Introduction
Introduction of safe and nutritious foods at about 6 months of age in addition to breastfeeding (BF) is referred to as complementary feeding (CF). Appropriate complementary feeding depends on accurate information and skilled support from the family, community and health care system. Inadequate knowledge about appropriate foods and feeding practices is often a greater determinant of malnutrition than the lack of food. Adequate CF entails feeding children age between 6 and 23 months foods at least twice a day. Globally, optimal BF could prevent 13% of death under five children with appropriate CF practice 6% of death reduction in under five mortality. CF is also influenced by cultural practices, beliefs and knowledge of parents regarding appropriate practices. In developing countries, inadequate knowledge on CF is one of the main reasons for malnutrition. However, part of the population, including health professionals, does not know of the scientific advances in this field. Recently study in Dhaka

Abstract
Background. In developing countries, inadequate knowledge and cultural practice on complementary feeding (CF) is one of the main reasons for malnutrition. Objective: This study aimed to document the knowledge, attitude, and practices pertaining to CF among the mothers of rural area in Bangladesh. Materials and Methods: A community-based cross-sectional study was conducted in upazila health complex, kachua, Chandpur from July to December, 2017. A total 408 mothers of the babies aged 6-24 months and children under six months were included. Data were collected from the mothers/caregivers of the children in a pretested semi-structured data collection sheet and analyzed by SPSS version 20. Appropriate statistical tests were done. Statistical significance was considered if p value was <0.05. Results: Knowledge regarding recommended CF practice only 50.8% but feeding should be started at 6 months of age (52.9), thick consistency (40.2%), adequate quantity (61.8%), and appropriate quality (62.3%) cases. Knowledge in recommended appropriate timing and consistency varied significantly with maternal education. Frequency of CF was not appropriate in many cases. Most common first complimentary food was thick dal with rice/roti, khichuri rice 166(40.7%). One hundred twenty four (30.4%) mothers did not properly clean their hands before feeding and 138(33.8%) of mother used bottle for feeding, force full feeding (56.9%) and environment during feeding playing 72.5% and roaming around 25.5%. Conclusion: CF knowledge and practices are far gap from ideal in our country. Awareness building in the community may change improper feeding practices need health education.

Keywords: Complementary Feeding; Infant-Feeding; Maternal Knowledge; Rural Area; Bangladesh.
Medical College, Dhaka City showed that amount consumption and consistency of complementary food are not optimal. Studies on prevalent practices and knowledge about CF are sparse in rural.

The current study was undertaken to find out the knowledge attitude, and practices of rural area of Bangladesh.

**Materials and Methods**

Community based cross-sectional study design was used to determine BF and CF practices (outdoor and indoor), Upazila Health Complex, Kachua, Chandpur, Bangladesh from July, 2017 to December, 2017. Four hundred eight mother-child pairs were included by non-random convenience sampling. Semi-structured data collection sheet the questionnaire were included socio-demographic characteristics, knowledge on CF, attitudes and CF practice of mothers with infant between 6-24 months. Children under six months children having major illness interfering were excluded after taking history and physical examination.

The data collected were analyzed using SPSS version 20 and presented using descriptive and inferential statistics such as Chi-square test with the level of significance set at <0.05.

Case Definitions A proper CF consists of foods that are rich in energy and in micronutrients (especially iron, zinc, calcium, vitamin A, vitamin C and foliates), free of contamination (pathogens, toxins or harmful chemicals), without much salt or spices, easy to eat and easily accepted by the infant, in an appropriate amount, easy to prepare from family foods, and at a cost that is acceptable by most families.

Appropriate complementary foods are Khichuri, Mixed family foods (Rice, pulses, vegetables, meat, egg and fish), Bread, Pitha, Fruits, Locally processed complementary foods etc. Inappropriate complementary foods are Rice gruel, Rice gruel with Milk, Suji (Wheat), Suji with Milk, Suji with Sugar, Sago, Burly, Sugar water, Animal milk, Formula, Commercial cereal, Fast foods etc. Khichuri is a dish prepared by mixing rice, lentils, oil, vegetables, egg/meat/fish etc.

