ORIGINAL ARTICLE

Feeding practices and associated factors among children of 2-5 years in rural area of Gurugram

Nidhi Gupta, Sunita Vashist, Neha Singla, Nitin Panwar
Department of Community Medicine, Faculty of Medicine & Health Sciences, SGT University, Gurugram

CORRESPONDING AUTHOR
Dr Nitin Panwar, Department of Community Medicine, FMHS, SGT University, Gurugram, Haryana
Email: nitin272322@gmail.com

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ABSTRACT

Background: Childhood malnutrition remains a major public health concern in India, with both undernutrition and overnutrition contributing to the growing double burden of disease. Feeding practices during early childhood play an important role in determining nutritional outcomes. This study assessed feeding practices among children aged 2–5 years in rural Gurugram and identified associated factors. **Methodology:** A community-based cross-sectional study was conducted among 275 mothers in two villages of rural Gurugram, Haryana. Data were collected using a pre-tested structured questionnaire and the validated Family Nutrition and Physical Activity (FNPA) tool. Information on sociodemographic profile, maternal health services, birth history, and feeding practices was obtained. Data were analysed using SPSS, and associations were tested using the Chi-square test, with $p<0.05$ considered significant. **Result:** Appropriate feeding practices were observed in 51.3% of children. Institutional delivery (92.7%) and early breastfeeding (97.1%) were high, but pre-lacteal feeding remained common (83.3%). Feeding practices were significantly associated with sex of respondent, ANC visits, birth weight, and sex of the child. **Conclusion:** Suboptimal feeding practices persist despite good service utilisation (ANC Visits). Strengthening counselling and community-based behaviour change interventions is essential to improve child nutrition outcomes.

KEYWORDS

Feeding practices, Child nutrition, Rural India, Antenatal care, Birth weight, Malnutrition

INTRODUCTION

Developing countries are increasingly facing the double burden of malnutrition, where undernutrition and micronutrient deficiencies coexist with overweight and obesity within the same population. This transition reflects rapid changes in dietary patterns, lifestyle, and socioeconomic conditions, making malnutrition a complex and evolving public health challenge globally.(1,2) While traditional concerns of undernutrition persist, the rising consumption of energy-dense, nutrient-poor foods and sedentary lifestyles are contributing to an increasing prevalence of childhood overweight and obesity.

Malnutrition among children under five years of age is the result of a multifactorial interaction involving food availability, accessibility, and utilization, along with healthcare access and environmental conditions.(3) Nutrition-specific factors such as inadequate food intake, poor caregiving practices, inappropriate feeding behaviour, and recurrent infections play a major role in determining a child's nutritional status.(4) A balanced and adequate diet is essential for optimal growth, immunity, and developmental outcomes.

However, poor dietary quality and unhealthy feeding patterns remain major contributors to malnutrition. Parents and caregivers play a central role in shaping children's eating behaviours and creating a healthy food environment through decisions related to food selection, feeding frequency, meal structure, and dietary diversity. Overnutrition is equally concerning, as childhood overweight and obesity are associated with comorbidities that often persist into adulthood and increase the risk of non-communicable diseases such as diabetes, hypertension, and cardiovascular disease.(5)

Despite economic growth and improvements in food production, undernutrition continues to be a major problem in India, with slow and uneven progress across regions. Children with severe acute malnutrition (SAM) remain at higher risk of mortality, recurrent illness, and impaired development.(6) Poor infant and young child feeding (IYCF) practices—including inadequate breastfeeding, delayed complementary feeding, and insufficient dietary diversity—significantly contribute to this burden and its long-term consequences.(7)

The magnitude of the problem is reflected in NFHS-5 data, which shows that 32.1% of children under five years are underweight, 35.5% are stunted, and 19.3% are wasted.(8) Although some improvement has occurred, the burden remains substantial. At the same time, childhood overweight is emerging as a public health

concern. A meta-analysis estimated the prevalence of overweight and obesity among children in India to be 12.64% and 3.39%, respectively, while Global Burden of Disease data reported an overweight prevalence of 11.5% among children aged 2–4 years.(9,10) These findings highlight the ongoing nutritional transition in the country.

The age group of 2–5 years represents a critical period for the development of dietary habits and feeding behaviour. During this stage, children are increasingly exposed to processed foods, packaged snacks, and sweetened beverages.

Unhealthy dietary practices during early childhood not only increase the risk of obesity but also predispose children to non-communicable diseases later in life, contributing to the double burden of disease in India. As rural populations adopt more urbanized lifestyles, the risk of childhood obesity is likely to increase further if preventive strategies are not implemented early.

