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FEEDING PRACTICES AND ITS ASSOCIATION WITH NUTRITIONAL STATUS OF UNDER 5 CHILDREN - A CROSS-SECTIONAL STUDY IN NORTHERN PART OF INDIA

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Abstract: Undernutrition is still a serious health concern for children, particularly in South-East Asia. An estimated 45% of all child deaths, are attributed to undernutrition. Malnutrition during early childhood can have lifelong consequences, including impaired cognitive development, increased susceptibility to infections, and reduced productivity in adulthood. The development and growth of young children under the age of five are significantly influenced by optimal feeding practices. The objectives of the study were to assess the feeding practices and nutritional status of children under 5 years of age, and to find out the association of feeding practices with their nutritional status. This was a community based cross-sectional study with a sample size of 815. The children aged 0-59 months from rural and urban areas of Aligarh were assessed using structured questionnaire, and WHO anthropometric indices and Z-score were calculated using WHO Anthro software. The data was analyzed using SPSS IBM 20.0. It was found that 45.2% were stunted and 13.4% of children were wasted, of which 17.3% and 3.1% were severely stunted and wasted respectively. 46.3% of children were exclusively breastfed, in 28.4% breast-feeding continued till 2 years of age or more while only 5.4% of children were started on complimentary feeding at 6 months of age. The Dietary Diversity Score (DDS) was seen to be appropriate in 51.4% of children only. The above findings indicate that inappropriate feeding practices were associated with stunting (p=<0.001) while poor dietary diversity was associated with wasting (p=0.002). There is a need to improve feeding practices and knowledge regarding dietary diversity for optimal growth and development of children. Hence, effective nutritional intervention is needed to enhance nutritional status.

Keywords: dietary diversity, feeding practices, malnutrition, nutritional status, stunting, wasting

Introduction

Childhood malnutrition remains an enduring global health concern, exerting profound implications on physical growth, cognitive development, and overall well-being (Black et al., 2013; Dewey & Adu-Afarwuah, 2008; Victora et al., 2008). An estimated 2.7 million child deaths per year, or 45% of all child deaths, are attributed to undernutrition. Less than a quarter of infants aged 6 to 23 months meet the standards for age-appropriate dietary diversity and feeding frequency (Infant and Young

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Child Feeding, n.d.). The World Health Organization (WHO) underscores malnutrition as an intricate construct encompassing undernutrition, overnutrition, and micronutrient deficiencies, each contributing to the mosaic of childhood health (Malnutrition, n.d.).

According to WHO, 149 million children are stunted & 45 million children are wasted worldwide (The UNICEF/WHO/WB Joint Child Malnutrition Estimates (JME) Group Released New Data for 2021). The National Family Health Survey (NFHS-5) provides crucial insights into the nutritional landscape of country like India, malnutrition continues to be a pressing issue with severe consequences as prevalence of stunting is 35% & of wasting is 19% among children under 5 years of age. There are 63% of children up to 6 months of age in India who are exclusively breastfed while merely 11% of total children of 6-23 months, are receiving an adequate diet. (NFHS-5_Phase-II_0.Pdf).

Stunting and wasting are two forms of undernutrition that are prevalent among children under five years of age in India. Stunting is characterised as low height-for-age and is caused by persistent or recurring undernutrition, which is typically linked to poverty, poor maternal health and nutrition, recurrent sickness, and/or insufficient feeding and care during infancy. Contrarily, wasting is characterised as low weight-for-height and frequently denotes a recent and significant weight loss. It typically happens when a person hasn't eaten enough food, both in terms of quantity and quality, or when they've been sick frequently or for a long time. Both stunting and wasting can have severe and long-term effects on the body (Malnutrition, n.d.).

WHO recommends early initiation of breastfeeding within 1 hour of birth, exclusive breastfeeding for the first 6 months of life, and introduction of nutritionally adequate and safe complementary (solid) foods at 6 months together with continued breastfeeding up to 2 years of age or beyond (Indicators for assessing infant and young child feeding practices, n.d.). The dietary diversity score (DDS) is a simple and useful statistic used to evaluate the nutritional quality of the population across age groups and nations. It serves as a proximate marker of nutritional quality. The small amount of accessible protein and micronutrients found in energy-dense starchy staples like cereals, roots, and tubers make persons who consume significant amounts of them susceptible to nutritional deficits (Arimond & Ruel, 2004).

