-score ≤2), wasted (weight-for-height Z-score ≤2), or underweight (weight-for-age Z-score ≤2) based on these thresholds.

The main aim of the analysis is to analyze temporal trends in child malnutrition prevalence over a period spanning 26 years (1996–2022), by key socio-demographic determinants: urban/rural place of residence, child sex, maternal educational level (no education, primary/completed lower secondary/2010 International Standard Classification of Education (ISCED) levels 0 or 1; completed upper secondary/incomplete tertiary/2010 ISCED levels 2 or 3; complete tertiary/2010 ISCED levels 5 or higher), age of the child in months (<6 months, 6–8 months, 9–11months,12–17 months, 18–23months, 24-35 months, 36-47 months, 48-59 months and groups combined [0-23) and [24 –59 months]) and household wealth quintiles (lowest/middle/highest). The age group of children is as per the nature of the available data. For each indicator, descriptive statistics including prevalence percentages and trends by survey year and subgroup were generated. Discrepancies and trends were visualized (figures and tables).

Results

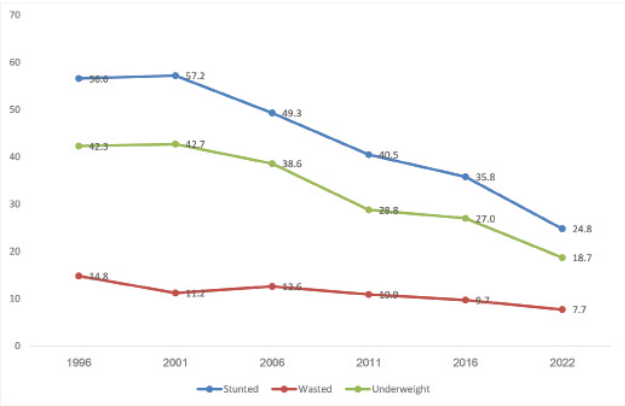
Analysis of nationally representative NDHS data from 1996 to 2022 reveals a substantial and sustained decline in the prevalence of child malnutrition among children under five in Nepal.

Overall Trends in Nutritional Status

Over the past 26 years, Nepal has got significant achievement in improving nutrition status of the children. About 57% of children were stunted in 1996 showing chronic malnutrition. This prevalence significantly dropped to about 25% in 2022. There was a noticeable decline (42.3% to 18.7%) in the rate of underweight also. The wasting, which is considered acute hunger, dropped from 14.8% to 7.7%. This improvement can be with the combined impact of better nutrition related programs and improved socioeconomic status (Figure 1).

Figure 1

Trends of nutritional status among children under aged up to 60 months in percentage



These findings show Nepal's significant progress toward global nutrition targets, including the World Health Assembly's 2025 goals and Sustainable Development Goal (SDG) 2.2. However, nearly 25% of the children remain stunted. It shows the need for continuously targeted efforts to eliminate still remaining disparities and sustain momentum.

Nutritional Status by Residence (Urban vs. Rural)

An examination of NDHS data spanning from 1996 to

2022 shows enduring and substantial differences in child nutrition between urban and rural regions. Across all survey years, rural children consistently exhibited higher prevalence rates of stunting, wasting, and underweight compared to their urban counterparts. For instance, in 1996, stunting affected 57.3% of rural children versus 45.6% in urban areas; by 2022, although both groups improved substantially, the gap remained (rural: 31.0% vs. urban: 21.5%). A similar pattern was observed for underweight prevalence, declining from 43.5% (rural) and 24.6% (urban) in 1996 to 21.9% and 16.9% respectively in 2022 — indicating that while progress has been made, rural disadvantage endures. Interestingly, the gap in wasting narrowed over time and even reversed slightly in 2022 (urban: 7.9% vs. rural: 7.5%), suggesting more equitable outcomes for acute malnutrition in recent years (Table 1). These findings underscore that despite nationwide improvements, geographic inequity remains a critical driver of malnutrition in Nepal, necessitating targeted interventions in rural communities where structural barriers including limited healthcare access, food insecurity, and lower maternal education continue to impede nutritional progress.

Table 1

Nutritional status of children by residence and year of survey in percentage

	Stunted			Wasted			Underweight		
Year	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
1996	56.6	45.6	57.3	14.8	9.2	15.1	42.3	24.6	43.5
2001	57.2	42.7	58.2	11.2	9.0	11.4	42.7	27.9	43.8
2006	49.3	36.3	51.1	12.6	7.5	13.3	38.6	23.2	40.7
2011	40.5	26.7	41.8	10.9	8.2	11.2	28.8	16.5	30.0
2016	35.8	32.0	40.2	9.7	9.2	10.2	27.0	23.4	31.1
2022	24.8	21.5	31.0	7.7	7.9	7.5	18.7	16.9	21.9

In 2022, stunting rates were almost the same for boys and girls: 24.7% for boys and 25.0% for girls, a gap of just 0.3 percentage points. The scenario of underweight children was also fairly close, at 16.6% for boys and 20.9% for girls. Despite slightly larger gaps, the difference between boys and girls has narrowed over the period from 1996 to 2022.