Given this background, it is important to assess feeding practices among young children in rural settings, where traditional practices coexist with emerging lifestyle changes. Understanding maternal feeding behaviour, dietary patterns, and associated factors can help identify modifiable determinants of child nutrition and guide context-specific interventions.

Therefore, the present study was undertaken to assess feeding practices among children aged 2–5 years in a rural area of Gurugram and to evaluate their nutritional status. The study also aimed to explore factors influencing feeding behaviour.

Material & Methods

Study design and study settings: We conducted a community based cross-sectional study. This study was conducted in the villages Makdola and Iqbalpur of Gurugram District, Haryana.

Study Duration: 12 months (February 2025 to February 2026)

Study participants: Children aged 2–5 years living in the villages of Makdola and Iqbalpur in Gurugram district, along with their mothers, constituted the study participants. If a household had more than one child of this age group, then the child was selected by the chit method. Mothers were the primary respondents, in case of no availability of mothers, the father was taken as the respondent. Those residing in the area for more than 6 months and who provided written informed consent were included. Mothers who refused consent or could not be contacted after three successive visits were excluded.

Sample size and sampling: The sample size was calculated using the formula for estimation of a single proportion:

$$N = \frac{Z^2 \times P \times Q}{D^2}$$

where P was taken as the prevalence of overweight and obesity among children, assumed to be 19.3% based on previous literature.[16] Q was calculated as $100 - P = 80.7$. The confidence level was kept at 95% (Z = 1.96), and absolute precision was taken as 10%.

Substituting these values in the formula:

$$N = \frac{(1.96)^2 \times 19.3 \times 80.7}{(10)^2}$$

The minimum required sample size was calculated to be 249. After adding 10% to account for non-response, the final sample size was 275 participants.

The Primary Health Centre Daulatabad caters to three villages. Considering the required sample size, two villages were selected as the study area using simple random sampling. A list of children aged 2–5 years from the selected villages served as the sampling frame. Only children residing in the area for more than six months were considered eligible.

Participants were selected using probability proportional to size (PPS) from the two villages. Household visits were conducted, and every alternate household was approached for enrolment. If a selected household did not have an eligible child, the next household was visited, after which the alternate sequence was continued.

The purpose of the study was explained to the mothers, and those who provided written informed consent were included in the study.

Study Tools: Two instruments were used for data collection in the present study:

Structured Proforma: A predesigned and pretested structured proforma was used to collect information from the study participants. It consisted of the following sections:

- **Section A:** Sociodemographic profile of the family
- **Section B:** Maternal details including demographic characteristics, obstetric history, and knowledge related to child feeding
- **Section C:** Child-related information including demographic profile, birth history, health problems during the past one year, and anthropometric details
- **Section D:** Feeding-related information including minimum dietary diversity, minimum meal frequency, minimum adequate diet, and consumption of unhealthy foods

Validated Questionnaire: Family Nutrition and Physical Activity (FNPA) Tool: The **Family Nutrition and Physical Activity (FNPA) questionnaire** was used to assess the home environment and parenting practices related to the child's risk of overweight and obesity. The FNPA tool was developed at Iowa State University by Ihmels MA et al. in collaboration with the American Dietetic Association and is available in the public domain[18].

The questionnaire consists of **20 items** scored on a **four-point Likert scale**. It covers multiple domains of feeding behaviour and the home environment, including:

- Family eating habits
- Food choices
- Beverage patterns
- Parental restriction and reward practices
- Screen-time behaviour
- Parental monitoring of child habits

Higher scores on individual items indicate healthier behavioural patterns, while lower FNPA scores suggest an increased risk of overweight or obesity in children.

Operational Definitions

Feeding Practices - Feeding practices were assessed using a structured questionnaire based on standard IYCF

recommendations. Practices were categorised as appropriate if the child met criteria for minimum dietary diversity, adequate meal frequency, and consumption of a balanced diet.

FNPA Scoring - The total score is used as the summary score on the FNPA. Each item should be scored on a 1 – 4 point scale, with 4 representing the more favourable practice or policy. Note: Items 3,4,5,7, 10, and 13 are reverse-coded, so values need to be flipped prior to calculations. The cutoff point has been taken as the mean score.