The nutritional well-being of children under 5 years of age is particularly susceptible due to the rapid growth and development that occurs during this period. Malnutrition during early childhood can have lifelong consequences, including impaired cognitive development, increased susceptibility to infections, and reduced productivity in adulthood (Black et al., 2013). Thus, addressing childhood malnutrition is a critical component of global health and development efforts.

Feeding practices play a fundamental role in shaping a child's nutritional status. Exclusive breastfeeding, appropriate introduction of complementary foods, and dietary diversity are key factors that influence a child's access to essential nutrients during the early years of life (Victora et al., 2016). The multifaceted nature of this association is underscored by the complexity of social, cultural, and economic factors that influence caregiving choices and dietary patterns (Ruel & Alderman, 2013). These practices, deeply ingrained within families and communities, carve the path to nutritional well-being, perpetuating a cycle that demands understanding, intervention, and transformation.

Global National Targets 2025 and Sustainable Development Goal 2, state to end all forms of malnutrition and achieve targets of stunting prevalence to be reduced by 40% of the present status while prevalence of wasting to be reduced to and maintained below 5% which seems to be unachievable according to current situation. Therefore, there is a need to focus on improving early childhood nutrition and addressing factors such as child nutrition, breastfeeding practices, and access to nutritious foods.

There are numerous studies done in India which provides insights on determinants and prevalence of undernutrition while we found no specific study which investigated the association of stunting and wasting with feeding practices and dietary diversity of children under five years of age, to better understand the prevalence of undernutrition. Most of the studies showed urban and rural disparities in feeding practices and nutritional status warrant further exploration, as urbanization continues to influence dietary habits and access to diverse foods. Moreover, there is also a need to examine the regional variations and socio-demographic factors that affect the feeding practices and nutritional status of children in India.

This study aims to contribute to the growing body of research on childhood nutrition by conducting a thorough analysis of the association between feeding practices and nutritional status among children. Through this, we can enable healthcare professionals and policymakers to implement strategies that promote healthy feeding practices and improve children's overall well-being. Through this exploration, we endeavor to shed light on the nuanced relationship between feeding practices and nutritional outcomes, ultimately offering insights that can inform evidence-based interventions and policies.

The primary goal of our study is to assess the feeding practices and nutritional status of children under 5 years of age. In addition to this, we aim to explore the association between feeding practices and their nutritional status. By achieving these objectives, we can gain valuable insights into the factors influencing childhood nutrition and take steps to address the issue.

Materials and Methods

The study was a community-based cross-sectional study based on household survey, conducted in rural and urban areas of Aligarh district, located in northern India at a latitude of 27.88° North and 70.08° East with temperature variation of maximum 47°C in summers and minimum 3-5°C in winters, receiving an average rainfall of 22 inches annually. The population of the district is 3,673,889 with sex ratio of 882 females per 1000 males and literacy rate of 57% (Aligarh District Population, Uttar Pradesh - Census India 2011, n.d.).

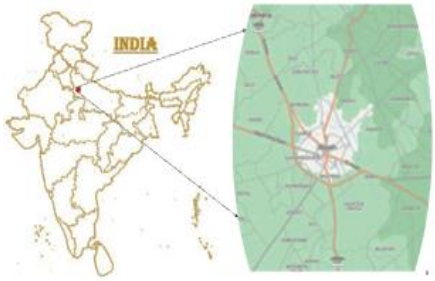

Figure 01: Map of data collected area in India.

The data was collected from mothers of children aged 0-59 months of age, whose families were registered under Department of Community Medicine, Jawaharlal Nehru Medical College, Aligarh Muslim University (AMU), Aligarh. There were 6 villages from rural area and 4 mohallas from urban area for which sample drawn was calculated according to PPS (Probability Proportion to Size). Since, an accurate listing of every unit of the accessible population was available, simple random sampling was done. All children of 0-59 months of age in study population were included while those whose mothers did not give consent, whose exact age could not be elicited, those with known severe diseases like congenital malformation and chronic illness, and children who are not residing in the area for last six months were excluded from the study.

Pre-designed structured questionnaire with close ended questions was used to obtain required information on socio-demographic characteristics, feeding practices, dietary diversity and anthropometric assessment using standard techniques. Mother of the child was informed about the purpose of the visit and the study, and their consent was obtained to participate in the study. Sample size came out to be 815 which was calculated using prevalence of wasting i.e., 14.6 percent in Aligarh district as per NFHS 4 data using formula $N= 1.96^2 PQ/l^2$ where N is sample size, P is prevalence, Q is 100-P and l is absolute error (2.5%) with confidence limit of 95%.

