Original Research Article

An Assessment Of Nutritional Status And Feeding Practices Among Children (Under 2years) In A Slum Of Kolkata

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ABSTRACT

Background: The period from birth to two years of age is very important for optimal growth and development of children. Poor child feeding patterns can lead to malnutrition which is a major public health problem in India. This study assessed the feeding practices and the nutritional status of children below 2 years in a slum of Kolkata.
Methods: The study was cross-sectional community based in nature. All children less than 2 years in a slum were line listed out of which the required number of children (i.e. minimum sample size-91) were selected by simple random sampling. Child feeding patterns were assessed by Infant and Young Child Feeding indicators and the magnitude of malnutrition was estimated by using WHO Z-score system and composite index of anthropometric failure (CIAF).
Results: Out of 91 children, 43 (47.25%) were suffering from under-nutrition according to CIAF. Complementary feeding practices were not satisfactory. Multivariate logistic regression model showed that high birth order, low birth weight, low per capita income and low education level of mother were significantly associated with CIAF.
Conclusion: The findings demonstrate the need to reinforce age- appropriate IYCF practices to address child malnutrition. Special attention is needed to improve the complementary feeding practices for children 6-23 months of age, while sustaining a focus on EBF among children under 6 months age. The study also reinforces the importance of appropriate maternal care, and family planning services in prevention of under-nutrition.

Key words: IYCF, CIAF, Multivariate logistic regression

INTRODUCTION

The nutritional wellbeing of a population is both an outcome and an indicator of national development. Every year about 10 million of under-five children die worldwide among which 2.4 million were from India. [1] Malnutrition directly and indirectly contributes to 67% of child death in India. [2]

Infant and young child feeding practices directly affect the nutritional status of children under two years of age and,

ultimately, impact child survival. Improving infant and young child feeding practices in children 0 - 23.9 months of age is therefore critical to improved nutrition, health and development of children.

World Health organization (WHO) has recommended exclusive breastfeeding (BF) for the first six months, addition of nutritionally adequate, age-appropriate complementary feeding (CF) at 6 months with continued BF till at least 2 years. These feeding practices, if followed appropriately can decrease Infant Mortality by 19% and can prevent malnutrition especially in developing countries as ours. [3]

A meta analysis on nutritional problems of slum children revealed serious erosion of breastfeeding practices in urban slums of three major cities (Mumbai, Kolkata, and Chennai). Also it was found that the introduction of complementary foods is markedly delayed and the foods lack the consistency, energy density and are fed in inadequate amounts and in unhygienic ways. [4]

With this background, this study has been conducted among the children under 2years in a slum of Kolkata.

Objectives
1. To assess the feeding practices of children below 2years.
2. To assess the nutritional status of the study population by different anthropometric measures.
3. To find out the different contextual factors of nutritional status of the study population.

MATERIALS AND METHODS
- **Study type-** An observational cross sectional community based study.
- **Study period-** 3 months. (May 2014-July 2014)
- **Study area-** The study was conducted in a slum, Chetla, under the urban field practice area of All India Institute of Hygiene and Public Health, Kolkata.
- Study population-All children under 2years age in that slum.
- ❖ *Inclusion criteria-*
- All children less than 2 years age. (i.e. age group 0-23.9 months)
- ❖ *Exclusion criteria-*
- Currently ill children
- Children whose parents are unwilling
- Children in the absence of their caregiver during data collection.
- **Sample size:**
  Considering prevalence of underweight (under 3yrs of age) in West Bengal as 37.6% (NFHS 3 data) and allowable absolute error (precision) of 10%, the minimum required sample size was 91 by applying the formula - $3.84*.p*.q/L^2$
- **Sampling Design:**
  All children less than 2 years in Chetla slum were line listed out of which the required number of children (i.e. 91) were selected by simple random sampling.
- **Study Tool-**
  1. Predesigned and pretested semi structured schedule.
  2. Health records (e.g.-immunisation cards)
- For anthropometric measurements-
3. Standard weighing machine
4. non-stretchable tape
5. Infantometer
6. WHO growth charts

The schedule was adopted from the standard validated questionnaire framed by **WHO (GENERIC Feeding QUESTIONNAIRE Children 0-23**

months). It was further modified according to the objectives of the study.