Data Analysis: After completion of data collection, the data were checked for completeness and consistency and then entered into a Microsoft Excel spreadsheet for coding and tabulation. Statistical analysis was performed using SPSS software.
Descriptive statistics were used to summarize the data, and results were expressed as proportions and percentages. Depending on the distribution of the variables, appropriate statistical tests were applied. The Chi-square test & Fischer exact test were used to assess associations between categorical variables. A p-value of less than 0.05 was considered statistically significant.
Ethical Considerations: Ethical approval for the study was obtained from the Institutional Ethics Committee of the Faculty of Medicine and Health Sciences, SGT University, prior to the commencement of the study. Written informed consent was obtained from all participating mothers after providing a detailed information sheet in the local language (Hindi). Confidentiality and anonymity of all participants were strictly maintained throughout the study.

RESULTS

A total of 275 mothers were included in the study. Most mothers (85.5%) were aged below 30 years, whereas 14.5% were aged above 30 years. With respect to the sex of the child, slightly more than half were female (54.2%), while 45.8% were male. Almost all participants belonged to the Hindu religion (99.3%), with only one participant each from Christian and Muslim religions. Most mothers were married (98.9%), while a very small proportion were single (0.7%) or divorced (0.4%). Regarding educational status, the largest proportion of mothers had studied up to intermediate/12th standard (29.8%). This was followed by matriculation (24.4%) and middle school education (19.3%). About 12.7% had completed primary education, while 12.4% were graduates. Only a small proportion of mothers (1.5%) had education beyond graduation. In terms of occupation, most mothers were homemakers (80.4%). Among working mothers, 9.5% were employed in non-government jobs, 6.5% were self-employed, and 3.6% were government employees. The detailed sociodemographic characteristics of the study participants are presented in Table 1.

The distribution of key maternal and child health service indicators, including initiation of breastfeeding within one hour of birth, use of pre-lacteal feeds, place of delivery, number of antenatal care visits, and type of delivery, are illustrated in Figures 1–5. Among the study participants, a considerable proportion of mothers were found to be practicing inappropriate feeding, while the remaining were practicing appropriate feeding as per the study criteria. The distribution of feeding practices across different sociodemographic and health-related variables is shown in Table 2.
A statistically significant association was observed between feeding practices and the sex of the respondent. Inappropriate feeding practices were more common among male respondents (58.7%) compared to female respondents (40.3%), and this difference was statistically significant (p = 0.002). Maternal age did not show a statistically significant association with feeding practices. Among mothers aged below 30 years, 49.4% practiced inappropriate feeding, compared to 45.0% among mothers aged above 30 years (p = 0.368). Similarly, religion was not significantly associated with feeding practices. Among Hindu participants, 48.7% reported inappropriate feeding, while the proportion among mothers belonging to Muslim or Christian religions was comparable (p = 0.738). Marital status also did not demonstrate a statistically significant association with feeding practices (p = 0.114). However, all single or divorced mothers reported inappropriate feeding practices, though their number was very small.

Among maternal health service indicators, antenatal care visits showed a statistically significant association with feeding practices. Mothers who had adequate ANC visits reported a lower proportion of inappropriate feeding compared to those with inadequate ANC visits (p = 0.022). Type of delivery did not show a significant association with feeding practices. The proportion of inappropriate feeding was similar among mothers who had normal delivery (48.9%) and those who had caesarean or assisted delivery (47.4%) (p = 0.924). Place of delivery also did not demonstrate a significant association with feeding practices. Inappropriate feeding was reported by 48.2% of mothers delivering in health facilities and 55.0% of those delivering at home (p = 0.645).

Similarly, the type of birth attendant was not significantly associated with feeding practices. Among deliveries assisted by doctors, 50.4% reported inappropriate feeding, while among those assisted by trained birth attendants, the proportion was lower (37.8%) but not statistically significant (p = 0.162). Early initiation of breastfeeding within one hour of birth also did not show a statistically significant association with feeding practices (p = 0.492). Birth weight showed a statistically significant association with feeding practices. Inappropriate feeding was more common among low-birth-weight infants (63.6%) compared to infants with normal birth weight (45.0%), and this difference was statistically significant (p = 0.013). The sex of the child was also significantly associated with feeding practices. Inappropriate feeding was reported more frequently among male children (53.6%) than among female children (39.1%) (p = 0.024). The detailed distribution of feeding practices according to sociodemographic, maternal health service, and child-related factors is presented in Table 2.

