



Original article

Impact of feeding practices on nutritional status of preschool children of Lucknow district: A community based cross-sectional study

Sumaiya Ahmad, Sudhanshu Mishra*

Department of Community Medicine, Affiliated to Career Institute of Medical Sciences & Hospital, Lucknow, India



ARTICLE INFO

Keywords:

Breastfeeding practices
Nutritional status
Preschool school

ABSTRACT

Background: A child's entire life is determined in large measures by the food given to him during his first five years. Their nutritional status is a sensitive indicator of community health and nutrition. Undernutrition among them is one of the greatest public health problems in India.

Materials and method: This community based cross-sectional study was carried out in urban and rural areas of Lucknow, Uttar Pradesh. Multistage random sampling technique was used to select 420 children of 1–5 years age group from urban and rural areas. Door to door survey was done to collect data and it was analysed using software M S Office excel and SPSS 17.

Results: It was found that total 71.7% children were breastfed, 67.6% were breastfed in an hour, colostrum was given to only 61.9% children while only 52.4% were exclusively breastfed. Children who were bottle-fed, started feeding after one hour of birth, not given colostrum and with non-exclusive breastfeeding were found significantly underweight and wasted.

Conclusion: Significant association was observed between type of family, overcrowding and socio-economic status with nutritional status of children. Statistically significant association was found between feeding practices and nutritional status of children. Children who were breastfed, initiated early feeding, given colostrum and breastfed for 2 years have better nutritional status than other groups.

1. Introduction

The health of children and youth is of fundamental importance. As today's children are the citizens of tomorrow's world, their survival, protection and development are the prerequisite for the future development of humanity. Pre-school children constitute the most vulnerable segment of any community. A child's entire life is determined in large measures by the food given to him during his first five years. Their nutritional status is a sensitive indicator of community health and nutrition.¹ Undernutrition among them is one of the greatest public health problems in India despite the many nutritional intervention programs running all over the country. World Health Organization (WHO) recommends initiation of breast feeding within 1 h of birth, exclusive breast feeding for first 6 months of life and continued breast feeding for 2 years or more together with age-appropriate, nutritionally adequate complementary feeding initiated after 6 months of age as Optimum Infant and Young Child Feeding (OIYCF) practices and formulated key indicators for assessment.^{2,3} Breastfeeding is the ideal food to promote healthy growth and development of infants providing

physiological and psychological advantages for both mother and the child^{4,5} and lowering the risk of mortality from infectious disease in the first 2 years of life.⁶ Breastfeeding has been reviewed to have a pivotal role in preventing child malnutrition.⁷ It accounts for 2.1 million of the 9.7 million annual under-five child deaths globally, thereby contributing to about 21% of the global burden of child deaths.⁸ Literature review shows that there is limited data available on infant feeding practices in Lucknow district. In order to obtain more detailed data on the child feeding situation and prevalence of undernutrition among preschool children of Lucknow District, Uttar Pradesh the present study has been carried out to explore the nutritional status of preschool children along with some socioeconomic and demographic factors and also to assess the association and effect of breastfeeding practices with nutritional status among preschool children of Lucknow district.

2. Material and methods

This study was a community based cross-sectional study and was carried out in urban and rural areas of Lucknow, Uttar Pradesh from

* Corresponding author. Department of Community Medicine, Career Institute of Medical Sciences & Hospital, Lucknow, India.

E-mail address: sudhanshu6886@gmail.com (S. Mishra).

<https://doi.org/10.1016/j.cegh.2022.101011>

Received 13 July 2021; Received in revised form 24 July 2021; Accepted 9 March 2022

Available online 17 March 2022

2213-3984/© 2022 The Authors. Published by Elsevier B.V. on behalf of INDIACLEN. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

December 2017 to May 2018. This study was carried out in Era's Lucknow Medical College and Hospital in Lucknow district.

2.1. Sample size

Considering 48% prevalence of malnutrition in under five children in UP (according to NFHS-3), sample size was calculated based on formula,

$$n = (Z\alpha)^2 pq / L^2$$

where p = expected proportion (prevalence), q = 100-p, α = confidence level (Type I error) and L = Allowable error (in % of p). With 10% of 'p' as allowable error and after adding 10% data loss sample size comes round to n = 420.