This schedule was judged by the experts of the department where necessary corrections were made to enhance the face validity and content validity. Then translation into Bengali was done. Pretesting of the schedule was done by administering the questions to a small number of representative samples. Necessary modifications were made following their response.

Data were collected by a predesigned and pretested schedule after obtaining informed consent from mothers of the under-2years children. All the information was collected by interviewing the mother or other responsible caregivers at home. All feeding practices for children were elicited using 24 hour recall method. Historic recall was used for initiation of breast feeding and exclusive breastfeeding up to 6months. Feeding practices were assessed using eight core and optional feeding practice indicators developed by the World Health Organization (WHO) for assessing the adequacy of infant and young child feeding (IYCF) practices.

IYCF INDICATORS:

CORE INDICATORS:

1. **Early initiation of breastfeeding**- Proportion of children born in the last 23.9 months who were put to the breast within one hour of birth.
2. **Exclusive breastfeeding under 6 months-** Proportion of infants 0-5.9 months of age who are fed exclusively with breast milk.
3. **Continued breastfeeding at 1 year-** Proportion of children 12 – 15.9 months of age who are fed breast milk.
4. **Introduction of solid, semi-solid or soft foods**- Proportion of infants 6-

8.9 months of age who receive solid, semi-solid or soft foods.

5. **Minimum dietary diversity-** Proportion of children 6-23.9 months of age who receive foods from 4 or more food groups*
6. **Minimum meal frequency-** Proportion of breastfed and non-breastfed children 6-23.9 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non breastfed children) the minimum number of times or more **
7. **Minimum acceptable diet-** Proportion of children 6-23.9 months of age who receive a minimum acceptable diet (apart from breast milk).***
8. **Consumption of iron-rich or iron-fortified foods-** Proportion of children 6-23.9 months of age who receive an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified in the home.

*Note 1 : The 7 foods groups used for tabulation of MDD are:

- grains, roots and tubers
- legumes and nuts
- dairy products (milk, yogurt, cheese)
- flesh foods (meat, fish, poultry and liver/organ meats)
- eggs
- vitamin-A rich fruits and vegetables
  other fruits and vegetables

** Note 2: For calculation of MMF indicator "Minimum" is defined as introduction of solid, semisolid or soft foods-

- 2 times for breastfed infants 6-8.9 months
- 3 times for breastfed children 9 - 23.9 months
- 4 times for non-breastfed children 6-23.9 months

*** Note 3-Minimum acceptable diet indicator is calculated by two parts-
Breastfed children 6-23.9 months of age who had at least the minimum dietary diversity and
the minimum meal frequency during the previous day /Breastfed children 6-23.9months of age
and
Non-breastfed children 6-23.9 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity and the minimum meal frequency during the previous day/ Non-breastfed children 6-23.9 months of age.

OPTIONAL INDICATORS:
1. Children ever breastfed- Proportion of children born in the last 23.9 months who were ever breast fed.
2. Continued breastfeeding at 2 years- Proportion of children 20 – 23.9 months of age who are fed breast milk.
3. Age-appropriate breastfeeding- Proportion of children 0-23.9 months of age who are appropriately breastfed.*
4. Predominant breastfeeding under 6 months- Proportion of infants 0 – 5.9 months of age who are predominantly breastfed.
5. Duration of breastfeeding- Median duration of breastfeeding among children 0-35.9 months of Age
6. Bottle feeding- Proportion of children 0-23.9 months of age who are fed with a bottle.

7. Milk feeding frequency for non-breastfed children- Proportion of non-breastfed children 6-23.9 months of age who receive at least 2 milk feedings.