Fast foods are prepared and served very quickly. While any meal with low preparation time can be considered fast food, typically the term refers to food sold in a restaurant or store with preheated or precooked ingredients, and served to the customer in a packaged form for take-out/take-away e.g. Burger, Sandwich, French fries, Pizza, Hot dog, Noodles, Fried chicken, Chips, Biscuits, Soft drinks, Commercial juices etc. Timely meaning that they are introduced when the need for energy and nutrients exceeds what can be provided through exclusive and frequent breastfeeding; Adequate meaning that they provide sufficient energy, protein and micronutrients to meet a growing child's nutritional needs.

Frequency of CF was defined according to recommendation of Integrated Management of Childhood Illness (IMCI) by WHO/UNICEF. Quantity of complementary foods were defined according to IYCF (Infant and Young Child Feeding) recommendation. Knowledge about CF was assessed by asking about optimum initiation time, types of recommended complementary foods, frequency and quantity.

Verbal consent was taken from the mothers/caregivers of the children after discussion about the study. Confidentiality was strictly protected.

**Results**

The study population comprised 408 mothers of children aged 6-24 months, where mean age were 14.17 months. Most children 359 (88%) were from Muslim families followed by Hindu 49 (12%). Religion had no significant influence on initiation, type of first CF, current main CF and frequency of CF (p>0.05). Most mothers started CF early due to the perception that their babies were not getting enough breast milk 358, (87.7%), by advice of elderly members of the family 31 (7.7%) and don't know about time of initiation of CF 19 (4.6%) (Table-I).

**Table 1:** Distribution of respondent by age (Month), (n=204), mean age was 14.17 month.

| Frequency | Frequency | Percent |
|-----------|-----------|---------|
| <2        | 2         | 1.0     |
| 2-4       | 5         | 2.5     |
| 5-7       | 23        | 11.3    |
| 8-10      | 40        | 19.6    |
| 11-13     | 40        | 19.6    |
| >14       | 94        | 46.1    |

Mean±StdDe=14.17±10.742, Minimum=2, Maximum=144
Fig 3: Distribution of family type. (Majority of parents belong to joint family.)

Fig 4: Immunization status. (99% children were immunized)

Table II: Type of occupation of parents in sample. (Home maker was the occupation of most of the mothers (96%) whereas the majority of father was service holder (43.1%))

| Occupation     | Frequency | Percentage (%) |
|----------------|-----------|----------------|
| Mothers         |           |                |
| Homemakers      | 392       | (96%)          |
| Working         | 16        | (4%)           |
| Fathers         |           |                |
| Service         | 176       | (43.1%)        |
| Business        | 56        | (13.7%)        |
| Others          | 174       | (42.6%)        |
| Unemployed      | 20        | (5%)           |

Table III: Age (month) of initiation of complementary feeding (n=408)

| Age          | Frequency | Percentage (%) |
|--------------|-----------|----------------|
| 0-1 month    | 16        | 3.9            |
| 2-3 months   | 36        | 8.8            |
| 4-5 months   | 114       | 27.9           |
| 6-7 months   | 216       | 52.9           |
| 8-9 months   | 26        | 6.4            |
| Total        | 408       | 100.0          |

Table IV: Analysis of the knowledge of mother/caregivers on complementary feeding (CF) (n=408)

| Question response | Correct response | No (%) giving correct |
|------------------|------------------|-----------------------|
| From 6 months of age | 2 meal | 60.8 (52.9%) |
|                   | 3 meal or more | 13.4                 |
| Consistency of CF | Appropriate     | 51                    |
|                   | Thick           | 40.2                  |
|                   | Thin            | 8.8                   |
| Quality of CF     | Appropriate for age | 62.3           |
|                   | Less for age    | 37.7                  |
|                   | Proper          | 61.8                  |
|                   | Less in quantity | 38.2                 |