Table No. 1: Sociodemographic details of the study participants (N=275)

Variable	Frequency	Percentage
Age of Mother		
<30	235	85.5
>30	40	14.5
Total	275	100
Gender of child		
Female	149	54.2
Male	126	45.8
Total	275	100.0
Religion		
Christian	1	0.4
Hindu	273	99.3
Muslim	1	0.4
Total	275	100.0
Marital Status		
Divorced	1	0.4
Married	272	98.9
Single	2	0.7
Total	275	100.0
Education of Mother		
Primary	35	12.7
Middle	53	19.3
Matriculation	67	24.4
Intermediate / 12th	82	29.8
Graduate	34	12.4
Postgraduate / Above	4	1.5
Total	**275**	**100.0**
Occupation of Mother		
Gov. employee	10	3.6
Homemaker	221	80.4
Non-government employee	26	9.5
Self-employed	18	6.5
Total	275	100.0

Table No. 2: Association of feeding practices with various factors

Determinant	Category	Inappropriate Feeding n (%)	Appropriate Feeding n (%)	Total	p value
Sex of respondent	Male	74 (58.7)	52 (41.3)	126	**0.002**
	Female	60 (40.3)	89 (59.7)	149	
Age of mother	<30	116(49.4)	119(50.6)	235	0.368
	>30	18(45)	22(55)	40	
Religion	Hindu	133 (48.7)	140 (51.3)	273	0.738
	Muslim/Christian	1 (50.0)	1 (50.0)	2	
Marital status	Married	131 (48.2)	141 (51.8)	272	0.114
	Single/Divorced	3 (100.0)	0 (0.0)	3	
ANC visits	Inadequate	51 (41.1)	73 (58.9)	124	**0.022**
	Adequate	83 (55.0)	68 (45.0)	151	
Type of delivery	Normal	116 (48.9)	121 (51.1)	237	0.924
	C-section/Assisted	18 (47.4)	20 (52.6)	38	
Place of delivery	Health facility	123 (48.2)	132 (51.8)	255	0.645
	Home	11 (55.0)	9 (45.0)	20	
Delivery assisted by	Doctor	120 (50.4)	118 (49.6)	238	0.162
	Trained birth attendant	14 (37.8)	23 (62.2)	37	
Breastfed within 1 hour	No	5 (62.5)	3 (37.5)	8	0.492
	Yes	129 (48.3)	138 (51.7)	267	
Birth weight	Low birth weight	35 (63.6)	20 (36.4)	55	**0.013**
	Normal	99 (45.0)	121 (55.0)	220	
Sex of child	Male	98 (53.6)	85 (46.4)	183	**0.024**
	Female	36 (39.1)	56 (60.9)	92	