*Note- Age appropriate Breast Feeding was calculated by two parts-
Infants 0-5.9 months of age who received only breast milk during the previous day / Infants 0-5.9 months of age
And
Children 6-23.9 months of age who received breast milk, as well as solid, semi-solid or soft foods, during the previous day / Children 6-23.9 months of age

- Anthropometric measurements following standard operating procedures were taken to determine nutritional status of the child. Weight was measured using a standard weighing scale. Height was measured using a non-stretchable tape fixed to a vertical wall, with the participant standing on a firm/level surface and it was measured to the nearest 0.1 cm. recumbent length was measured by using an infantometer. Each measurement was done twice, and the mean of the two readings was recorded.
- **Definitions Used-**
- **Wasting** (acute malnutrition) is defined as a Weight for Height Z-score (WHZ) of < -2. Severe wasting is considered if WHZ is < -3
- **Stunting** (chronic malnutrition) is defined as a Height for Age Z-score (HAZ) of < -2. Severe stunting is considered if HAZ is < -3.
- **Underweight** (mixed acute and chronic malnutrition) is defined as Weight for Age Z-score (WAZ) of

<-2. Severe underweight is considered if WAZ is < -3.

- **Composite Index of Anthropometric Failure (CIAF**): Peter Svedberg developed a model of six groups of children (A to F) to calculate Composite Index of Anthropometric Failure (CIAF). Nandi et al [5] later modified the Svedberg's model by identifying an additional subgroup (Group Y: children who are only underweight).

The CIAF excludes those children not in anthropometric failure (group A) and includes all children who are wasted, stunted, or underweight, and their combinations (groups B–Y). It therefore provides a single measure with which the overall prevalence of under-nutrition can be estimate.

Composite Index Anthropometric Failure

Group A- No failure
Group B-Wasting only
Group C- Wasting and underweight
Group D- Wasting, stunting & underweight
Group E- Stunting & underweight
Group F- Stunting only
Group Y- Underweight only

Ethical issues:

Participants were made aware about the nature and purpose of the research study. They were informed that data obtained from them will be kept confidential and will be used only for research or academic purpose. Informed verbal consent was taken from them.

Statistical Analysis

Data were analysed using SPSS (version20). Firstly, a bivariate analysis was done to ascertain the relationship of under-nutrition assessed by CIAF with the socioeconomic and demographic variables. Only those found to be significant were entered into a multiple logistic model. The association between CIAF and IYCF indicators was assessed by bivariate logistic regression analysis.

RESULT

Mean age (SD) of the sample population was 9.99 (5.55) months. Majority of the sample population were girls (54.9). 24.2 % of the sample population had low birth weight. Mean birth weight (SD) was 2.54kg (0.25). (Table 1)

Table1. Distribution of the study population according to the demographic characteristics (n=91)

Variables		Frequency	Percentage (%)
Age (in completed months)	0-5.9	19	20.9
	6-8.9	26	28.5
	9-11.9	17	18.7
	12-15.9	8	8.8
	16-19.9	16	17.6
	20-23.9	5	5.5
Sex	Boy	41	45.1
	Girl	50	54.9
Religion	Hindu	79	86.8
	Muslim	12	13.2
Birth order	1	50	54.9
	2	26	28.6
	>=3	15	16.5
Birth Weight	<2.5	22	24.2
	>=2.5	69	75.8

Mean age of the caregiver was 23.26 years with a SD of 4.19. Majority (60.5%) of the caregiver had education level above middle while 12.1% were illiterate. Majority (97.8%) of the caregiver were home makers. Mean per capita income was Rs 1265.9 (SD-483.02) and highest number (70.3%) of the respondents belonged to Socioeconomic class4 (Modified BG Prasad Scale 2014) (Table 2)

Exclusive breast feeding up to 6months among the sample population was 76.92 %. Among the total 91 children aged less than two years, 67.0% had started breast feeding within 1 hour after birth. 78.9 % of children under 6months were found to be exclusively breast fed. Continued breast feeding at 1 year was found to be 100 %. Minimum dietary diversity (MDD), Minimum meal frequency (MMF) and Minimum acceptable diet (MAD) were found adequate in 62.5 % , 59.7 % and 44.4 % children of 6-23 months age respectively . (Table 3)

