

# Complementary Feeding Practices and Nutritional Status of Children (6–23 months) in an Urban Resettlement Colony of East Delhi

Pragti Chhabra, Anita Gupta, Neelima Thakur<sup>1</sup>

Department of Community Medicine, University College of Medical Sciences and GTB Hospital, <sup>1</sup>Breast Feeding Promotion Network of India, Delhi, India

## Abstract

**Background:** Even with optimum breastfeeding, children are at risk of being stunted if they do not receive timely adequate and appropriate complementary feeding. **Objectives:** The objective is to determine the prevailing complementary feeding practices, and nutritional status of children aged 6–23 months. **Materials and Methods:** Mothers of 350 children of age 6–23 months of an urban resettlement colony of East Delhi were interviewed using a pre-tested questionnaire based on the WHO indicators to record their complementary feeding practices. Weight and height was taken to assess the nutritional status. **Results:** The minimum meal frequency was adequate in 60.6%, minimum dietary diversity in 15.1%, and minimum acceptable diet in 9% children. The prevalence of wasting was 43.7%, underweight 43.4%, and stunting 29.1%, as per Z-score. Statistically significant association of wasting with low birth weight, bottle feeding, and consumption of market food was observed ( $P < 0.05$ ). **Conclusions:** Complementary feeding indicators were unsatisfactory in most children. A high prevalence of wasting and under-nutrition was observed.

**Keywords:** Complementary feeding, stunting, underweight, wasting

## INTRODUCTION

Adequate breastfeeding and complementary feeding practices can prevent under-five mortality by 19%.<sup>[1]</sup> Studies have shown that growth faltering starts as early as 3 months up to 2 years of age. Even with optimum breastfeeding, children are at risk of being stunted if they do not receive adequate dietary amount, diversity, and meal frequency after 6 months of age.<sup>[2]</sup>

As per NFHS 4 figures, child malnutrition remains a matter of serious concern for India, with the occurrence of stunting in 38.4%, wasting in 21%, and underweight 35.1% in under five children. The complementary feeding indicators were poor with only 9.6% children receiving minimum acceptable diet (MAD) at the national level.<sup>[3]</sup> In a recent analysis of the NFHS 4 data on complementary feeding practices a wide variation in the prevalence, and factors associated across the regions was observed.<sup>[4]</sup>

The urban poor constitute more than one-third of Delhi's population, constituted by slums and resettlement colonies. Resettlement colonies though have been provided with basic

amenities but the socio-economic and environmental sanitation conditions remain unsatisfactory in these areas.<sup>[5]</sup> This increases the vulnerability of infants and young children to malnutrition and infections. The present communication examines the practices of mothers regarding complementary feeding including dietary diversity, frequency, and acceptable diet. It also aims to study the association of these with the nutritional status of children aged 6–23 months, in an urban resettlement colony of East Delhi.

## MATERIALS AND METHODS

A community-based cross-sectional study was conducted among children 6–23 months of age in an urban resettlement colony in

**Address for correspondence:** Dr. Pragti Chhabra, Department of Community Medicine, University College of Medical Sciences and GTB Hospital, Delhi - 110 095, India. E-mail: pragschhabra@gmail.com

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East Delhi. A sample size of 346 was estimated using the Epi Info Software (Epi Info for windows version 7.2, Center for Disease Control, US Department of Health and Human Service, Atlanta, USA), based on the prevalence of timely complementary feeding at 6–8 months among children in Delhi as 52.6% (NFHS-3) and a relative precision of 10% on either side at 95% confidence level. It was rounded off to 350. There are 5 blocks and 21 subblocks in the area with 45 Anganwadi Centers (AWC) with an average of 2 AWC in each sub block. On an average 30–35 children (6–23 months) were registered in one AWC. One AWC was selected randomly from each subblock. From the list of eligible children by systematic random sampling, every second child was included and the mother was contacted at home.

After taking a written consent, using a pre-tested semi-structured questionnaire, information about socio-demographic and economic details were recorded and practices about complementary feeding was obtained by interviewing the mothers. By 24 h recall the WHO indicators for complementary feeding were assessed.<sup>[6,7]</sup> Information on counseling for complementary feeding was also sought.

The weight of the infants was recorded to the nearest 0.1 kg and height/length to 0.1 cm. Average of two measurements was taken. Mothers who were not available during the first visit were revisited.