Table V: Frequency of meal, consistency, and quantity of complementary feeding (n=408)

| Question                                      | Response-No. (%) |
|-----------------------------------------------|------------------|
| How many main meals per day given by after 6 months of age? | 2 meal 60.8 | 3 meal or more 13.4 |
| Consistency of CF                             | Appropriate 51   |
|                                               | Thick 40.2       |
|                                               | Thin 8.8         |
| Quality of CF                                 | Appropriate for age 62.3 |
|                                               | Less for age 37.7 |
|                                               | Proper 61.8      |
|                                               | Less in quantity 38.2 |

Table VI: Environment during feeding practices

| Environment during feeding | Frequency | Percent |
|----------------------------|-----------|---------|
| During TV viewing          | 4         | 2.0     |
| During playing             | 148       | 72.5    |
| Roaming around             | 52        | 25.5    |
| Total                      | 204       | 100.0   |

Table VII: If child refuses to eat his/her meal, what are the proper ways of persuading him/her to eat? (n=408)

| Question                              | Type of response            | No (%) |
|---------------------------------------|-----------------------------|--------|
| Environment during feeding            | during playing and lovingly | (72.5%)|
|                                       | Roaming around              | (25.5%)|
|                                       | Allow him to watch television | (2%)   |
| Forceful feeding                      |                             | (52.9%)|
It was evident from current study most common reasons given for early introducing CF were did not having enough breast milk (87.7%). The finding was consistent with the another study where it is (84%) but lower than in other studies (49.2%), (30.6%) and (27.5%) respectively.19,17,20

In this study, (6.4%) mothers had introduced CF after 6 months. A study conducted in Delhi where 77% mothers delayed CF initiation.21,22 In India, religious factor in Hindu families is responsible for late initiation.23 In Bangladesh, religious barrier is rare. (Table-III)

The current study revealed that (61.8%) of mothers were giving an adequate quantity of CF. The practice of quantity of CF Indian mothers were less in Allahabad (38.7%), urban slum area Delhi(25%) and south costal area (32 %).25,30,31 Study in urban slum area Dhaka showed (11%) children get adequate quantity from CF.14 This indicate that rural women are aware of quantity of CF. (Table-V)

However, when asked about the frequency of feeding, more than half (60.8%) of the mothers fed their children less than two times whereas 14.4% mothers fed three or more than three times a day. In India 39.3% child taken three or more feeds per day.19 In Pakistan, 50% of 12-23 month’s old children received CF at the recommended frequency of three or four times a day.14 This might be as a result of social, cultural and educational differences existed between the current study and others. In this study, the appropriate consistency of CF was 51%. A similar finding has been reported from studies in Bangladesh, Ghana and Nepal.7,25,26 Most of the mother introduce thick food in rural area. (Table-V)

The present study shows that the rate of thin feeds only (8.8%) children. A study in a tertiary hospital in India (62%) were giving thin in consistency.2 Urban mother used thin CF.

Behavioral studies observed that responsive feeding with psychosocial care practices has a positive effect on child growth and development.27-29 (Table-VI)

Bottle feeding had significant influence on initiation, type of first CF. So, once they are fed with bottle, they reduce want to suck breast or take complementary foods. The present study shows that the rate of bottle-feeding was (33.8%). Similar result observed in another study(26%).26 Bottle feeding was practiced low in many Indian studies.21,22 But mothers were using bottle high prevalence in Sikhim(46%).25 Bottle feeding is easy for baby, so it is popular in low income area. But parents had inadequate knowledge regarding hazards of bottle feeding practices.