Table2. Distribution of the caregiver according to the demographic & socioeconomic characteristics (n=91):

Variables		Frequency	Percentage (%)
Age (In completed years)	18-22	47	51.6
	23-27	29	31.9
	28-31	12	13.2
	32-36	3	3.3
Education level	Illiterate	11	12.1
	Primary (1-4)	4	4.3
	Middle(5-8)	21	23.1
	Secondary(9-10)	32	35.2
	Higher secondary(11-12)	21	23.1
	Graduate & above	2	2.2
Occupation	Housewife	89	97.8
	Unskilled labour	1	1.1
	Shop owner	1	1.1
Family Type	Nuclear	35	38.5
	Joint	56	61.5
Socio Economic Class (Modified BG Prasad Scale 2014)	1 (PCI>=5571)	0	0.0
	2 (PCI 2786-5570)	1	1.1
	3 (PCI 1671-2785)	8	8.8
	4 (PCI 836-1670)	64	70.3
	5 (PCI<836)	18	19.8

3. Assessment of IYCF indicators

Table3.1: core indicators

Core Indicators		Frequency	Percentage (%)
.1. Early initiation of breastfeeding (n=91)	Within 1 hour	61	67.0
	After 1 hour	30	33.0
2.Exclusive breast feeding under 6 months (n=19)	Yes	15	78.9
	No	4	21.1
3.Continued breastfeeding at 1 year (n=8)	Yes	8	100.0
	No	0	0.0
4.Introduction of solid,semisolid or soft food (n=26)	Yes	20	76.9
	No	6	23.1
5.Minimum dietary diversity (n=72)	Adequate	45	62.5
	Inadequate	27	37.5
6.Minimum meal frequency (n=72)	Adequate	43	59.7
	Inadequate	29	40.3
7.Minimum acceptable diet (n=72)	Adequate	32	44.4
	Inadequate	40	55.6
8.Consumption of iron rich or iron fortified food (n=72)	Adequate	15	20.8
	Inadequate	57	79.2

Optional indicators

OPTIONAL INDICATORS		FREQUENCY	PERCENTAGE (%)
1.Children ever breastfed (n=91)	Yes	91	100.0
	No	0	0.0
2.Continued breastfeeding at 2 years (n=5)	Yes	4	80.0
	No	1	20.0
3.Predominant breastfeeding under 6 months (n=19)	yes	12	63.2
	No	7	36.8
4.Bottle feeding (n=91)	Yes	15	16.5
	No	76	83.5
5.Age appropriate breast feeding (0-5.9mths) (n=19)	Yes	15	78.9
	No	4	21.1
Age appropriate breast feeding(6-23.9mths) (n=72)	Yes	64	88.9
	No	8	11.1

36.6 % of boys were moderately underweight and 12.2% were severely underweight. Prevalence of being underweight was higher among boys than girls. Prevalence of stunting was also higher among boys (29.3%) than girls (26.0%).

Prevalence of moderate wasting and severe wasting among boys were 19.5% and 7.3% respectively. Prevalence of wasting was lower among girls (moderate wasting-8.0% and severe wasting-2.0%). (Table 4.)

Table 4.1: distribution of study population according to weight for age, height for age, weight for height (n=91)

	Sex	Normal (Z score ->-2 to <2) n (%)	Moderate (Z score --2 to-3) n (%)	Severe (Z score <-3) n (%)	Total n (%)
Wasting ((WHZ)	Male	30 (73.2)	8 (19.5)	3 (7.3)	41 (100.0)
	Female	45 (90.0)	4 (8.0)	1(2.0)	50 (100.0)
	Total	75 (82.4)	12 (13.2)	4 (4.4)	91 (100.0)
Stunting ((HAZ)	Male	29 (70.7)	7 (17.1)	5 (12.2)	41 (100.0)
	Female	37 (74.0)	10 (20.0)	3 (6.0)	50 (100.0)
	Total	66 (72.5)	17 (18.7)	8 (8.8)	91 (100.0)
Underweight (WAZ)	Male	21 (51.2)	15 (36.6)	5 (12.2)	41 (100.0)
	Female	35 (70.0)	13 (26.0)	2 (4.0)	50 (100.0)
	Total	54 (61.5)	30 (30.8)	7 (7.7)	91 (100.0)