Wasting tells a different story. Throughout the years, boys had slightly higher rates of acute malnutrition than girls, with the gap increasing a bit in 2022 (8.5% vs. 6.9%). However, these findings suggest that gender does not play a major role in the malnutrition of children in Nepal. However, boys may need extra attention in efforts to prevent and respond to acute malnutrition.

Table 2

Nutritional status of children by sex and year of survey in percentage

	Stunted		Wasted		Underweight	
Year	Male	Female	Male	Female	Male	Female
1996	56.5	56.6	15.5	14.0	42.1	42.5
2001	57.1	57.3	12.3	10.2	42.1	43.3
2006	49.0	49.6	12.9	12.3	37.5	39.7
2011	41.4	39.5	12.0	9.7	29.6	28.0
2016	36.0	35.7	9.5	9.8	26.7	27.4
2022	24.7	25.0	8.5	6.9	16.6	20.9

Nutritional Status by Mother's Education Level

The DHS data from 1996 to 2022 illustrate a strong negative relationship between maternal education and child stunting. In every survey, children of mothers with no formal education revealed the highest stunting prevalence, declining from 60.5% in 1996 to 36.3% in 2022. However, it is still higher than all other educational groups. In contrast, children of mothers with higher education showed the lowest stunting rates, falling from 18.4% to 12.0% over the same period.

The gap between the least and most educated mothers has not fully closed, despite the decline in stunting across all levels of maternal education. In 1996, children of mothers with no education were 42% more likely to be stunted in comparison to those whose mothers with higher education. The gap had narrowed in 2022 but still remained at around 24 points (36.3% vs. 12.0%) reflecting the vital role of mother's education for improving child nutrition. Therefore, educational support to the women and girls can

Table 3

Nutritional status of children by mother's education level and survey year in percentage

	Stunted				Wasted				Underweight			
Year	No education	Primary	Secondary	Higher	No education	Primary	Secondary	Higher	No education	Primary	Secondary	Higher
1996	60.5	48.7	35.0	18.4	16.0	10.8	9.5	7.1	46.5	30.9	22.3	8.5
2001	61.5	50.5	41.7	34.8	12.8	9.3	6.1	2.8	47.8	34.5	25.8	19.6
2006	57.7	46.1	29.9	16.4	14.6	8.4	11.5	8.1	46.5	31.0	24.2	11.6
2011	47.4	41.4	30.6	22.9	13.3	11.5	6.3	11.6	37.9	26.2	18.0	8.6
2016	45.7	36.7	30.3	21.2	12.6	9.0	8.5	7.2	36.7	27.9	21.4	13.9
2022	36.3	27.5	17.6	12.0	10.4	7.6	6.7	6.7	29.7	19.5	13.7	6.9

be powerful tools for reducing child malnutrition in Nepal (Table 3).

Nutritional Status of Children's Age-Specific Patterns

Analysis of NDHS data from 1996 to 2022 reveals a consistent and biologically plausible age gradient in child malnutrition, with the most vulnerable period concentrated between 6 and 23 months — coinciding with the introduction of complementary feeding and heightened exposure to infections. Stunting increases sharply after 6 months of age and reaches at the pick for the age of 18–23 months in all survey years (e.g., 71.9% in 1996; 34.2% in 2022). Then it gradually declined in older age groups. This pattern of gradual decline emphasizes the special care of children in the first two years of life, which can determine lifelong growth trajectories (Table 4).

Table 4
Stunting of children by age in months and survey year in percentage

Age in months	1996	2001	2006	2011	2016	2022
<6	30.2	22.6	11.6	19.4	13.5	18.2
6-8	30.9	27.0	18.9	17.8	17.6	12.9
9-11	38.5	34.5	28.4	13.6	20.0	6.1
12-17	54.6	50.0	39.5	28.6	31.9	23.7
18-23	71.9	62.8	55.3	42.2	41.9	34.2
24-35	76.4	68.3	57.8	51.7	44.5	29.1
36-47		70.4	62.4	53.0	39.8	26.8
48-59		63.5	57.2	43.4	40.8	23.7
0-23						21.8
24-59						26.6
6-11						9.9
12-23						28.5

Wasting peaks earlier between 9–11 months (24.6% in 2011; 7.1% in 2022) and increases through 18–23 months. It suggests that insufficient food intake can lead to acute nutritional status in children (Table 5).