2.2. Sampling technique

A multi-stage random sampling technique has been used to select the required sample size. At first stage Sample size was divided according to Census 2011 of Govt. of India of Lucknow District i.e. 70% urban and 30% rural.⁹ So the sample size for urban was 294 urban and 126 in rural area of Lucknow. In rural Lucknow, there are 8 blocks, from which 2 blocks were randomly selected. From each block, 6 villages were selected by simple random sampling. Total 12 villages were surveyed to get required numbers of sample size. In urban Lucknow, there are 110 wards in which 10 wards were selected randomly. From each ward 2 mohallas were selected by simple random sampling. So total of 20 mohallas were elected randomly. Simple random sampling was used to select household.

2.3. Selection of subjects

2.3.1. Inclusion criteria

- Children between age group of 1 year–5 years of age.
- Children living in Lucknow district for 6 months or more. And their mother giving consent and willing to participate in this study.

2.3.2. Exclusion criteria

- Children who are uncooperative and their mothers not willing to participate in the study.
- Children living in Lucknow district for less than 6 months.
- Children who are having congenital anomaly.

2.4. Data collection and tool of investigation

Door to door survey was done for collection of necessary information. Informed consent were obtained prior administration of tool of investigation. A structured pre-tested preformed interview schedule was used to record the following information: socio-demographic characteristics: age of children, gender of children, religion, Socio-economic status (SES), Infant feeding practices: initiation of breastfeeding, feeding of colostrum, exclusive feeding, complementary feeding. Anthropometric parameters (weight and height) were obtained using standard procedure. The weight and height measurements were converted into three indices of nutritional status: weight-for-age, height-for-age, weight-for-height. These are interpreted by using the WHO Z-score classification system. Children were graded as underweight (weight for age Z score of -2 SD) and severe underweight (weight for age Z score -3 SD). Similarly children were graded as stunted (height for age Z score -2), severely stunted (height for age Z score -3), wasted (weight for height Z score -2) and severely wasted (weight for height Z score -3). Socio-economic status has been calculated using Revised Modified BG Prasad Socio-economic classification 2017.

2.5. Statistical analysis

Data was analysed using software M S Office excel and SPSS 17 for windows. Descriptive statistical analysis, which included frequency, percentages was used to characterise the data. The following statistics were calculated in present analysis Chi-square test: categorical (discrete) data from the groups was compared by chi-square test. Statistical Significance: A two-tailed p value less than 0.05 ($p < 0.05$) was considered statistically significant.

2.6. Observations and results

As depicted in Table 1, total of 420 preschool children were studied. Of these 56% (235) children were males and 44% (185) females. 70% (294) children from urban area whereas 30% (126) from the rural area. According to standard age stratification as recommended by WHO, 30.4% (128) children were in age group 12–23 months, 18.5% (78) in age group 24–35 months, 19.7% (83) in 36–47 months and 14.2% (60) in 48–60 months. 48.5% (204) families were Hindu and 50.9% (214) were Muslim by religion.

Table 2 shows the distribution of feeding practices of children. Total 71.7% children were breastfed (63.4% urban, 88.9% rural) while only 28.3% children were bottle fed. This difference was found to be highly significant i.e. < 0.001 . 67.6% children were breastfed within an hour. Colostrum was given to 61.9% children (66.3% urban, 51.3% rural). This difference was statistically significant. Only 52.4% were exclusively breastfed which was highly significant. Total 60.5% were exclusively breastfed for 6 months and only 79.5% were continued their breast-feeding till 2 years of age. Some children (7.1%) continued breastfeed for more than 2 yrs. 86% children had started complementary feed on time.

Table 3 shows the nutritional status of children which depicts stunting is more common form of malnutrition in both rural and urban area. 66.9% children are normal for weight for age, 19.1% are moderately underweight 9.3% are severely underweight. 3.3% children are overweight and 1.4% are obese. 51.2% children have normal height for age while only 28.8% are moderately stunted and 20% are severely stunted. 75.6% children have normal weight for height and 20% children are moderately wasted and 2.6% children are severely wasted while only 1.4% children have weight for height $+2$ SD.

