Infant- and Young Child-feeding Practices in Bankura District, West Bengal, India

Apurba Sinhababu, Dipta K. Mukhopadhyay, Tanmay K. Panja, Asit B. Saren, Nirmal K. Mandal, and Akhil B. Biswas

Department of Community Medicine, B.S. Medical College, Bankura 722 102, West Bengal, India

ABSTRACT

A community-based, cross-sectional descriptive study was conducted during June-July 2008 to assess the infant- and young child-feeding (IYCF) practices in Bankura district, West Bengal, India. In total, 647 children aged less than two years selected through revised 40-cluster sampling using the indicators of the Integrated Management of Neonatal and Childhood Illness (IMNCI) and World Health Organization. The proportions of infants with early initiation of breastfeeding (13.6%) and exclusive breastfeeding under six months (57.1%) and infants who received complementary feeding at the age of 6-8 months (55.7%) were low. Appropriate feeding as per the IMNCI protocol was significantly less among infants aged 6-11 months (15.2%) and children aged 12-23 months (8.7%) compared to infants aged less than six months (57.1%), which could be attributable to low frequency and amount of complementary feeding. The main problems revealed from the study were late initiation of breastfeeding, low rates of exclusive breastfeeding, and inappropriate complementary feeding practices.

Key words: Breastfeeding; Child-feeding practices; Cross-sectional studies; Descriptive studies; Exclusive breastfeeding; Infant-feeding practices; India

INTRODUCTION

Optimal infant- and young child-feeding (IYCF) practices are crucial for nutritional status, growth, development, health, and ultimately the survival of infants and young children (1-3). Worldwide, suboptimal breastfeeding still accounts for deaths of 1.4 million children aged less than five years (under-five mortality). The timely introduction of complementary feeding can prevent almost 6% of under-five mortality (4). It was estimated that, if 90% of infants are covered with a package of intervention to protect, promote, and support the optimal IYCF practices, almost one-fifth of overall under-five mortality can be averted (4). The poor complementary feeding practices mean that many children continue to be vulnerable to irreversible outcomes of stunting, poor cognitive development, and significantly increased risk of infectious diseases, such as diarrhoea and acute respiratory infection (3,5,6).

This has a tremendous impact in a developing country, like India, with a high burden of disease and low access to safe water and sanitation. Even in developed countries, recent studies have underscored the role of IYCF practices in reducing child mortality (7,8).

The World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life with early initiation and continuation of breastfeeding for two years or more together with nutritionally-adequate, safe, age-appropriate complementary feeding starting at six months (9). The WHO and United Nations Children Fund (UNICEF) have articulated a global strategy for infant- and young child-feeding. Based on these guiding principles, the Government of India, in collaboration with international agencies, has adopted the culturally-acceptable IYCF guidelines, which were incorporated in the Integrated Management of Neonatal and Childhood Illness (IMNCI) Programme (10).

The National Family Health Survey (NFHS-3) has provided useful national- and state-level information on the IYCF practices (11). Available data showed a gross inter-state variation. However, the NFHS was not designed to provide district-level
data. With this background, the present study was undertaken to assess the IYCF practices among children aged less than two years in Bankura district, West Bengal, as part of the “Multi-indicator survey on delivery and child-caring practices in Bankura district, West Bengal”.

**MATERIALS AND METHODS**

**Study setting, design, and sample**

A community-based, cross-sectional descriptive study was conducted in Bankura district of West Bengal among children aged less than two years during June-July 2008 using the two-stage revised 40-cluster sampling technique (12).

In absence of any previous study in the district, the lowest figure of all the IYCF indicators as reported in the NFHS-3 (i.e. 24.5% for early initiation of breastfeeding) was used for calculating the sample size. Considering 95% confidence level, 20% relative precision, and design effect 2, the yielded sample size was 616. It was rounded off to 640 for an equal subsample of 16 from each of 40 clusters (villages/urban wards).

In the first stage, 40 clusters (villages/urban wards) were selected based on the probability proportional to size. Each selected cluster was divided into four arbitrary quadrants. With a random start, consecutive households were visited in each quadrant to select four children aged less than two years to include a total of 16 children per cluster. All the eligible children in the last household of each quadrant were included even if the number exceeded four.