The following WHO indicators of complementary feeding were computed:

1. Minimum dietary diversity: Proportion of children 6–23 months of age who receive foods from 4 or more food groups
2. Minimum meal frequency: Proportion of breastfed and nonbreastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (also including milk feeds for nonbreastfed children) the minimum number of times or more
3. Minimum acceptable diet: Proportion of children 6–23 months of age who receive a MAD (apart from breast milk).

Ethical clearance was obtained from Institutional Ethics Committee.

### Statistical analysis

Anthropometric data were standardized for age using WHO Anthro v. 3.2.2. Nutritional status indicators namely weight-for-length (WLZ), length-for-age (LAZ) and weight-for-age (WAZ) were derived by comparing with the WHO standards. Children below –2 standard deviations (–2SD) of the WHO median for WLZ, LAZ, and WAZ were considered wasted, stunted and underweight, respectively.<sup>[8]</sup>

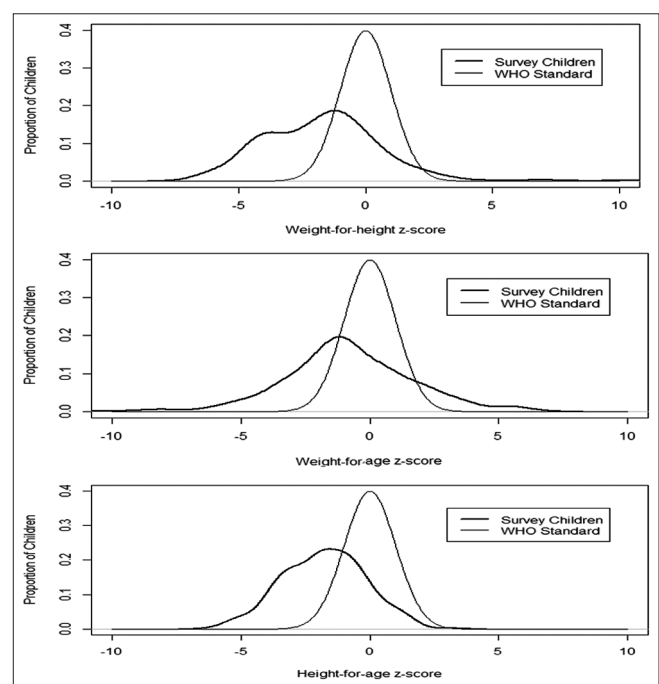
Data were analyzed using the SPSS 20 software (IBM Corporation, Armonk, New York, USA). Chi-square test was applied to examine association between the sociodemographic and complementary feeding variables. Univariate analysis and multivariate logistic regression analysis was done to ascertain association between sociodemographic variables and nutritional status indicators.

## RESULTS

The mean age of the mothers was 25.6 (3.9) years with two-fifth (44%) between 26 and 30 years. Most of fathers (81.7%) and mothers (69.7%) were educated up to middle or high school, 87.5% of the families were in the income bracket of Rs. 5000–9999 and 64.0% were from joint families. Majority of the mothers (97%) were homemakers. The mean age of the infants under study was 13.4 months (SD+5.23) with 50.9% males and 49.1% females.

The prevalence of the three complementary feeding indicators namely minimum meal frequency, minimum diet diversity, and minimum adequate diet was 60.6%, 15.2%, and 9%, respectively. No statistically significant association of the complementary feeding indicators with age of mother, family income, family type and place of birth of child was observed. Minimum meal frequency was higher in children who received market foods while the MAD was more likely to be adequate in children whose mothers received counseling for complementary feeding [Table 1].

Figure 1 compares the WHO child standard with distribution pattern of WAZ, LAZ and WLZ z-scores calculated from the surveyed children. All three indicators of the surveyed children can be seen to fall on the left of the WHO Standards indicative of high prevalence of stunting, wasting and underweight among them. The mean/median of all the three indicators is negative and far from the standard mean zero. The mean HAZ is however comparatively closer to the WHO standard than other two indicators. The mean and SD values for the anthropometric indicators WHZ, WAZ, and HAZ z-scores were –1.72 (2.39), –1.78 (1.61), and –0.83 (2.51), respectively.