Anthropometric indices, Height/Age (H/A) & Weight/Height (W/A) and their Z-scores were calculated using WHO Anthro (version 2, 2005) (WHO_TRS_854) software and macros. Z-scores indicates how many Standard Deviation (SD) an element is from the mean, i.e., stunting and wasting

are defined as H/A and W/H less than minus two SD of the WHO Child Growth Standards median 2006 respectively. The age of child was calculated by exact birth date through documentary evidence (birth certificates or immunisation card) and if not available then date of birth given verbally by the mother was cross-checked by family registers (available with Medico Social Workers), records from Anganwadi centres and ASHA or by 'Sandwich Method' using local events-based calendar(Guidelines for Estimating the Month and Year of Birth of Young Children, n.d.). Weight was taken by digital weighing machine which was calibrated to zero before taking every measurement. Length of the children was taken who were below 24 months of age by infantometer and those who were above 24 months of age their height was recorded by Stadiometer.

Data analysis was done using IBM SPSS 20.0. Descriptive statistics were applied to indicate the prevalence of stunting and wasting as frequencies and percentages. Bivariate analysis was done using Chi-square test, to find association between quantitative variables. A value of $p < 0.05$ was taken as significant.

The ethical approval was obtained from Ethical Committee, JNMC, AMU, Aligarh before conducting the study. Health education and adequate counselling was provided to all the individuals interviewed. If any subject was found to have any problem, adequate treatment, and referral to JNMCH was done.

Results and Discussion

Socio-demographic profile of study population

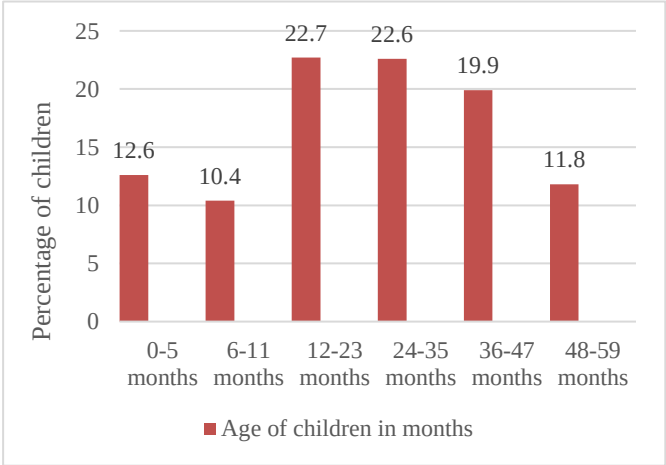

Figure 02: Distribution of study population according to their age

From this, we can deduce that children are almost equally distributed between age group of 0 to 11 months (23%), 12 to 23 months (22.7%) and 24 to 35 months (22.6%). However, we find slightly a smaller number of children between 36 to 47 months (19.9%) of age and minimum number of

children between 48 to 59 months of age. This distribution is understandable as children started to enroll in Aganwadi centre and school after three years of age and it was difficult to catch them in home survey. The mean age of children studied was 26.1 ± 16.1 month.

Table 1: Distribution of study population according to other socio-demographic characteristics

CHARACTERISTICS		FREQUENCY	PERCENTAGE
Place of Residence	Rural	494	60.6
	Urban	321	39.4
Religion	Hindu	349	42.8
	Muslim	466	57.2
Caste	General	224	27.5
	SC	182	22.3
	OBC	409	50.2
Type of Family	Nuclear	321	39.4
	Joint	494	60.6
Child sex	Female	407	49.9
	Male	408	50.1
Birth order	1	241	29.6
	2	204	25.0
	3	162	19.9
	> 3	208	25.5
Perceived size of child at birth	Normal size	600	73.6
	Small size	180	22.1
	More than normal	1	0.1
	Don’t know	34	4.2
Birth interval with preceding child	< 3	191	23.4
	> 3	28	3.4
	NA	596	73.1
Birth interval with proceeding child	< 3	375	46.0
	> 3	189	23.2
	NA	251	30.8

From the Table 1, it can be inferred that most of children were from rural area (60.6%) than urban area (39.4%). Since, rural area is larger in area and more populous than urban, we have taken proportionally more children from rural area. It also depicts that out of total 815 children majority of children were Muslim (57.2%) followed by Hindus (42.8 %). Out of 815 children, 591 (72.5%) belonged to backward castes which includes Other Backward Classes (OBC) and Schedule Caste (SC) category which is followed by General caste children 224 (27.4 %). Since this is not a tribal area, we could not find any children belonging to Schedule Tribe (ST) category. Most of them belonged to

joint family (60.6%), while only 39% of children were living in nuclear family (39.4%). Distribution of study population according to their sex is also shown in table 1, there were 50.1% of male and 49.9% of female. So, males and females were equally distributed.