In this study hygiene practices during food preparation such as adequate knowledge and misconceptions used to guide and influence the mothers about CF. In the present study, majority were in joint families. Similar findings were observed by an Indian study.20 (Fig-3)

Table VIII: Type of first complimentary foods (n=384)

| First complimentary foods         | Number | Percentage (%) |
|-----------------------------------|--------|----------------|
| Rice gruel with milk              | 42.6   |                |
| Khichuri/thick dal with rice or   | 42.7   |                |
| mashed roti                        |        |                |
| Suji with milk                    | 4      |                |
| Commercial cereal                 | 9.2    |                |
| Others                            | 1.5    |                |

In our study 50.8% of main caregivers had correct knowledge regarding initiation of CF. In studies in Sri lanka and India revealed similar results 46% but higher in Sri Lanka 92%.14,15,16 Differences between the two studies may be due to the well-established community midwife service and high literacy rate in Sri Lanka than above countries. (Table-IV)

According to this study, initiation of CF at 6 months were reported by 52.9% of mothers. Almost similar results were found in other studies done in Bangladesh and Ethiopia (34.2%) and (56.5%) respectively.17,20 This finding was also lower in slum area of Bangladesh and India by 23%, 17.5% and 16.6% respectively.14,16,19 The results of these studies are indicating that even their knowledge is better than practices, the strong cultural factors and beliefs affect their practices. (Table-III)

In this study, (6.4%) of mothers introduced CF after 6 months. A study conducted in Delhi where 77% mothers delayed CF similar in Nepal, 18.8% of them attributed this delay.18,23 In India, religious factor in Hindu families is responsible for late initiation.23 In Bangladesh, religious barrier is rare. (Table-III)

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In this study hygiene practices during food preparation such as (30.4%) of mothers washed their hands before preparing foods. Similar result in Nigerian and Indian showed that (28%) and (20.4%) of mothers washed their hands before preparing their foods.32-34 In one study in Dhaka urban slum area about 83% of non exclusive breast feed mothers wash hand.35 So, picture of good practice about hygiene more in urban than rural.

When joint family culture was more in our society, elderly persons of the family, especially mother-in-laws usually lack of adequate knowledge and misconceptions used to guide and influence the mothers about CF. In the present study, majority were in joint families. Similar findings were observed by an Indian study.20 (Fig-3)

Rice gruel with milk as first complimentary food is not an appropriate choice. Rice is the main staple food in our country. Animal milk is considered as highly nutritious food for children in our society. In our study observed 42.6% child practiced it. Similarly, in a rural community of Malaysia but commercial cereal (Nestum) was most commonly used as the first weaning food.36 However,64% of mothers were using dal water as main weaning food in a locality of India.32 In our study Khichuri or dal with rice or roti feed about 42.6%. Similar result observed in two other studies done in a rural community in Bangladesh and in a slum of Dhaka city.27,36 Khichuri was the main complimentary food (49.7%) in another study in a rural area of Dhaka.39 Our samples were representatives of rural, so different from other towns, villages and urban slum. (Table-VIII)

Commercial cereal feeding has been increasing day by day even in low income group in our country. This food is not recommended here, on the other hand various food items were used during CF. Current study revealed (9.2%) of mothers started with marketed weaning foods. Similar results of study in Bangladesh, showed that (15.1%) and Indian studies showed urban slum area tried marketed weaning food;14,17,33
One study in Ethiopia 94.9% child of the age 6-11 years old, took commercial cereal. Another study by Manan WA in rural and semi-urban communities 38% of them had introduced cereals. It had been found still low prevalence in rural area.

**Conclusion**

Nutrition education to the mothers/caregivers, family members and general peoples should be emphasized through local health care providers and all other possible opportunities should be utilized more effectively to increase awareness so that their attitude and practice are changed a lot to improve child survival.

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**References**

1. Imdad A, Yakoob MY, Bhutta ZA. Impact of maternal education about complementary feeding and provision of complementary foods on child growth in developing countries. BMC Public Health 2011;11(3): ISSN 1471-1478.

2. World Health Organization. Global strategy for infant and young feeding. WHO, 2003.

3. World health Organization. Complementary feeding. WHO, 2014.

4. World health Organization. Indicators for assessing infant and young child feeding practices. Part 1: Definitions. Conclusions of a consensus meeting held 6-8 November 2007.

5. Jones G, Streketee RW, Black RE, Bhutta ZA, Mortis SS, Bellagio Child Survival Study Group. How many child Survival Study Group. How many child death can we prevented this year? Lancet 2003; 362:65-71.