**Figure 1:** Distribution of weight-for-height, weight-for-age and height-for-age z scores of the study children and WHO growth standard

**Table 1: Complementary feeding indicators in relation to socio demographic and other factors**

Factor	MMF adequate	MMF inadequate	MMD adequate	MMD inadequate	MAD adequate	MAD inadequate
Mother's age (years)						
<25 (n=147)	88 (59.9)	59 (40.1)	22 (15)	125 (85.0)	14 (9.5)	133 (90.5)
25-30 (n=151)	92 (60.9)	59 (39.1)	25 (16.6)	126 (83.4)	14 (9.3)	137 (90.7)
>30 (n=45)	28 (62.2)	17 (37.8)	5 (11.1)	40 (88.9)	3 (6.7)	42 (93.3)
Monthly income in rupees						
<5000	10 (62.5)	6 (37.5)	1 (6.2)	15 (93.7)	1 (6.3)	15 (93.8)
5000-10,000	180 (60.0)	120 (40.0)	45 (15.0)	255 (85.0)	26 (8.7)	274 (91.3)
>10,000	18 (66.7)	9 (33.3)	6 (22.2)	21 (77.8)	4 (14.8)	23 (85.2)
Type of family						
Joint	125 (56.8)	95 (43.2)	35 (15.9)	185 (84.1)	18 (8.2)	202 (91.8)
Nuclear	83 (67.5)	40 (32.5)	17 (13.8)	106 (86.2)	13 (10.6)	110 (89.4)
Place of delivery						
Home	30 (71.4)	12 (28.6)	6 (14.3)	36 (85.7)	4 (9.5)	38 (90.5)
Government hospital	154 (58.8)	108 (41.2)	41 (15.6)	221 (84.4)	23 (8.8)	239 (91.2)
Private hospital	24 (61.5)	15 (38.5)	5 (12.8)	34 (87.2)	4 (10.3)	35 (89.7)
Received market foods						
Yes	183 (64.0)*	103 (36.0)	45 (15.7)	241 (84.3)	29 (10.1)	257 (89.9)
No	25 (43.9)	32 (56.1)	7 (12.3)	50 (87.7)	2 (3.5)	55 (96.5)
Received counseling						
Yes	85 (60.7)	55 (39.3)	25 (17.9)	115 (82.1)	18 (12.9)*	122 (87.1)
No	123 (60.6)	80 (39.4)	27 (13.3)	176 (86.7)	13 (6.4)	190 (93.6)

Figures in parentheses indicate percentage. \* $P < 0.05$ . MMF: Minimum meal frequency, MMD: Minimum dietary diversity, MAD: Minimum acceptable diet

**Table 2: Prevalence of wasting in association with various socio demographic factors**

Factor	Wasted (n=153), (<-2SD)	Normal (n=197), (>=-2SD)	OR (95% CI) univariate analysis, P	OR (95% CI) multivariate analysis, P
Age (months)				
6-8 (n=90)	52 (57.8)	38 (42.2)	2.67 (1.6-4.5)	2.7 (1.6-4.8), <0.01
9-11 (n=80)	40 (50)	40 (50)	1.37 (0.7-2.5)	2.0 (1.2-3.6), 0.01
12-23 (n=180)	61 (33.9)	119 (33.9)	1	1
Family type				
Joint (n=235)	93 (41.3)	132 (58.7)	0.75 (0.49-1.18), 0.26	
Nuclear (n=125)	60 (48.0)	65 (52.0)	1	
Family income (Rs.)				
<9999 (n=323)	139 (43.0)	184 (57.0)	0.70 (0.32-1.54), 0.37	0.68 (0.30-1.54)
>9999 (n=27)	14 (51.9)	13 (48.1)	1	1
Mother's education				
Illiterate (n=31)	13 (41.9)	18 (58.1)	0.83 (0.33-2.10)	1.06 (0.36-3.15)
Primary (n=43)	20 (46.5)	23 (53.5)	0.88 (0.42-1.89)	1.17 (0.42-3.22)
Intermediate (n=234)	105 (43.0)	129 (57.0)	0.81 (0.30-2.2)	1.1 (0.49-2.46)
Graduate	15 (46.9)	17 (53.1)	1	1
Birth weight				
<2.5 (n=119)	65 (54.6)	54 (45.4)	1.96 (1.25-3.06), 0.003	2.17 (1.34-3.52), 0.002
2.5 or >2.5 (n=231)	88 (38.1)	143 (61.2)	1.0	1.0
Minimum acceptable diet				
Adequate	11 (35.5)	20 (64.5)	1	
Inadequate	139 (44.6)	173 (55.4)	0.68 (0.32-1.48)	
Consumption of market food				
Yes (n=287)	133 (46.8)	154 (53.7)	1.86 (1.04-3.31), 0.036	1.52 (0.94-2.46), 0.085
No (n=63)	20 (31.7)	43 (68.3)	1.0	1.0
Bottle feeding				
Yes (n=157)	82 (52.2)	75 (47.8)	1.88 (1.22-2.88), 0.004	1.97 (1.26-3.08), 0.003
No (n=193)	71 (36.8)	122 (63.2)	1.0	

SD: Standard deviation, OR: Odds ratio, CI: Confidence interval

The prevalence of wasting was observed to be 43.7% (95% confidence interval [CI] 38.5–48.9), underweight 43.4% (95% CI 38.2–48.6) and stunting 29.1% (95% CI 24.3–33.9). The prevalence of wasting was highest in the 6–8 months of age group and decreased with age while the prevalence of stunting increased with increasing age ( $P < 0.01$ ). The prevalence of underweight was also higher in older children, but it was not statistically significant. No difference in the prevalence of the three indices was observed with sex of the child [Table 2].