Most children in our study were found to be of first birth order i.e.,29.6. Almost 3.4% and 23.2% our children have more than three year of birth interval with preceding and proceeding child respectively. In our study majority of children were found to have normal size at birth i.e., 73.6% as perceived by mothers. Almost 22.1 % children were small in size. Birth order and birth interval have a bearing on birth weight of the child. Studies have shown that birth order 2 or more and birth interval less than 3 years can lead to low birth weight which is a determinant for malnutrition.

Feeding Practices of Children

Table 2: Feeding Practices of Children under 5 years of age

Characteristics		Frequency (No.)	Percentage
Initiation of breast feeding (N=784)	Early	578	73.7
	Delayed	206	26.3
Type of feeding (N=815)	Breast feeding	633	77.7
	Top feeding	31	3.8
	Mixed	151	18.5
Type of breast feeding (N=784)	EBF	363	46.3
	Predominant	273	34.8
	Partial	148	19.9
Breast feeding continued till (N=784)	<6 months	145	18.5
	6 months to <1 years	133	17
	1 year to < 2 years	283	36.1
	2 year or more	223	28.4
Complimentary feeding started at (N=815)	< 6 months	37	4.5
	6 months	44	5.4
	> 6 months	617	75.7
	Not yet started	16	2.0
Dietary Diversity Score (N= 698)	< 4	339	48.6
	≥ 4	359	51.4

As shown in table 2, among 815 children, only 73.7% received breastfeeding during first hour of their life, this ensures colostrum feeding and followed by this, 26.3% of children started breastfeeding after one hour of birth. In our study, only 77.7% of children were found to be breastfed during their infancy, 18.5% of children had mixed feeding i.e., both breast feeding and top feeding while 3.8% of children had relied on top feeding. Out of total, 784 children who received breastfeeding during their infancy, only 46.3% were exclusively breastfed, 34.8% of children were found to have predominant breastfed and 19.9% of children were partially breastfed.

While, out of 784 children who were breastfed, 36.1% of children continued breastfeeding for one year to less than two years, 28.4% of children continued breastfeeding for two year or more, almost 18.5% of children were breastfed for less than six months and 17% of children continued breastfeeding for six months to one year. Mean duration of breast feeding was found to be 15.9 ± 10.26 month (Mean ± S.D.). One of the best strategies to ensure a child's health and survival is to breastfeed them. Since breastmilk meets up to half or more of a child's nutritional demands in the second half of the first year of life and up to one third in the second year, it is the best source of nourishment for children. Stopping breastfeeding before two years of age can have negative consequences for both the mother and the child.

Among 815 participants, about 75.7% of children started complementary feeding at more than 6 months of age while merely 5.4 % i.e., 44 children were introduced to complementary feeding at the appropriate age of 6 months, highlighting an insufficiency in providing adequate nutrition during this critical phase. Almost, 4.5% of children started complementary feeding before completion of 6 months of age and 2% of children didn't start, even after completing 6 months at the time of study which signifies a delayed introduction of complementary which can lead to inadequate nutrient intake and growth faltering (Dewey, 2016). Mean age of starting complementary feeding was 8.44± 2.77month (Mean ± S.D.). Delayed and inappropriate complementary feeding in children often arises from a lack of knowledge, cultural practices, socioeconomic limitations, and misleading information. Insufficient awareness of proper timing and food choices, combined with cultural beliefs and financial constraints, can lead to delayed introduction of solid foods. Socioeconomic factors and limited access to nutritious options further exacerbate the issue.

The WHO dietary diversity score for infants and young children is calculated based on the number of different food groups consumed over a specified period, usually the previous day. The recommended minimum dietary diversity score is commonly based on at least four or more food groups consumed. These food groups usually include grains, roots, and tubers, legumes and nuts, breast milk, dairy products, Vit A eggs, rich fruits and vegetables, and other fruits and vegetables. Table 2 depicts that among 698 children who started complimentary feeding, majority of children (51.4%) had dietary diversity score of four or more and 48.6% of children had taken diet, day before survey, with less diversity score i.e., less than 4. Mean dietary diversity score was 3.39 ± 1.23 (Mean ± S.D.). The dietary diversity score helps to assess the adequacy and variety of a child's diet. A higher score indicates a more diverse and balanced diet, which is associated with better overall nutritional status and growth outcomes (Arimond & Ruel, 2004).