Figures 1 Breastfeeding initiation within 1 hour of work

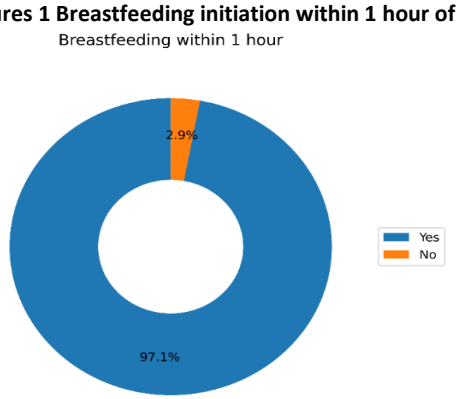


Figure 2 Pre-lacteal feeds

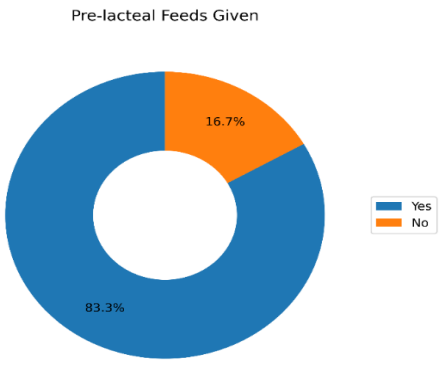


Figure 3: Place of delivery

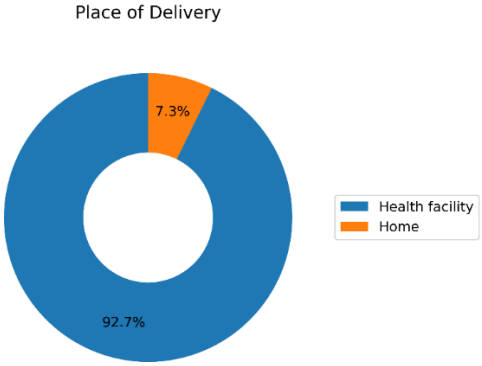


Figure 4: Number of ANC Visits

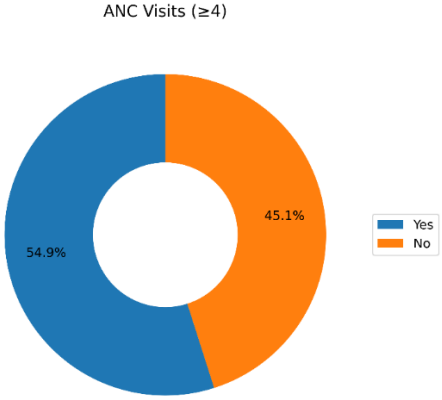
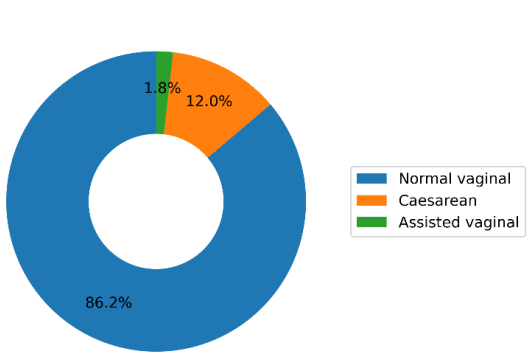


Figure 5: Type of delivery



DISCUSSION

The present community-based cross-sectional study assessed feeding practices among mothers of children aged 2–5 years in rural Gurugram and explored their association with maternal, obstetric and child-related factors. The study included 275 mothers, the majority of whom were younger than 30 years. Female children slightly outnumbered male children in the study population. Nearly all participants belonged to the Hindu religion, and most were married. In terms of educational attainment, the largest proportion of mothers had completed education up to the intermediate/12th level, indicating a predominantly moderately educated study population. In this study, 51.3% of children had appropriate feeding practices, while 48.7% had inappropriate feeding practices.

Feeding practices compared with other studies: In the present study, slightly more than half of children (51.3%) were receiving appropriate feeding practices. A comparable pattern was seen in the study by Saha et al., where 49.3% mothers had average IYCF knowledge and 74.5% had average practices[13].

The moderate level of appropriate feeding practices observed in our study reflects the transitional nutrition scenario in rural India, where some modern health messages are being adopted while traditional practices persist.

Maternal education and socio-demographic factors: Most mothers in the present study had education up to secondary level (about 54% up to matriculation or middle schooling, and only 13.9% graduates or above). This pattern resembles findings from other Indian rural studies where lower maternal education has been linked with suboptimal feeding behaviour. Mishra et al. reported maternal illiteracy as a major independent risk factor for severe acute malnutrition[14], while Singh et al. documented lower parental education as a predictor of SAM[12].

Although maternal education was not tested for association in this study, the numerical distribution suggests that limited higher education among mothers may partly explain the moderate level of feeding practices.

Gender-related differences: A statistically significant association between feeding practices and the sex of the respondent was observed in the present study. Among male respondents, 58.7% had inappropriate feeding practices, compared to 40.3% among females, indicating that female caregivers may adopt healthier feeding behaviours.

Similarly, the sex of the child showed a significant association, with inappropriate feeding reported in 53.6% of male children compared to 39.1% of female children. Gender differences in child nutrition have also been documented in Indian studies, where cultural norms and differential care patterns influence feeding behaviour and growth outcomes[15].

These findings highlight that gender norms in caregiving and resource allocation may continue to influence feeding practices even in rural populations.

Health-service utilization and obstetric factors: In the present study, 54.9% mothers had adequate ANC visits, and feeding practices differed significantly with ANC utilization. Among mothers with inadequate ANC visits, 58.9% had appropriate feeding practices, compared to 45.0% among those with adequate visits. This unexpected finding may be attributed to residual confounding, variations in the quality and content of counselling during ANC visits, or differences in socio-cultural practices and caregiving behaviours that are not solely influenced by healthcare utilization.

This unexpected direction of association contrasts with other studies. Saha et al. reported that mothers who received ASHA home visits had better feeding practices[13], and studies on nutritional outcomes also emphasize that health-service contact improves maternal knowledge and feeding behaviour[11,12].

Birth weight and feeding practices: Birth weight showed a significant association with feeding practices in this study. Among low-birth-weight children, 63.6% had inappropriate feeding, compared to 45.0% among normal-weight children.