Most of the socio-economic and demographic variables were not associated with child underweight and stunting. Birth weight of the child, market-food consumption, and bottle-feeding were significantly associated with wasting. On multivariate logistic analysis by backward elimination method, the prevalence of wasting was higher among low birth weight children as compared to those with normal weight (adjusted odds ratio [AOR] = 2.01; 95% CI: 1.35–3.57) (AOR = 7.22; 95% CI: 1.49–35.02). Similarly, the odds of wasting was 1.86 time higher among the children who consumed market based food. Bottle fed children were more likely to have wasting (AOR = 2.55; 95% CI: 1.57–4.17) [Table 2].

## DISCUSSION

The study reveals that the feeding practices of children 6 months to 24 months of age were poor in the resettlement area as per the WHO indicators; although a higher minimum meal frequency (60.6%) was reported as compared to that reported in NFHS 4 and another study from Delhi.<sup>[3,9]</sup> Fifteen percent of the children had an adequate diverse diet which is similar to that observed in urban settlements of Mumbai<sup>[10]</sup> and lower than the national figure of 22%<sup>[3]</sup> and the National Nutrition Monitoring Bureau survey.<sup>[11]</sup> Only 9.0% children met the recommendations of MAD which is higher than the figure reported for North region but similar to the figure observed for the southern and North Eastern regions as shown in an analysis of the NFHS data.<sup>[3,11]</sup>

The prevalence of MAD was higher among children whose mothers received counseling on complementary feeding, but no significant difference in MMF and MDD was seen. Significant impact of community-based skilled counseling on breastfeeding and IYCF is noted by other authors.<sup>[12,13]</sup>

The present study revealed higher prevalence of underweight (43.4%), and wasting (43.7%), as compared to the figures reported by NFHS-4 (35.7% and 21.5%, respectively). In contrast, the prevalence of stunting among the children (29.1%) is less in comparison to that of national average (38.40%).<sup>[3]</sup> It was also seen that children 6–8 months had a higher prevalence of wasting while older children had a higher prevalence of stunting in comparison to the younger ones. This may be attributable to delayed and inadequate complementary feeding. In a review on NFHS 4 data, a high prevalence of wasting was observed at birth which decreased with age, although underweight and stunting coexist with wasting but are relatively lower at birth, increase till 2 years

of age and then plateau.<sup>[14]</sup> As we included children from 6 months to 2 years a high prevalence of the three indices was observed. Similar findings have also been reported in other studies.<sup>[15,16]</sup> However, gender-wise variations in the prevalence of underweight, stunting, and wasting status were not observed.

Children with low birth weight were at 2 times higher risk of wasting as compared to those with normal birth weight which is in agreement with findings of other studies.<sup>[11,15]</sup> Risk of wasting was 2.55 times higher among children who were bottle fed than nonbottle fed. Bottle feeding is identified as a vital factor in malnutrition-infection cycle and considered a major risk factor for infant and child mortality. Mothers need to be informed about the risks of bottle feeding.

Majority (82%) of the children had consumed market foods which was similar to a study in urban Mumbai.<sup>[15]</sup> According to the mothers, they felt satisfied that at least the child has eaten something. The emerging popularity of such foods has been attributed to ready availability, taste, low cost, marketing strategies, and peer pressure.<sup>[16]</sup> The prevalence of wasting was 1.86 times higher among the children who consumed market-based ready to eat snacks as compared to those who did not.

## CONCLUSION

The proportion of children receiving MAD was low; mothers who received counseling were more likely to receive MAD. The study reveals a high prevalence of under-nutrition (wasting and stunting) among children in the area. Low birth weight children, those receiving market foods and bottle-fed children were at a higher risk of malnutrition. Skilled counseling regarding complementary feeding and appropriate behavioral change of mother and family is needed to improve the feeding practices and nutritional status of the children.

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## Conflicts of interest

There are no conflicts of interest.

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