Table 4 depicts nutritional status of urban children was better than their rural counterparts. 29.4% of rural children were underweight whereas only 27.9% urban children were underweight. Wasting was present in 23.5% of urban children and 19.8% of rural children. Malnutrition was more common in Joint family. 35%, 52% and 27% children from joint family were found to be underweight, stunted and wasted respectively but difference was not found significant. Muslim children have poor nutritional status as compared to other religion.

Table 1
Distribution of children according to Demographic Profile.

Variable	Urban (N = 294)		Rural (N = 126)		Total (N = 420)	
	No.	%	No.	%	No.	%
Age						
12–23 month	91	31.0	37	29.3	128	30.4
24–35 month	55	18.7	23	18.3	78	18.5
36–47 month	57	19.4	26	20.6	83	19.7
48–60 month	91	30.9	40	31.7	131	31.1
Gender						
Male	166	56.5	69	54.8	235	56.0
Female	128	43.5	57	45.2	185	44.0
Religion						
Hindu	115	52.7	89	70.6	204	48.5
Muslim	177	60.2	37	29.4	214	50.9
Christian	1	0.3	0	0.0	1	0.2
Others	1	0.3	0	0.0	1	0.2

Table 2
Distribution of children according to breast feeding practices.

Variable	Urban (N = 294)		Rural (N = 126)		Total (N = 420)		chi sq	p- value
	No.	%	No.	%	No.	%		
Type of feeding								
Breastfeed	189	64.3	112	88.9	301	71.7	26.29	<0.001
Bottle feed	105	35.7	14	11.1	119	28.3		
Initiation of breastfeed								
Within an hour of birth	199	67.7	85	67.5	284	67.6	0.002	0.964
Later	95	32.3	41	32.5	136	32.4		
Colostrum Given								
Yes	195	66.3	65	51.6	260	61.9	8.125	0.004
No	99	33.7	61	48.4	160	38.1		
Type of Breastfeed								
Exclusive	125	42.5	95	75.4	220	52.4	45.38	<0.001
Non-exclusive	169	57.5	31	24.6	200	47.6		
Duration of EBF								
<6 months	85	28.9	25	19.8	110	26.2	1.115	0.774
≥6 months	187	63.6	89	70.6	276	65.7		
Don't know	22	7.5	12	9.5	34	8.1		
Breastfeed continued till								
<2 year	40	13.6	16	12.7	56	13.4	4.08	0.252
2 years	234	79.6	100	79.4	334	79.5		
>2 years	20	6.8	10	7.9	30	7.1		
Starting age of complementary feed								
<6 months	64	21.8	29	23.0	93	22.1	0.144	0.986
6 months	190	64.6	79	62.7	269	64.0		

Table 3
Distribution of children according to Nutritional Status.

Variable	Urban (N = 294)		Rural (N = 126)		Total (N = 420)	
	No.	%	No.	%	No.	%
Weight for age(Z score)						
Normal (-2SD to +2SD)	198	67.3	83	65.9	281	66.9
Moderate underweight (-2SD to -3SD)	56	19.05	24	19.05	80	19.1
Severe underweight (<-3SD)	26	8.8	13	10.3	39	9.3
Overweight (+2SD to +3SD)	10	3.4	4	3.18	14	3.3
Obese (>+3SD)	4	1.4	2	1.6	6	1.4
Height for age (Z score)						
Normal (-2SD to +3SD)	154	52.4	61	48.4	215	51.2
Moderate stunting (-2SD to -3SD)	82	27.9	39	31.0	121	28.8
Severe stunting (<-3SD)	58	19.7	26	20.6	84	20.0
Weight for height (Z score)						
Normal (-2SD to +2SD)	221	75.17	98	77.7	319	75.6
Moderate wasting (-2SD to -3SD)	63	21.4	21	16.6	84	20.0
Severe wasting (<-3SD)	6	2.04	5	3.9	11	2.6
Obesity (>+2SD)	4	1.4	2	1.6	6	1.4

Social class has direct relation with nutritional status especially for underweight and wasting, as the social class increased nutritional status improved. The difference was found to be highly significant for wasting ($p < 0.001$).