Similar findings were reported by Sharma et al., who identified birth weight as an important determinant of malnutrition[15]. Mishra et al. also found that inappropriate feeding practices, lack of breastfeeding and deprivation of colostrum significantly increased the risk of severe acute malnutrition[14].

These findings suggest that low-birth-weight children remain nutritionally vulnerable and may require additional counselling and follow-up to ensure appropriate feeding.

Early feeding indicators: Early initiation of breastfeeding was very high in the present study (97.1%), yet it did not show a significant association with feeding practices. Previous studies have shown that delayed initiation of breastfeeding is linked to poor nutritional outcomes. For example, Kumar et al. reported that late initiation of breastfeeding and deprivation of colostrum were significant risk factors for undernutrition[11].

The prevalence of pre-lacteal feeding in this study was extremely high (83.3%), indicating strong persistence of cultural feeding practices. Mishra et al. similarly reported administration of pre-lacteals as an independent risk factor for SAM[14]. These findings emphasize the continued importance of behaviour-change interventions addressing traditional feeding customs.

Context of India's double burden of malnutrition: The findings of this study must be interpreted within the broader national nutrition transition. NFHS-5 reports that 32.1% children under five are underweight, 35.5% stunted and 19.3% wasted[8]. At the same time, systematic reviews show increasing prevalence of childhood overweight and obesity, estimated at 19.3% after 2010[16], while multicentric data report obesity prevalence as high as 23.9% using WHO criteria[17].

Strengths: The present study was conducted using a community-based design, which improves the generalizability of the findings to the local population. A sufficiently large sample size was included, ensuring adequate statistical power to detect associations between feeding practices and relevant maternal and child factors. Standardized data collection tools were used, which helped maintain uniformity in responses and minimized interviewer-related variation. The study also assessed multiple domains, including sociodemographic characteristics, maternal health service utilization, and child-related factors, allowing for a comprehensive understanding of determinants of feeding practices.

CONCLUSION

The present study demonstrates that nearly half of the children had inappropriate feeding practices despite relatively good maternal health service utilization. Feeding practices were significantly associated with antenatal care visits, birth weight, and sex of the child. These findings highlight gaps in effective counselling and the need to strengthen behaviour change communication, particularly during antenatal and postnatal care. Focused interventions targeting low-birth-weight children and reinforcing appropriate feeding practices are essential to improve child nutrition outcomes.

RECOMMENDATION

- Maternal counselling on appropriate child feeding practices should be systematically integrated into antenatal, delivery, and postnatal care, with at least one dedicated counselling session per contact using standardized IEC materials.
- Village-level health education sessions should be conducted monthly by frontline workers (ASHA/Anganwadi workers) to address harmful cultural practices such as pre-lacteal feeding and promote healthy snacking behaviours.
- Low-birth-weight children should be enrolled in targeted follow-up through regular growth monitoring (monthly) and home visits, with individualized counselling for caregivers.
- Study findings should be incorporated into existing programmes such as ICDS and POSHAN Abhiyaan by strengthening Village Health and Nutrition Days (VHNDs) to include structured counselling on child feeding practices.
- Periodic training and capacity-building of frontline health workers should be conducted to ensure effective delivery of nutrition counselling messages.
- Longitudinal studies should be undertaken to assess causal relationships between feeding practices and nutritional outcomes and to evaluate the effectiveness of implemented interventions.

LIMITATION OF THE STUDY

- As the study was cross-sectional, causal relationships between feeding practices and associated factors could not be established.
- Information regarding feeding practices, dietary intake, and health history was based on maternal recall, which may have led to recall bias.
- Mothers may have reported socially acceptable feeding practices rather than actual behaviour, potentially leading to overestimation of appropriate practices.
- The study was conducted in two villages of a single rural area, which may limit generalizability of the

findings to other regions with different socio-cultural contexts.

Relevance of the Study

Malnutrition is a priority public health problem in India. Among children, 2-5 years is an age group in which a child develops some control, likes and dislikes about food. Feeding habits and practices if made healthy during this time shall decrease undernutrition as well as overnutrition. Early risk assessment of overweight and obesity is also important so that mothers can be made aware about this and change the eating pattern of their child. This study shall contribute by identifying feeding practices (health or unhealthy) and double burden of malnutrition which is slowly becoming prominent in rural areas of India as well.

Authors Contribution

All authors have contributed equally.

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Nil

Conflict of Interest

There are no conflicts of interest.

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

During the preparation of this work the authors used Chat GPT 5.2 to improve language of the article. After using this, the authors reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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