Nutritional Status of Children

In the present study nutritional status of children was assessed by taking weight and length/height of the children and compared with new international reference released by WHO in April 2006 (WHO Multicentre Growth Reference Study Group, 2006) (Group & de Onis, 2006) and accepted by the Government of India.

Table 3: Prevalence of stunting and wasting in study population.

Characteristic		Frequency	Percentage
Height/Length	Normal (± 2SD)	447	54.8
	Stunting (< - 2SD)	368	45.2
	Severe Stunting (< -3SD)	141	17.3
Weight/Height	Normal (± 2 SD)	706	86.6
	Wasting (< - 2 SD)	109	13.4
	Severe Wasting (< -3SD)	25	3.1

The prevalence of stunting was found to be 45.2% which comes under "Very high prevalence" according to cut-off values for public health significance of stunting at population level (De Onis et al., 2019). This is higher than the estimated prevalence of 35% and 39.7% for Aligarh district and Uttar Pradesh respectively as per NFHS-5 survey. Out of 45.2% stunted children, 27.9% children were moderately stunted whereas 17.3% children were severely stunted showing chronic malnutrition and is also indicative of long-term undernutrition.

The prevalence of wasting was found to be 13.4 % which is "High" according to cut-off values for public health significance of wasting at population level (De Onis et al., 2019). This is higher than the estimated prevalence (11%) of wasting for Aligarh district as per NFHS-5 data. This is lower than the prevalence of wasting in under for children (17.3%) for Uttar Pradesh. In our study, out of 13.4% wasted children, 10.1% children were moderately wasted and 3.1% were severely wasted which signifies acute malnutrition.

Factors Influencing Nutritional Status of Children

Socio-demographic characteristics of children

Table 4: Distribution of stunting and wasting according to age of children:

Characteristics / Age of children	Stunting		Wasting	
	Present N (%)	Absent N (%)	Present N (%)	Absent N (%)
0-5 months	18 (17.5)	85 (82.5)	32 (31.1)	71 (68.9)
6-11 months	19 (22.4)	66 (77.6)	24 (28.2)	61 (71.8)
12-23 months	95 (51.4)	90 (48.6)	22 (11.9)	163 (88.1)
24-35 months	97 (52.7)	87 (47.3)	17 (9.2)	167 (90.8)
36-47 months	91 (56.2)	71 (43.8)	6 (3.7)	156 (96.3)

48-59 months	48 (50.0)	48 (50.0)	8 (8.3)	88 (91.7)
χ^2, df, p value	$\chi^2 = 65.67$, df = 5, p value ≤ 0.001		$\chi^2 = 62.2$, df = 5, p value ≤ 0.001	

This analysis depicts that age is associated with nutritional status of children. It was observed that as the age of children increases, prevalence of stunting also increases. Since, stunting is an irreversible condition, sets in first two years of life. If we observe the curve keenly it shows prevalence of stunting increases after the age of six months. There is steep vertical increase in graph between six to eleven month and twelve to twenty-three months. The rise in childhood stunting with age emphasises the necessity of effective and timely introduction of complimentary feeding to fulfil the children's increasing nutritional needs. In NFHS-5 survey, it was found that nationally prevalence of stunting increases with a child's age through 18-23 months and decreases slightly thereafter; like our finding. While children > 23 months had a noticeably decreased risk of wasting than infants 12 months. This information is in line with earlier research (Khan et al., 2019), which indicated that wasting decreased with a child's age and that babies are particularly susceptible to wasting.