47.3% of the study population had Composite Index Anthropometric Failure (CIAF) while 52.7% were normal. (Table 4.2)

Table 5 showed the association and its strength of factors which were significantly associated with under-nutrition assessed by CIAF. In the bivariate analysis, the significant factors associated with increased risk of under- nutrition were - age of the children, low education level of mother, low birth weight of the baby, low per capita income and higher birth order. The variables already found significant in bivariate analysis were entered into a Multivariate Logistic model. Strength of association of variables age of the children, birth weight and birth order were increased,

when controlling for the other variables in the multivariate analysis.

Table 6 showed the association between CIAF and IYCF indicators. Bivariate analysis showed significant association between CIAF and exclusive breast feeding, minimum dietary diversity, minimum meal frequency, consumption of iron rich or iron fortified foods and bottle feeding.

Table4.2: Distribution of study population according to CIAF: (n=91)

CIAF	Frequency	Percentage
A=no failure	48	52.7
B=Wasting only	2	2.2
C=Wasting and underweight	11	12.1
D=Wasting stunting and underweight	3	3.3
E=stunting and underweight	16	17.6
F=Stunting only	6	6.6
Y=Underweight only	5	5.5
Total	91	100.0

Table5: Bivariate and Multivariate logistic regression model of demographic and socioeconomic factors with under-nutrition assessed by composite index of anthropometric failure (CIAF) :(n=91)

C0-VARIATES		CIAF No (%)	OR (CI)	AOR (CI)
AGE	>9MONTHS	25(65.8)	3.74 (1.55-9.00)	4.57(1.6-13.04)
	<=9MONTHS (MEDIAN)	18(34.0)	1	1
PCI	<=1200 (MEDIAN)	26(63.4)	3.36 (1.41-7.98)	2.75(0.9-8.15)
	>1200	17(34.0)	1	1
BIRTH ORDER	>=3RD	11(73.3)	3.78 (1.1-12.9)	4.45 (1.03-19.18)
	1ST &2ND	32(42.1)	1	1
MOTHER'S EDUCATION	<=SECONDARY	37(54.4)	3.38 (1.18-9.62)	2.19 (0.59-8.08)
	>SECONDARY	6(26.1%)	1	1
BIRTH WEIGHT	<2.5	16(72.7)	4.14 (1.44-11.92)	6.28 (1.8-21.9)
	>=2.5KG	27(39.1)	1	1

Table 6: Association between IYCF indicators and CIAF (n=91)

IYCF Indicators		CIAF no (%)	OR (CI)
Exclusive Breast Feeding (0-23.9 months) n=91	No	19 (76.0)	5.55 (1.95-16.67)
	yes	24 (36.4)	1
Minimum Dietary Diversity (n=72)	no	19 (70.4)	2.94 (1.07-8.18)
	yes	20 (44.4)	1
Minimum Meal Frequency (n=72)	no	21 (72.4)	3.64 (1.32-10.1)
	yes	18 (41.9)	1
Consumption of iron rich or iron fortified foods(n=72)	no	36 (63.2)	6.85 (1.72-25.0)
	yes	3 (20.0)	1
Bottle feeding (n=91)	yes	11(73.3)	3.78 (1.1-12.9)
	no	32(42.1)	1

DISCUSSION

In this study early initiation of breast feeding under 6 months was 67.0% which was more than NFHS-3 data (23.4%-National level and 23.7% in West Bengal) [5,7] and a study in an Urban Health centre in East Delhi (37.1%), [8] a slum in Bakura district(39.6%), [9] in a slum of Gujarat (38.1%). [10] However, a study in rural Karnataka has found this figure to be better than the present study (81%). [11]

78.9% of less than 6 months old children was found to be exclusively breast fed. This figure was much better than that reported by NFHS 3 data, at national level (46.4%) [5] and at state level (58.6%) [7] and also from other studies in Delhi (57%), [8] rural Bankura district (57.1%), [9] rural Karnataka (40%). [11] This may reflect the good service delivery by the field staff of UHC Chetla.