Table 5 shows children who were bottle-fed found to more stunted than breastfed. Children who have started feeding after one hour of birth were found to be more stunted than children who were breastfed earlier. This difference is statistically highly significant ($p < 0.001$). Children who were not given colostrum were found to be significantly underweight and wasted. Children with non-exclusive breastfeeding were significantly underweight than who were exclusively breastfed. Children who completed their breastfeeding more than 2 years found to be less wasted than other group which was highly significant.

3. Discussion

In this study 66.9% children were normal for weight for age, 19.1% were moderately underweight 9.3% were severely underweight. 4.7%

Table 4
Association of Socio-demographic characteristics with malnutrition.

Variable	Underweight (119)		Stunting (205)		Wasting (95)	
	No.	%	No.	%	No.	%
Place of residence						
Urban (294)	82	27.9	140	47.6	69	23.5
Rural (126)	37	29.4	65	51.6	25	19.8
Chi-square	0.052		0.189		0.258	
P value	0.819		0.663		0.611	
Type of family						
Nuclear (229)	52	22.7	104	45.4	43	18.8
Joint (191)	67	35.1	101	52.8	52	27.2
Chi-Square	4.355		0.796		2.666	
P value	0.036		0.372		0.102	
Religion						
Hindu (204)	53	25.9	113	55.3	41	20.1
Muslim (214)	66	30.8	92	42.9	54	25.2
Christian (1)	0	0.0	0	0.0	0	0.0
Others (1)	0	0.0	0	0.0	0	0.0
Chi-square	1.246		3.180		1.446	
P value	0.742		0.364		0.694	
Socioeconomic Class						
II (7)	3	42.8	2	28.5	1	14.3
III (164)	43	26.2	94	57.3	34	20.7
IV (224)	56	25.0	93	41.5	42	18.7
V (25)	17	68.0	16	64.0	18	72.0
Chi-square	9.536		4.448		17.320	
P value	0.022		0.217		<0.001	

children had more than +2SD weight for age. 51.12% children had normal height for age while only 28.8% were moderately stunted and 20% were severely stunted. 75.6% children had normal weight for height and 20% children had weight for height between -2SD to -3SD and 2.6% children were severely wasted while only 1.4% children had weight for height +2SD. In the similar study conducted by Nigatu G et al (2018)¹⁰ in Ethiopia it was found that the prevalence of underweight, stunting, and wasting were 126 (19.5%), 236 (36.5%), and 52 (8%), respectively. The proportion of severe and moderate underweight children was 53 (8.2%) and 73 (11.3%), respectively. Underweight was higher (76.9%) among rural dwellers than among urban residents (23.1%). Similarly in our study severe underweight, stunting and wasting were higher in rural area than urban area. As per NFHS-4 in India 35.7% children below 5 years are underweight which is quite

Table 5
Association of feeding practices with nutritional status of children.

Variable	Underweight (119)		Stunting (205)		Wasting (95)	
	No.	%	No.	%	No.	%
Feeding type						
Breastfeed (301)	93	30.8	132	43.8	67	22.2
Bottle feed (119)	26	21.8	73	61.3	28	23.5
Chi-square	1.983		13.18		0.049	
P value	0.159		<0.001		0.824	
Initiation of breastfeed						
Within an hour (284)	87	30.6	103	36.2	52	18.3
Later (136)	32	23.5	102	75.0	43	31.6
Chi-square	1.303		18.61		5.670	
P value	0.253		<0.001		0.017	
Colostrum given						
Yes (260)	46	17.6	108	41.5	39	15.0
No (160)	73	45.6	97	60.6	56	35.0
Chi-square	20.42		4.83		13.834	
P value	<0.001		0.027		<0.001	
Type of breast feed						
Exclusive (220)	40	18.1	94	42.7	42	19.1
Non-exclusive (200)	79	39.5	111	55.5	53	26.5
Chi-square	13.080		2.34		2.06	
P value	<0.001		0.125		0.150	
Duration of exclusively breastfeed						
<6 months (110)	35	31.8	60	54.2	37	33.6
≥ 6 months (276)	77	27.8	134	48.5	53	19.2
Don't know (34)	7	20.5	11	32.3	5	14.7
Chi-square	6.633		3.790		6.035	
P value	0.036		0.150		0.048	
Breast feeding continued till						
< 2 years (56)	21	37.5	33	58.9	28	50.0
2 years (334)	92	27.5	158	47.3	56	16.7
>2 years (30)	6	20.0	14	46.6	11	36.6
Chi-square	1.124		0.607		18.621	
P value	0.570		0.738		<0.001	