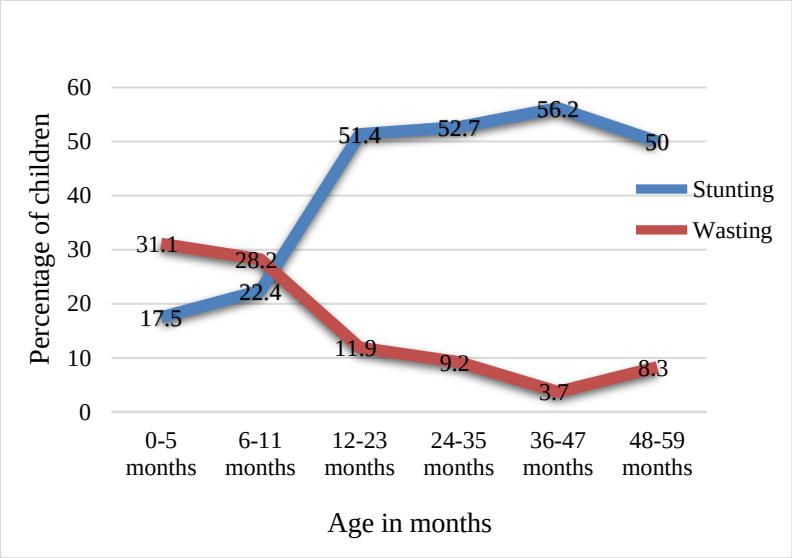

Figure 03: Distribution of stunning and wasting according to age of children.

Table 5: Distribution of stunting and wasting according to socio-demographic characteristics of children.

Characteristics		Stunting		Wasting	
		Present N (%)	Absent N (%)	Present N (%)	Absent N (%)
Place of residence	Rural	231 (46.8)	263 (53.2)	74 (15.0)	420 (85.0)
	Urban	137 (42.7)	184 (57.3)	35 (10.9)	286 (89.1)
	χ^2, df, p value	χ^2 = 1.309, df = 1, p value =		χ^2 = 2.79, df = 1, p value =	

		0.253		0.095	
Religion	Hindu	164 (47.0)	185 (53.0)	49 (14.0)	300 (86.0)
	Muslim	204 (43.8)	262 (56.2)	60 (12.9)	406 (87.1)
	χ^2, df, p value	χ^2 = 0.833, df = 1, p value = 0.362		χ^2 = 4.97, df = 1, p value = 0.629	
Caste	SC/OBC	281 (47.5)	310 (52.5)	84 (14.2)	507 (85.8)
	General	87 (38.8)	137 (61.2)	25 (11.2)	199 (88.8)
	χ^2, df, p value	χ^2 = 4.97, df = 1, p value = 0.026		χ^2 = 1.306, df = 1, p value = 0.253	
Type of family	Nuclear	161 (50.2)	160 (49.8)	39 (12.1)	282 (87.9)
	Joint	207 (41.9)	287 (58.1)	70 (14.2)	424 (85.8)
	χ^2, df, p value	χ^2 = 5.35, df = 1, p value = 0.021		χ^2 = 0.686, df = 1, p value = 0.408	
Sex of child	Female	182 (44.7)	225 (55.3)	49 (12.0)	358 (88.0)
	Male	186 (45.6)	222 (54.4)	60 (14.7)	348 (85.3)
	χ^2, df, p value	χ^2 = 0.62, df = 1, p value = 0.803		χ^2 = 1.25, df = 1, p value = 0.263	
Birth order of child	1 or 2	189 (42.5)	256 (57.5)	58 (13.0)	387 (87.0)
	3 or more	179 (48.4)	191 (51.6)	51 (13.8)	319 (86.2)
	χ^2, df, p value	χ^2 = 2.86, df = 1, p value = 0.092		χ^2 = 0.098, df = 1, p value = 0.754	
Birth size as perceived by mother	Small size	105 (58.3)	75 (41.7)	40 (22.2)	140 (77.8)
	Normal & above	246 (40.9)	355 (59.1)	63 (10.5)	538 (89.5)
	χ^2, df, p value	χ^2 = 16.9, df = 1, p value ≤ 0.001		χ^2 = 16.67, df = 1, p value ≤ 0.001	
Birth interval with preceding child	3 or < 3	105 (55.0)	86 (45.0)	15 (7.9)	176 (92.1)
	> 3 years	13 (46.4)	15 (53.6)	1 (3.6)	27 (96.4)
	χ^2, df, p value	χ^2 = 0.718, df = 1, p value = 0.397		χ^2 = 2.16, df = 1, p value = 0.700	
Birth interval with proceeding child	3 or < 3	187 (49.9)	188 (50.1)	53 (14.1)	322 (85.9)
	> 3 years	82 (43.4)	107 (56.6)	25 (13.2)	164 (86.8)
	χ^2, df, p value	χ^2 = 2.15, df = 1, p value = 1.46		χ^2 = 0.769, df = 1, p value = 0.767	

Table 5 depicts that more stunted children were found in rural area. Similarly, wasting was also more prevalent in rural area. But in both the situations, the difference was not statistically significant which is a good sign. According to NFHS-5 data, prevalence of stunting in under five children in Uttar Pradesh is higher in rural areas (41.3 percent) than in urban areas (33.0 percent); these findings are similar with our study. However, prevalence of wasting, though slightly, but found to be higher in urban area (18.7 percent) than rural areas (17.0 percent). Our findings are supported by Dabale & Sharma, (2014), they reported that children whose parents resided in rural areas were more likely to

be wasted. Khan et al., (2019) also reported that children born to rural mothers (COR = 1.57, 95%CI 1.25-1.96) were more likely to be stunted.