Table 5
Wasting of children by age in months and survey year in percentage

Age in months	1996	2001	2006	2011	2016	2022
<6	13.2	14.3	12.3	11.8	15.2	7.5
6-8	13.5	15.5	15.4	16.7	21.3	10.0
9-11	19.4	21.5	23.2	24.6	16.0	7.1
12-17	20.2	20.6	18.8	14.2	14.8	11.2
18-23	19.8	17.3	17.4	19.4	10.2	9.1
24-35	8.8	7.3	12.2	7.4	6.5	8.0
36-47		6.2	9.5	7.2	6.4	5.4
48-59		7.5	8.4	7.8	6.2	7.2
0-23						9.2
24-59						6.9
6-11						8.7
12-23						10.2

Underweight peaks at 18–23 months (49.3% in 1996; 18.9% in 2022). Children aged 0–23 months revealed higher stunting (21.8%) and underweight (16.3%) rates than those aged 24–59 months (26.6% and 20.0%, respectively) in 2022. It shows that chronic malnutrition in early childhood can persist into the preschool years (Table 6).

Table 6
Underweight of children by age in months and survey year in percentage

Age in months	1996	2001	2006	2011	2016	2022
<6	33.7	26.7	16.2	18.2	13.8	11.1
6-8	33.3	33.0	27.5	18.5	21.4	17.0
9-11	35.9	38.6	33.9	26.8	24.1	9.7
12-17	42.3	44.8	34.1	24.9	27.3	20.8
18-23	49.3	47.9	43.7	37.0	29.8	18.9
24-35	47.7	46.0	41.3	30.5	30.7	23.3
36-47		45.9	43.7	30.4	26.5	17.2
48-59		43.9	43.5	32.0	30.4	19.5
0-23						16.3
24-59						20.0
6-11						13.7
12-23						19.9

Notably, children under 6 months consistently showed the lowest malnutrition rates across all indicators, highlighting the protective role of exclusive breastfeeding in early infancy. The significant decline in age-specific malnutrition over time shows the success of Nepal's nutrition program. However, the high risk between 6 and 23 months shows the need for an age-specific action program for better supplementary support for the children.

Nutritional Status by Household Wealth Quintile

Children from the poorest families have consistently faced the greatest nutritional challenges. In 2022, stunting affected 36.9% of children in the lowest wealth group,

almost three times the rate among the wealthiest (13.1%), even though stunting declined sharply from 64.5% in 1996. Underweight followed a similar pattern. The poorest households recorded a prevalence of 20.4% in 2022, nearly twice that of the richest group at 11.7%, down from 49.8% in 1996. Although the absolute gap in stunting and underweight has narrowed over time, inequality remains. This suggests that progress has been slower for the most vulnerable groups. Wasting showed a different trend. In 1996, children in wealthier families had much lower wasting rates than those in poorer households (6.5% vs. 15.7%). By 2022, the gap in wasting rates between rich and poor children had decreased and was slightly reversed. It means children from wealthier families showed marginally higher wasting rates (9.2%) than those from poorer families (5.6%) (Table 7).

Overall, the evidence points to household wealth as a key factor shaping long-term nutritional outcomes in Nepal. It also points to the importance of designing nutrition programs with emphasis on equity to make progress more inclusive and ensure that no group is left behind.

Discussion

Trends of nutritional status show the considerable progress in Nepal's child nutrition during 1996-2022. According to NDHS, stunting among children under five declined from 57% in 1996 to about 25% in 2022 (Ministry of Health and Population Nepal, et al., 2022). Over the same period, wasting fell from about 15% to about 8%, and underweight shifted downwards (from about 42% in early years to about 19%). Nepal's trajectory of decline is among the strongest seen in South Asia; for example, from similarly high baseline levels — from about 42.3% in 2011 to about 40.2% in 2018 (Ataullahjan et al., 2025).

The trend of stunting rate is found higher in rural areas (31%) than in urban areas (22%) in Nepal (Ministry of Health and Population Nepal et al., 2022). This rural disadvantage is similar to patterns observed in other countries in South Asian region. In Pakistan (2012-13 DHS), the stunting rate was about 48% in rural areas, compared with about 37% in urban areas (Raju & Souza, 2017). In Bangladesh (2014 DHS), children in rural settings had a stunting prevalence of 39.6% compared to 32.4% in urban settings (Rahman & Rahaman, 2019). Similarly, Sri Lanka's DHS shows the limited improvement in child nutrition, with underweight declining only slightly from 23% in 2000 to about 20.5% in 2016, while stunting remained largely unchanged at around 17% between 2006/07 and 2016 (Department of Census and Statistics (DCS) & Ministry of Health, Nutrition and Indigenous Medicine, 2017).

These comparisons indicate that, while Nepal has made notable progress, its rural-urban gap in stunting is in the same direction, though possibly smaller in magnitude than in some of its SAARC neighbors. Although recent studies report rural–urban differences in underweight less consistently, the available evidence clearly shows that children in rural areas face worse nutritional outcomes than those in urban settings.