Among the infants of 6-8.9 months of age introduction of solid, semi-solid or soft foods was 76.9 % which was greater than NFHS 3 state level and national level data.(National level-55.8% & West Bengal-55.9%) . [5,7]

Continued breast feeding at 1 year was found to be 100% among children aged 12 to 15 months. This finding was same in a study in a rural area of Hooghly district in West Bengal. [12]

Minimum dietary diversity was found to be adequate in 62.5 % of children aged 6-23 months which was much lower than rural area of West Bengal (83.3%) [12] but higher than the NFHS 3 state level data(59%). [7] Minimum meal frequency was found to be adequate in 59.7 % of children. It was more than the finding of study in Delhi (48.6%) [8] and less than that of NFHS 3 West Bengal (87.5%). [7] 44.4% of children had minimum acceptable diet which was much higher than NFHS 3 data in West Bengal (29%) [7] and in Delhi (19.7%). [8]

Consumption of iron rich or iron fortified food was adequate in only 20.8 % children of 6-23 months age. Green leafy vegetables were reported to be consumed by only 10.2% children of 6-23 months age. As

leafy vegetables are the good source of Iron, there is need to create awareness on the importance of including green leafy vegetable with lemon as one of the choices for CF especially in those families who are vegetarian. Very few children of 6-23 months age were reported to be receiving egg(20.83%), meat(5.6%) and fish(9.72%) i.e. non-veg food in the study. As many of the parents consider non-veg as heavy food item so they avoid it giving as CF even if the other family members consume it. As non-vegetarian foods are good source for meeting out the iron and also protein requirement of the children there is a need to overcome this misconception, and it should be promoted for at least those families who are Non-Vegetarian.

Bottle feeding was found in 16.5 % of children. This figure was lower than NFHS 3 state level data (19.7%). [7]

In this study, 17.6% of the sample was wasted and 38.5% were under-weight, when compared to 37.6% under-weight and 19.2% wasting in West Bengal (NFHS 3). [7] Stunting was present in 27.5%, while it was 29.6% in urban West Bengal according to NFHS 3. The prevalence of under-nutrition using composite Index of Anthropometric Failure (CIAF) was 47.3% which is much less than one observed in Hooghly District of West Bengal(73.1%), [13] in Bankura district of West Bengal (69.1%), [14] and in Purulia District of West Bengal (66.3%). [15]

The significant factors associated with increased risk of CIAF were - age of the children above 9 months, low education level of mother, low birth weight of the baby, low per capita income and higher birth order. Shit et al also observed similar findings regarding education level of mother and number of siblings in the family. [16]

Lack of exclusive breast feeding, minimum dietary diversity, minimum meal frequency, consumption of iron rich food and bottle feeding were found to be significant predictors of nutritional status of the children based on CIAF.

So there is a need to create awareness regarding proper complementary feeding practices of children with special emphasis for the age group of 6-8.9 months i.e. at the time of weaning when most of the parents remain unaware about the ideal frequency and consistency of solid, semisolid or soft foods to be given to their children.

Limitation of the study:

- Complementary feeding practices can be best depicted over a prolonged period of time. But this study was a cross sectional study.
- This study did not consider about the amount and consistency of complementary food.
- Small sample size.

CONCLUSION

Both breast feeding practices and complementary feeding practices were not satisfactory. Health education on child feeding must be given from time to time in easy language and by the field health staff who are very much acceptable by the general people. Messages on appropriate feeding practices should include importance of dietary diversity and minimum meal frequency. A longitudinal study should be conducted to effectively link feeding practices and individual growth patterns.

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