Trained interviewers collected information on age, sex, and feeding practices of the study children by interviewing mothers/other responsible caregivers at their home. All feeding practices for children were elicited using the 24-hour recall method, except for initiation of breastfeeding and prelacteal feeding, for which historic recall was used. Definitions formulated by the WHO for indicators of the IYCF practices were used (13). However, for computing appropriate feeding, the IMNCI guidelines were followed (10) (Table 1).

### Table 1. Age-specific ‘appropriate feeding’ as per the IMNCI guidelines

| Age-group (months) | Breastfed | Type of food                  | Frequency and amount          |
|--------------------|-----------|-------------------------------|------------------------------|
| 0-5                | Yes       | Only breastmilk               | 8 times or more per 24 hours |
| 6-11               | Yes       | Solid/semi-solid/soft food    | Minimum 1 katori* 3 times    |
|                    | No        | Solid/semi-solid/soft food    | Minimum 1 katori 5 times     |
| 12-23              | Irrespective of status | Solid/semi-solid/soft food    | Minimum 1.5 katori 5 times   |

*Katori=150 g; IMNCI=Integrated Management of Neonatal and Childhood Illness

**Analysis of data**

For consistency and inter-observer agreement, standardized proforma was used, and collected data were cross-checked and supervised. Analysis was done using the SPSS software (version 13.0), along with duplicate entry to check consistency of data. Simple proportions were calculated for each IYCF indicator. The differences in the feeding practices between sexes and age-groups, if any, were noted using chi-square test.

**Ethics**

The Institutional Ethics Committee of the B.S. Medical College, Bankura, approved the study.

**RESULTS**

In total, 3,318 households in 40 clusters were covered during the survey in Bankura district. The total number of people covered in the survey was 18,136; the average family size was 5.5±2.7. Children aged less than five and two years comprised 9.6% and 4.2% of the surveyed population respectively.

Although breastfeeding was universal, only 13.6% of the study children were put to the breast within one hour of birth. About 5% of the neonates (n=647) had to wait for at least 24 hours for first sips of breastmilk. The difference between age-groups in the proportion of children having early initiation of breastfeeding, although not significant, is shown in Table 2. Sex was not associated with early initiation of breastfeeding. The overall prevalence of prelacteal feeding was 26.7%, which showed a very little variation among age-groups or sexes. The major types of prelacteal feeds were sweetened water, animal-milk, especially goat’s milk, and honey.

As per 24-hour recall, 57.1% of the infants aged less than six months were exclusively breastfed. The exclusive breastfeeding rate dropped from 75.0% in infants aged less than two months to 48.7% at 2-3 months and 39.0% at 4-5 months of age. Similarly, the proportion of infants who were given only plain water, along with breastfeeding, decreased with age up to six months, and the overall prevalence was 14.3% at the age-group of 0-5 months (Table 3).

Conversely, the consumption of ‘other milk’ (formula milk and animal-milk), in addition to breast-
Table 2. Initial breastfeeding practices of study children according to age and sex

| Age (months) and sex | Total | Early initiation* | $\chi^2$ (p value) | Prelacteal feeding† | $\chi^2$ (p value) |
|----------------------|-------|-------------------|-------------------|-------------------|-------------------|
| 0-5                  |       |                   |                   |                   |                   |
| Male                 | 67    | 15 (22.4)         | 3.32 (0.068)      | 19 (28.4)         | 0.05 (0.817)     |
| Female               | 73    | 8 (11.0)          |                   | 22 (30.1)         |                   |
| Total                | 140   | 23 (16.4)*        | df=1              | 41 (29.3)         | † df=1           |
| 6-11                 |       |                   |                   |                   |                   |
| Male                 | 84    | 9 (10.7)          | 1.09 (0.297)      | 18 (21.4)         | 1.74 (0.187)     |
| Female               | 100   | 16 (16.0)         |                   | 30 (30.0)         |                   |
| Total                | 184   | 25 (13.6)*        | df=1              | 48 (26.1)         | † df=1           |
| 12-23                |       |                   |                   |                   |                   |
| Male                 | 150   | 19 (12.7)         | 0.02 (0.886)      | 42 (24.3)         | 0.58 (0.447)     |
| Female               | 173   | 21 (12.1)         |                   | 42 (24.3)         |                   |
| Total                | 323   | 40 (12.4)*        | df=1              | 84 (26.0)         | † df=1           |
| 0-23                 |       |                   |                   |                   |                   |
| Male                 | 301   | 43 (14.3)         | 0.22 (0.630)      | 79 (26.2)         | 0.07 (0.792)     |
| Female               | 346   | 45 (13.0)         |                   | 94 (27.2)         |                   |
| Total                | 647   | 88 (13.6)         | df=1              | 173 (26.7)        | df=1             |