In our study it was observed that both stunting and wasting were almost equally prevalent in Hindu and Muslim religion, there was no significant difference. However, it was observed that there is significant association between caste and stunting. Children from OBC and SC caste were more stunted whereas no significant difference was found with wasting. This suggests that marginalized section of society, irrespective of religion is more affected. Similarly, Mane et al., (2018) could not find any association between the prevalence of wasting and stunting with religion of children, this finding is similar with our results.

This study revealed that children living in nuclear families were significantly more stunted as compared to children living in joint families. This may be because of children in joint families are getting good caring practice from grandparents and other family member. However, there was no such association with wasting.

As per NFHS-5 data, prevalence of under-nutrition was almost the same among girls and boys. Similarly, in our study stunting is almost equally prevalent in both male and female and there was no statistical association. On contrary, Dhok & Thakre, (2016) reported higher proportion of female stunting i.e., 36.61% than males (33.33%) but the difference was not statistically significant (P = 0.586). Gebre et al., (2019) stated, sex of child (AOR = 1.98, 95% CI: 1.46-2.72) was found to be important predictor for stunting.

In our study it was observed that prevalence of both stunting and wasting was more in children with low birth weight than those with normal birth weight. This difference was found to be statistically significant for both stunting and wasting. Dabale & Sharma, (2014) also reported that small size at birth was found to be a significant risk factor for wasting. Mane et al (2018) in their study among under five in Shivamoga, Karnataka found that stunting and wasting were significantly more in children who had low birth weight compared to others. Khan et al., (2019) reported that children that were of smaller than average size at time of birth (OR = 1.48, 95%CI 1.02-2.16) were more likely to be stunted.

It was observed in our study that stunting was more prevalent in children with 1ª & 2nd birth order than those with third or more birth order, however this difference was not statistically significant. This result is explainable that as birth order increases maternal health, if not taken care of, will deteriorate affecting birth weight of children. Whereas wasting which is a acute condition is equally distributed in both birth order. This distribution is also not statistically significant. Similarly, Mane et al., (2018) in their study among under five in Shivamoga, Karnataka found that prevalence of stunting was directly

proportional to birth order of children and this association is statistically significant (p=0.023). However, this study could not find any significant association between the prevalence of wasting and birth order of the children. Das & Gulshan, (2017) found that there was significant association between prevalence of stunting and birth order of children, whereas no such association with wasting. As evident from above table, in our study it was observed that both stunting and wasting was found to be more prevalent in children with less than three years of interval with either preceding or proceeding child. However, this difference was not statistically significant. This difference is explainable as adequate birth interval is required after each delivery, for recovery of mother's health.

Feeding practices of children

Table 6: Distribution of stunting and wasting according to feeding practices of children.

Characteristics		Stunting		Wasting	
		Present N (%)	Absent N (%)	Present N (%)	Absent N (%)
Feeding practices	Appropriate	58 (32.6)	120 (67.4)	26 (14.6)	152 (85.4)
	Inappropriate	310 (48.7)	327 (51.3)	83 (13.0)	554 (87.0)
	χ^2, df, p value	$\chi^2 = 14.528$, df = 1, p value ≤ 0.001		$\chi^2 = 0.299$, df = 2, p value = 0.585	
Dietary diversity score	< 4	175 (57.6)	164 (48.4)	46 (13.6)	293 (86.4)
	≥ 4	170 (47.4)	189 (52.6)	24 (6.7)	335 (93.3)
	χ^2, df, p value	$\chi^2 = 1.271$, df = 1, p value = 0.260		$\chi^2 = 0.002$, df = 1, p value = 0.002	

Feeding practices of child were assessed on the basis of IYCF guideline, that whether they are appropriate for age of children or not. We looked for initiation of breast feeding, exclusive breastfeeding for six months, starting of complimentary feeding after completion of six month and continued breastfeeding for two years. It was observed in our study that there was statistically significant difference between the prevalence of stunting among children who were appropriately fed for their age and those who were not. However, there was no such significant association found with wasting.