higher than our study showing Lucknow children nutritional status is better than the other cities. Percentage of wasting was close to the NFHS-4 data which is 22%. Nutritional status of urban children was better than their rural counterparts. But there was no significant association of area of residence on the nutritional status of children; though the various studies have shown the similar findings like Yadav SS *et al* (2016)¹¹ and Senbanjo IO *et al* (2016)¹² and NFHS-4 (2015–16). In our study it was observed that malnutrition was more common in Joint family than the nuclear family. Type of family is significantly associated with weight for age of preschool children. Study done by Khanna P *et al* (2017)¹³ also favours that the lesser the number of children in a household, the better is the nutritional status of under-five children. Poverty is a strong underlying determinants that leads to household food insecurity, poor child care, maternal undernutrition, unhealthy environments and poor health care. Strong association was observed especially for underweight and wasting (<0.001), as the social class increased nutritional status improved. Ansuya *et al* (2018)¹⁴ in their study also found that children from low socio-economic family have 2 times more odd of developing malnutrition which was statistically significant. Infant-feeding practices constitute a major component of child caring practices apart from socio-cultural, economic and demographic factors. Somehow, these practices constitute one of the most neglected determinants of young child malnutrition in spite of their important role in growth pattern of children. In our study children who were bottle fed found to more stunted than breastfed children. Children who have started feeding after one hour of birth were found to be more stunted than children who were breastfed earlier. This difference is statistically highly significant ($p < 0.001$). Children who were not given colostrum were found to be significantly underweight and wasted. Children with non-exclusive breastfeeding were significantly underweight than who were exclusively breastfed. Children who completed their breastfeeding more than 2 years found to be less wasted than other group which was highly significant. Similar finding was found by Tette *et al* (2016),¹⁵

Gadappa SM *et al* (2016)¹⁶, Ole Tankoi *et al* (2016)¹⁷ and Kumar D *et al* (2006)¹⁸ which found statistical significant difference in breast feeding initiation, complementary feeding and age, frequency of feeding, feeding method, length of exclusive breast feeding.

4. Conclusion

The present study revealed that most common form of malnutrition was stunting followed by underweight and wasting. Nutritional status of urban children were better than their rural counterparts. Malnutrition was seen maximum in age group 12–23 months than other groups which was highly significant (<0.001). Males were significantly underweight and wasted than females ($p < 0.001$) while females children were found to be more stunted than male children. Significant association was observed between type of family, overcrowding and socio-economic status with nutritional status of children. Statistically significant association was found between feeding practices and nutritional status of children. Children who were breastfed, initiated early feeding, given colostrum and breastfed for 2 years have better nutritional status than other groups. ($p < 0.001$).

4.1. Limitations

As the study was cross-sectional in design, so it could not establish clear cut causal relationship. There was relatively small sample size, which is not true representation of whole district. Respondent might not have told real information about their socioeconomic status and habits. This could have brought some differences in association of variables.

Source(s) of support

Nil.

Conflicting interest (if present, give more details)

Nil.

Contribution details (to be ticked marked as applicable)

Sumaiya Ahmad: Concepts, Design, Definition of intellectual content, Literature search, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing, Manuscript review. Sudhanshu Mishra: Design, Definition of intellectual content, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review.