* $\chi^2=1.36$, df=2, p=0.507; † $\chi^2=0.59$, df=2, p=0.7438; Figures in parentheses in Column 3 and 5 indicate percentages; df=Degree of freedom

Table 3. Current feeding status of study children by age

| Age (months) | Not breastfeeding | Exclusive breastfeeding | Breastfeeding and consuming | Total | Appropriate feeding |
|--------------|-------------------|-------------------------|-----------------------------|-------|--------------------|
|              |                   |                         | Plain water | Other milk | Complementary Feeding |       |                     |
| <2           | 1 (1.7)           | 45 (75.0)               | 10 (16.7)  | 4 (6.7)    | 0 (0.0)              | 60 (100) | 45 (75.0)          |
| 2-3          | 2 (5.1)           | 19 (48.7)               | 6 (15.4)   | 12 (30.8)  | 0 (0.0)              | 39 (100) | 19 (48.7)          |
| 4-5          | 3 (7.3)           | 16 (39.0)               | 4 (9.8)    | 14 (34.2)  | 4 (9.8)              | 41 (100) | 16 (39.0)          |
| 0-5          | 6 (4.3)           | 80 (57.1)               | 20 (14.3)  | 30 (21.4)  | 4 (2.9)              | 140(100) | 80 (57.1)          |
| 6-8          | 4 (3.8)           | 5 (4.7)                 | 0 (0.0)    | 38 (35.9)  | 59 (55.7)            | 106 (100) | 15 (14.2)          |
| 9-11         | 1 (1.3)           | 0 (0.0)                 | 0 (0.0)    | 4 (5.1)    | 73 (93.6)            | 78 (100) | 13 (16.7)          |
| 12-23        | 29 (8.9)          | 0 (0.0)                 | 0 (0.0)    | 7 (2.2)    | 287 (88.8)           | 323 (100) | 28 (8.7)           |

Figures in parentheses indicate percentages

feeding, was 6.7% in infants aged less than two months and increased to around 30% and more at 2-3 months onwards and declined sharply at 9-11 months of age (5.1%). The premature introduction of liquids other than breastmilk and soft/semi-solid food were found in 40.0% and 2.9% of the infants aged less than six months respectively (Table 3).

The continued breastfeeding rates at one year (12-15 months) and two years (20-23 months) were 97.9% and 88.6% respectively.

It was observed that 93.6% of all the breastfeeding infants aged less than six months were breastfed for eight times or more in the last 24 hours preceding the survey, the average number of feeds being 12.3 (±2.3). All the exclusively-breastfed infants aged 0-5 months received breastmilk eight times or more.

Fifty-nine (55.7%) infants aged 6-8 months were given semi-solid/solid food in addition to continued breastfeeding, and the proportion increased to 93.6% at the age of 9-11 months and declined thereafter (Table 3).

No infants aged less than two months used bottle-feeding. On the whole, 10.2% of the study children were bottle-fed.

In 0-5 months, adherence to ‘appropriate feeding’ was equal to exclusive breastfeeding, i.e. 57.1%. Table 2 shows that, in the age-group of 6-8 months and thereafter, huge disparity was observed between the proportion of children receiving complementary feeding and the proportion adhered to age-appropriate feeding as per the IMNCI guide-
lines. The overall proportion of appropriate feeding in children aged 0-23 months was 21.0%, with 15.2% at 6-11 months of age and 8.7% at 12-23 months of age (Table 4).

**DISCUSSION**

Early initiation of breastfeeding, exclusive breastfeeding for six months, and timely introduction of age-appropriate complementary feeding are the key interventions to achieve the Millennium Development Goal 1 and 4, which address child malnutrition component of the targets and mortality respectively (1,14).

The present study revealed that initiation of breastfeeding within one hour of birth was less common than the corresponding national (24.5%) and West Bengal (23.5%) figures of the NFHS 3 (11,15) and far short of the 10th plan target of 50% (16). A study in Ghana reported that 22% of all neonatal deaths could be prevented if all women could initiate breastfeeding within one hour of delivery (17). An epidemiological evidence of a causal association between early initiation of breastfeeding and infection-specific neonatal mortality has also been documented (18).