According to Tiwari et al., (2014) compared to those who had been breastfed for less than 12 months, children aged 0-23 months who had been breastfed for up to 12 months had a significantly lower risk of stunting. Furthermore, in contrast to children of the same age group who were not now breastfed, infants who were currently breastfed had a markedly lower risk of being severely stunted (adjusted OR=0.70; CI: 0.54, 0.94; p=0.017). Dhok & Thakre, (2016) also reported that duration of breastfeeding < 2 years was found to be significantly associated with stunting (P = 0.004). However, Khan et al., (2019) reported no statistically significant association between stunting and breastfeeding status of children. Mane et al., (2018) also could not find any association between the prevalence of stunting and breastfeeding status of the children.

Table 6 depicts that both stunting and wasting were more prevalent among those children who had consumed a less diverse diet as compared to those who had consumed more diverse diet. However, this distribution was significant only for wasting not for stunting. Insufficient dietary diversity, where a child's diet lacks a variety of essential nutrients from different food groups, can contribute to wasting. Inadequate intake of essential nutrients weakens the body's resistance to infections and impairs growth, potentially leading to rapid weight loss and muscle wasting observed in children with acute malnutrition. We didn't find any other study which shows the association of dietary diversity with wasting.

This paper delves into the crucial link between children's nutritional status with their socio-demographic characteristics and feeding practices. With an emphasis on the early years of life, the study explores how various feeding methods and behaviours impact the nutritional well-being of children. The intricate interplay between dietary choices, nutrient intake, and population attributes were examined, shedding light on the significance of adequate nutrition for healthy growth and development. By investigating the association between nutritional status and feeding practices, this study contributes to a deeper understanding of effective strategies to enhance child health outcomes and informs potential interventions for improved childhood nutrition.

As it is a cross-sectional study design, we could only establish association between predictor and outcome variable, not causations. The participants were susceptible to miss classification due to recall bias. Since, there was a one-time contact, the incidence and duration of disease could not be calculated and therefore, study is not sufficient to understand trends of under nutrition in the community. Though, as data collection was done throughout the year, seasonal trends can be easily captured, can be considered as strength of our study.

Conclusion

Our study has ascertained dissatisfactory level of inappropriate feeding practices but comparable DDS, almost 50% of children had appropriate dietary diversity. While the prevalence of stunting and wasting was categorised as 'very high' and 'high' risk according to cut-off value of public health importance at population level. The significant associations between feeding practices, nutritional status, and age-related variations among children under 5 years of age were found in our study. The findings emphasize the critical role that early feeding practices play in determining growth outcomes, with stunting closely linked to feeding patterns. Additionally, our investigation underscores the importance of dietary diversity in preventing wasting, offering a strategic avenue for tackling acute malnutrition.

The discernible age-specific trends in stunting prevalence underscore the need for tailored interventions that evolve as children progress through different growth phases. The notable lower risk of wasting among older children (> 23 months) compared to infants (< 12 months) highlights the dynamic nature of nutritional needs throughout early childhood, necessitating adaptable approaches to address these distinct requirements.

Our study revealed no significant correlations between sex and place of residence (rural or urban) with observed nutritional outcomes. This suggests the dominance of other influential factors in shaping the nutritional landscape among these children, which warrants further exploration to inform more comprehensive strategies.

Based on our research findings, although majority of our study population was poor, but still half of the children had satisfactory DDS. So, it can be inferred that there was no resource crunch as such but need of education about which type of food should be given in how much amount so, as to provide not only nutritious but balanced diet for the proper growth and development of child after 6 months of age. Recognizing the impact of social and cultural contexts on feeding practices is crucial. Tailored interventions that respect and integrate local traditions while promoting nutritionally sound practices can foster sustainable improvements in childhood nutrition.

To address the varying nutritional needs of children at different developmental stages, interventions should be age-specific and adaptable. Timely interventions that coincide with key growth milestones can enhance the effectiveness of nutritional programs. At last, a holistic approach involving collaboration between healthcare providers, nutritionists, educators, and community leaders can strengthen the impact of interventions. This synergy enables comprehensive support for children's nutritional well-being.

In conclusion, our study's implications extend beyond research findings, serving as a call to action for stakeholders at various levels. By implementing evidence based Social and Behavioural Change Communication (SBCC) campaigns and fostering a supportive environment rooted in cultural sensitivity, we can collectively pave the way for improved childhood nutrition, better growth outcomes, and a healthier future for our children.

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Declaration of Interest Statement

The authors declare that they have no conflict of interests.

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