A strong and persistent inverse relationship between maternal education and child stunting is evident across the Nepal DHS series (1996–2022), aligning with trends across the SAARC region. In Nepal, stunting among children of mothers with no education was 36.3%, nearly triple the 12.0% among children of mothers with higher education in 2022, with the education gap narrowing but still substantial

Table 7

Nutritional status of children by wealth quintile and survey year in percentage

Survey Year	Stunted					Wasted					Underweight				
	Lowest	Second	Middle	Fourth	Highest	Lowest	Second	Middle	Fourth	Highest	Lowest	Second	Middle	Fourth	Highest
1996	64.5	61.0	58.1	52.2	39.8	15.7	16.9	17.5	14.5	6.5	49.8	47.1	46.4	38.4	21.4
2001	67.6	61.3	54.3	53.1	42.1	12.7	13.0	12.1	9.7	6.9	51.3	47.0	44.6	37.5	25.2
2006	61.6	54.9	50.4	39.8	31.0	11.5	15.1	15.2	12.8	7.0	47.0	45.9	41.7	31.0	18.9
2011	56.0	45.7	34.5	30.5	25.8	12.5	10.7	12.9	8.8	7.4	40.3	31.6	28.8	22.9	10.1
2016	49.2	38.7	35.7	32.4	16.5	8.8	9.4	10.6	11.3	7.3	32.9	28.3	32.8	23.5	11.6

Nepal's stunting rate moved from about 57% (2001) to 25% in 2022, while in the same interval, underweight fell from about 43% to 19% (Siddiqui et al., 2024). Similarly, India, despite larger absolute improvements in some areas, has struggled with persistently high rates of stunting; recent NFHS data show national prevalence at about 35.7% in 2019-21(Rao et al., 2023). Pakistan has shown slower progress, with stunting rates declining more gradually at 24.3 percentage points (Ministry of Health and Population [Nepal] et al., 2023) where DHS/NFHS data show consistently higher stunting among children of less educated mothers in low income countries (Rezaeizadeh et al., 2024). Maternal education, belonging to the poorest wealth quintile, is identified as a significant contributor to undernutrition (Dhakal et al., 2025). Therefore, maternal education remains an important determinant of child nutrition inequities in Nepal

and the wider South Asian region.

Household wealth remains the main factor affecting child nutrition in Nepal, with stark differences over the years. According to the 2022 NDHS report, stunting prevalence was 36.9% in the lowest wealth quintile, nearly three times the 13.1% recorded in the highest quintile. Similarly, the rate of underweight was 20.4% among the children from the household from lowest quintile, compared to 11.7% from the highest wealth quintile (Ministry of Health and Population [Nepal] et al., 2023). These inequities in child nutrition show that there is urgent need for a focused program, especially for the poorest households, to mitigate the gap.

Policy Implications

Nepal must implement strategies that put equity first to accelerate progress toward SDG 2.2 and national nutrition targets with a focus on the first 1,000 days and home-based infant and young child feeding (IYCF) counseling. It emphasizes hygiene, responsive feeding, and dietary diversity, especially in rural and low-literacy communities. Therefore, nutrition education should be included in formal education and adolescent health programs. The lowest wealth quintiles and marginalized areas should receive pro-poor financing through targeted social protection and nutrition-sensitive agriculture. Enhancing real-time nutrition surveillance can help assess other possible disparities. Finally, integrating interventions for wasting and stunting can address both acute and chronic malnutrition, especially in high-burden areas.

Limitations

As this study depends on the cross-sectional survey data that may limit inference to draw conclusions about root-causality. Sample variability may affect subgroup analyses (e.g., by age or education in early surveys). Furthermore, although DHS data are nationally representative, they might not properly include the population from marginalized communities with the same accuracy.

Conclusion

Nepal has achieved considerable reductions in child malnutrition over the last 26 years, with stunting, wasting, and underweight falling by over half. Yet, there remain inequities in the nutritional status. The children of rural areas, those of mothers with no education, and children from the poorest households continue to face the highest risk, particularly during the 6–23 months' critical period. Nepal should emphasize on equity in child nutrition to sustain the progress and achieve SDG 2.2 which aims to end all forms of malnutrion by 2030. The interventions in the first 1,000 days is crucial in addition to girls' education and nutrition education. The government must develop a national nutrition monitoring mechanism to ensure the effective implementation of the program.

Declarations

Ethical Approval

We used secondary data from DHS Program.

Consent for Publication

We received approval letter from DHS program to publish the article from DHS datasets.

Availability of Data and Materials

Datasets can be obtained from the DHS Program upon request.

Conflict of Interest

The authors declare that there is no conflict of interest.

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