The use of prelacteal feeding was also far less compared to the corresponding NFHS 3 figures for India (57.2%) and West Bengal (47.8%). Similar figure was reported by Roy et al. (19). The corresponding figures were 8% in rural Bangladesh (3) and 71% in urban Bangladesh (20). Although this practice was prevalent across the cultures, there was an international consensus that providing other liquids in addition to breastmilk in the first six months of life was unnecessary and harmful (21).

Exclusive breastfeeding under six months (57.1%) in the present study was far short of the 10th plan target of 80% (16), although better than all-India average of 46.4% (11) and similar to West Bengal (58.6%) (15). The declining rate of exclusive breastfeeding with age was also reported in the NFHS 3 study (11,15) and could be attributed to supplementation with plain water in early months and milk other than breastmilk in later months. Similar findings were observed by Saha et al. in Bangladesh (3) and Hop et al. in Viet Nam (6) in longitudinal studies. Studies in India with historic recall noted that about one-fourth of study children received exclusive breastfeeding for six months (19,24). Explanations put forward for this in different studies include beliefs that breastmilk does not contain water, and breastmilk alone is insufficient (25,26). Several studies showed that partial breastfeeding was associated with increased risk of child morbidity and mortality (1,2,4). Even introduction of plain water was reported to interfere with breastfeeding (27). If the practice of giving plain water could be avoided, almost 15% increase in exclusive breastfeeding rate could be achieved. About one-fourth of study children who received liquids and solids, along with breastfeeding at 0-6 months of age, remained at risk for infectious diseases and undernutrition (2,4).

Because of associated exposure to pathogens and interference with successful breastfeeding, current recommendations strongly discouraged bottle-feeding (28). The proportion of bottle-feeding in the present study was comparable with results of a study by Wamani et al. (25) but less than that reported by Pandey et al. from rural West Bengal (29).

---

**Table 4. Age-specific appropriate feeding as per IMNCI protocol**

| Age (months) | Appropriate feeding as per IMNCI protocol | \( \chi^2 \) (p value) |
|-------------|------------------------------------------|------------------------|
|             | Yes | No | Total | \( \chi^2 \) (p value) | df=1 |
| 0-5         | 80 (57.1)* | 60 (42.9) | 140 | 0.86 | 0.353 |
| Male        | 41 (61.2) | 26 (38.8) | 67 | \n | df=1 |
| Female      | 39 (53.4) | 34 (46.6) | 73 | \n | df=1 |
| 6-11        | 28 (15.2)* | 156 (84.8) | 184 | 1.76 | 0.185 |
| Male        | 16 (19.0) | 68 (81.0) | 84 | \n | df=1 |
| Female      | 12 (12.0) | 88 (88.0) | 100 | \n | df=1 |
| 12-23       | 28 (8.7)* | 295 (91.3) | 323 | 0.63 | 0.428 |
| Male        | 15 (10.0) | 135 (90.0) | 150 | \n | df=1 |
| Female      | 13 (7.5) | 160 (92.5) | 173 | \n | df=1 |
| 0-23        | 136 (21.0) | 511 (79.0) | 647 | 2.85 | 0.091 |
| Male        | 72 (23.9) | 229 (76.1) | 301 | \n | df=1 |
| Female      | 64 (18.5) | 282 (81.5) | 346 | \n | df=1 |

*\( \chi^2 = 143.45; df=2; p<0.0001; \) Figures in parentheses in Column 2 and 3 indicate percentages; df=Degree of freedom; IMNCI=Integrated Management of Neonatal and Childhood Illness
Cousens et al. found that, when prolonged breastfeeding was accompanied with complementary solid foods, there was a reduction in clinical malnutrition (30). In the present study, the proportion of infants, aged 6-8 months, who received solid, semi-solid or soft food, in addition to breastmilk, was low (55.7%) when viewed against the 10th plan target of 75% (16) but slightly better compared to India (52.7%) and West Bengal (47.1%) (11,15). This low figure could be due to the increased use of ‘other types of milk’ till 6-8 months of age. It is worthwhile to note that the percentage of complementary feeding improved a lot at 9-11 months of age (93.6%). Saha et al. and Hop et al. have corroborated the findings (3,6). A wide variation in the proportion of children who received complementary feeding at 6-9 months of age was reported from two other studies done in India (71.7% in Kolkata and 38.7% in Allahabad) (19,24).