Declaration of competing interest

No conflict of interest.

References

- 1 Park K. *Textbook of Preventive and Social Medicine*. 23th edition. Jabalpur: Banarasidas Bhanot Publishers; 2015:651.
- 2 World Health Organization. *Global Strategy on Infant and Young Child Feeding*. Geneva, Switzerland: World Health Organization; 2003.
- 3 WHO/UNICEF/USAID/AED/UCDAVIS/IFPRI. *Indicators for Assessing Infant and Young Child Feeding Practices: Part- 1: Definition: Conclusions of a Consensus Meeting Held 6-8 November 2007*. Washington DC, USA. Geneva, Switzerland: World Health Organization; 2008:4–11.
- 4 Horta BL, Bahl R, Martines JC, Victora CG. *Evidence on the Long-Term Effects of Breastfeeding: Systematic Reviews and Meta-Analyses*. Geneva: WHO; 2007:52. Google Scholar.
- 5 van Rossum CTM, Büchner FL, Hoekstra J. Quantification of Health Effects of Breastfeeding - Review of the Literature and Model Simulation. RIVM Report 350040001. Access date 12 Apr 2019.
- 6 WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. *Lancet*. 2000;355: 451–455 [PubMed] [Google Scholar].

- 7 Scherbaum V, Srour ML. The role of breastfeeding in the prevention of childhood malnutrition [PubMed] [Google Scholar] *World Rev Nutr Diet.* 2016;115:82–97.
- 8 UNICEF. The role of breastfeeding in the prevention of childhood malnutrition. *World Rev Nutr Diet.* December 2007;115:82–97 [PubMed] [Google Scholar].
- 9 Jawed IH, Al jabory KHH, Baey HA. Assessment of nutritional status among children less than 5 years old in hilla city. *International Journal of Scientific and Research Publications.* 2016;6(8):276–280.
- 10 Nigatu G, Assefa Woreta S, Akalu T, Yenit M. Prevalence and associated factors of underweight among children 6–59 months of age in Takusa district, Northwest Ethiopia. *Int J Equity Health.* 2018;17:106.
- 11 Yadav SS, Mishra P, Mittal A, Kumar RS. An epidemiological study of malnutrition among under five children of rural and urban Haryana. *J Clin Diagn Res.* 2016;10(2), 07-10.
- 12 Senbanjo IO, Olayiwola IO, Afolabi WA. Dietary practices and nutritional status of under-five children in rural and urban communities of Lagos State, Nigeria. *Niger Med J.* 2016;57:307–313.
- 13 Khanna P, Kaur R, Singh T, Miller J, Sandhu Ak, Jyoti. Prevalence and socio demographic determinant of malnutrition in rural communities of district Fatehgarh Sahib, Punjab. *Curr. Res. Nutr Food Sci Jour.* 2017;5(3):374–382.
- 14 Ansuya, Nayak B, Unnikrishnan B, George A, N S, Mundkur S. Risk factors for malnutrition among preschool children in rural Karnataka: a case-control study. *BMC Publ Health.* 2018;1, 283-10.
- 15 Tette EMA, Sifah EK, Tete-Donkor P, Nuro-Ameyaw P, Nartey ET. Feeding practices and malnutrition at the Princess Marie Louise Children’s hospital, Accra: what has changed after 80 years. *BMC Nutrition.* 2016;2:42.
- 16 Gadappa SM, Behera MK. Nutritional status and feeding practices in relation to IYCN policy among children under 2 Years of age in Tertiary care Centre. *International journal of contemporary medical research.* 2016;3:1649–1651.
- 17 Ole Tankoi EO, Asito SA, Adoka S. Determinants of malnutrition among children aged 6-59 Months in Trans-Mara East Sub-County, Narok county, Kenya. *Int J Publ Health Sci.* 2016;1:116.
- 18 Kumar Dinesh, Goel NK, Mittal Poonam C, Misra Purnima. Influence of infant-feeding practices on nutritional status of under-five children. *Indian J Pediatr.* 2006; 73(5):417–421.