Studies in Malawi revealed that children who were given foods according to the time schedule recommended by the WHO were found to be well-nourished compared to children who received complementary feeding early (31). The current recommendations advocated the introduction of complementary food after six months of exclusive breastfeeding (9,28). A positive association was observed between the intake of complementary food and the nutritional status in Yemen (32). A study in Bangladesh documented that the frequency, amount, energy-density, and diversity of food remained important issues in complementary feeding (33). The Indian guidelines on IYCF included minimum meal-frequency and amount per meal to compute age-appropriate feeding (10). Factors, such as characteristics of diet or child’s appetite, are known to influence the frequency of complementary feeding (25,26). Although these were not measured in this study, it is unlikely that such factors could solely explain the observed deviance from recommendations. Traditional beliefs and practices, besides lack of knowledge regarding current feeding recommendations, might also play a part (34,35). The main problems that came out from the present study were late initiation of breastfeeding, low rates of exclusive breastfeeding, and inappropriate complementary feeding practices. Giving water and ‘milk other than breastmilk’ to breastfed babies were the limiting factors for exclusive breastfeeding. As for inappropriate complementary feeding practices, late introduction, low frequency, and inadequate amount of solid or semi-solid food turned out to be the areas of main thrust.

Area-specific programmes are to be planned to create an enabling environment for comprehensive nutrition and health education of mothers/caregivers, health and nutrition workers to protect, promote, and sustain the optimal IYCF practices in Bankura district.

**ACKNOWLEDGEMENTS**

The authors gratefully acknowledge the financial support rendered by District Health and Family Welfare Samiti, Bankura and the all-round support extended by the teachers of the Department of Community Medicine, B.S. Medical College, Bankura.

**REFERENCES**

1. Bhutta ZA, Ahmed T, Black RE, Cousens S, Dewey K, Giugliani E et al. What works? Interventions for maternal and child undernutrition and survival. *Lancet* 2008;371:417-40.

2. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? *Lancet* 2003;361:2226-34.

3. Saha KK, Frongillo EA, Alam DS, Ariffen SE, Persson LA, Rasmussen KM. Appropriate infant feeding practices result in better growth of infants and young children in rural Bangladesh. *Am J Clin Nutr* 2008;87:1852-9.

4. Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS; Bellagio Child Survival Study Group. How many child deaths can we prevent this year? *Lancet* 2003;362:65-71.

5. World Health Organization. Complementary feeding of young children in developing countries: a review of current scientific knowledge. Geneva: World Health Organization, 1998. 237 p. (WHO/NUT/98.1).

6. Hop LT, Gross R, Giay T, Sastroamidjojo S, Schultink W, Lang NT. Premature complementary feeding is associated with poorer growth of Vietnamese children. *J Nutr* 2000;130:2683-90.

7. Chen A, Rogan WJ. Breastfeeding and the risk of postneonatal death in the United States. *Pediatrics* 2004;113:e435-9.

8. Quigley MA, Kelly YJ, Sacker A. Breastfeeding and hospitalization for diarrheal and respiratory infection in the United Kingdom Millennium Cohort Study. *Pediatrics* 2007;119:e837-42.

9. World Health Organization. Global strategy for infant and young child feeding. Geneva: World Health Organization, 2003. 41 p.

10. India. Ministry of Health and Family Welfare. Integrated management of neonatal and childhood illness. Training module of health workers. New Delhi:
Ministry of Health and Family Welfare, Government of India, 2003:74-5.

11. International Institute for Population Sciences. National family health survey (NFHS 3), 2005-06: India. V. I. Mumbai: International Institute for Population Sciences, 2007. 540 p.

12. World Health Organization. Immunization coverage cluster survey: reference manual. Geneva: Department of Immunization, Vaccine and Biologicals, World Health Organization, 2005. 115 p. (WHO/IVB/04.23).

13. World Health Organization. Indicators for assessing infant and young child feeding practices: conclusion of a consensus meeting, held on 6-8 November 2007 in Washington, DC, USA. Geneva: World Health Organization, 2008. 19 p.

14. Dadhich JP, Agarwal RK. Mainstreaming early and exclusive breastfeeding for improving child survival. Indian Pediatr 2009;46:11-7.

15. International Institute for Population Sciences. National family health survey (NFHS 3), 2005-06: India. V. II. Mumbai: International Institute for Population Sciences, 2007. 168 p.

16. Planning Commission of India. Tenth five year plan (2002-2007). V. 2, Chapter 3. New Delhi: Government of India, 2001:337.

17. Edmond KM, Zandoh C, Quigley MA, Amenga-Etego S, Owusu-Agyei S, Kirkwood BR. Delayed breastfeeding initiation increases risk of neonatal mortality. Pediatrics 2006;117:e380-6.

18. Edmond KM, Kirkwood BR, Amenga-Etego S, Owusu-Agyei S, Hurt LS. Effect of early infant feeding practices on infection-specific neonatal mortality: an investigation of the causal links with observational data from rural Ghana. Am J Clin Nutr 2007;86:1126-31.

19. Roy S, Dasgupta A, Pal B. Feeding practices of children in an urban slum of Kolkata. Indian J Community Med 2009;34:362-3.

20. Hassan MQ, Hanan A, Kabir ARML, Barua PC, Rahman AKMF, Rahman A et al. Infant and young child feeding practices in urban areas of Bangladesh (abstract). In: Khan MS, Rahim MA, Ahmed T, editors. Combating malnutrition and intestinal diseases in children: are we doing enough?: abstracts book of the 8th Commonwealth Congress on Diarrhoea and Malnutrition, 6-8 February 2006, ICDDR,B, Dhaka. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 2006:20.

21. Martines JC, Rea M, De Zoya I. Breast feeding in the first six months: no need for extra fluids. BMJ 1992;304:1068-9.

22. Li L, Li S, Ali M, Ushijima H. Feeding practice of infants and their correlates in urban areas of Beijing, China. Pediatr Int 2003;45:400-6.

23. Batal M, Boughourjian C, Abdallah A, Afifi R. Breast-feeding and feeding practices of infants in a developing country: a national survey in Lebanon. Public Health Nutr 2006;9:313-9.

24. Kumar D, Goel NK, Mittal PC, Misra P. Influence of infant-feeding practices on nutritional status of under-five children. Indian J Pediatr 2006;73:417-21.

25. Wamani H, Astrom AN, Peterson S, Tylleskär T, Tumwine JK. Infant and young child feeding in western Uganda: knowledge, practices and socioeconomic correlates. J Trop Pediatr 2005;51:356-61.

26. Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. Food Nutr Bull 2003;24:5-28.

27. Sachdev HP, Krishna J, Puri RK, Satyanarayana L, Kumar S. Water supplementation in exclusively breastfed infants during summer in the tropics. Lancet 1991;337:929-33.

28. Pan American Health Organization. Guiding principles for complementary feeding of the breastfed child. Washington, DC: Pan American Health Organization, 2003. 37 p.

29. Pandey GK, Hazra S, Vaipajee A, Chatterjee P. Breastfeeding indicators from a rural community in West Bengal. Ind J Public Health 1997;41:71-4.

30. Cousens S, Nacro B, Curtis V, Kanki B, Tall F, Traore E et al. Prolonged breast-feeding: no association with increased risk of clinical malnutrition in young children in Burkina Faso. Bull World Health Organ 1993;71:713-22.

31. Madise NJ, Mpoma MO. Child malnutrition and feeding practices in Malawi. Food Nutr Bull 1997;18:190-201.

32. Jumaan AO, Serdula MK, Williamson DF, Dibley MJ, Binkin NJ, Boring JJ. Feeding practices and growth in Yemeni children. J Trop Pediatr 1989;35:82-6.

33. Kimmons JE, Dewey KG, Haque E, Chakraborty J, Osendarp SJ, Brown KH. Low nutrient intakes among infants in rural Bangladesh are attributable to low intake and micronutrient density of complementary foods. J Nutr 2005;135:449-51.

34. Dobe M. Optimal infant feeding in rural areas—the missing agenda of communication needs. Indian J Public Health 2002;46:145-50.

35. Matthew AK, Amodu AD, Sani I, Solomon SD. Infant feeding practices and nutritional status of children in north western Nigeria. Asian J Clin Nutr 2009;1:12-22.