6. Bhandari N, Mazummder S, Bahl R, Mortines J, Black RE, Bhan MK. An educational intervention to promote appropriate complementary feeding practices and physical growth in infant and young children in rural Haryana. J Nutr 2004; 134:2342-2348.

7. Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. Food and Nutrition Bulletin 2003. 24(1): 5-28.

8. PAHO / WHO. Guiding principles for complementary feeding of the breastfed child. Division of Health Promotion and Protection. Food and Nutrition Program. Pan American Health Organization / World Health Organization. Washington / Geneva; 2003.

9. Begeum T, SK AzimulHoque A, MdRafiqul Islam, Sofia Khatun, Azanta Rani Shaha. Infant feeding practice of mother attending pediatric outdoor patients department in a tertiary care centre. Bangladesh J Child Health. 2013; 37(3): 136-141.

10. Vaalhetera M, Kulmala T, Hietanen A, Mdek M, Cullinan T, Salin ML et al. Breast feeding and complementary feeding practices in rural Malawi. Acta Paediatr 2001; 90:328-332.

11. World Health Organization. Infant and young child feeding. A tool for assessing national practices, policies and programs. Geneva 2003.

12. World health Organization. Global forum for child health research foundation for improving child health. Switzerland Geneva. WHO, 2002.

13. WHO. Complementary feeding: Family foods for breastfed children. Geneva: World Health Organization. WHO/NHD/ 00.1: WHO/CHCAH/00.6; 2000.

14. Aggrawal A, Feridi MA, Chand D. Complementary feeding-reasons for inappropriateness in timing, quality and consistency. Indian J Pediatr. 2008; 75:49-56.

15. Seram SNV, Punchihewa P, M G, Sri. Knowledge on complementary feeding among parents of children aged 4-12 months attending a base hospital in a rural district in Sri Lanka. Sri Lanka Journal of Child Health, 2017; 46(2): 139-147.

16. Sethi V, Kashyap S, Seth V. Effect of nutrition education of mothers on infant feeding practices. Indian J Pediatr. 2003; 70, 6:463-466.

17. SK Paul, S Roy, QR Islam, MZ Islam, M Akteruzzaman. Barriers of Appropriate Complementary Feeding Practices in Under - 2 Children. Journal of Bangladesh College of Physicians and Surgeones.2015; 33 (4):197-201.

18. Molla M, TadeseseJigu, and GirmaNega. Complementary Feeding Practice and Associated Factors among Mothers Having Children 6-23 Months of Age, Lasta District, Amhara Region, Northeast Ethiopia Hindawi Advances in Public Health 2017, Article ID 4567829, 8 pageshttps://doi.org/10.1155/2017/4567829.

19. Saleh F, Ara F, M. Hoque A, Alam MS. Complementary Feeding Practices among Mothers in Selected Slums of Dhaka City: A Descriptive Study J Health Popul Nutr. 2014; 32(1):89-96.

20. Semahneg A, Tesfaye G, Bogale A. Complementary feeding practice of mothers [36] and associated factors in Hiwot Fana Specialized Hospital, Eastern Ethiopia. Pan African Medical Journal. 2014;18:143.

21. Bhardwaj N, Hasan BS, Zaheer M. feeding and weaning practices- A rural study in Uttar Pradesh. J Family Welfare 1991; 39(1): 23-29.
22. Rao S, Swathi PM, Unnikrishnan B, Hegde A: A study of complementary feeding practices among children of mothers aged six months to two years- A study from coastal south India. AMJ 2011, 4 (5): 252-257.

23. 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: 417-421.

24. Memon S, Shaikh S, Kousar T, Memon Y, Rubina. Assessment of infant feeding practices at a tertiary care hospital. J Pak Med Assoc 2010; 60:100-1015.

25. Kabir I, Khanam M, Agho KE et al. (2012) Determinants of inappropriate complementary feeding practices in infant and young children in Bangladesh: secondary data analysis of Demographic Health Survey 2007. Matern Child Nutr 8, 11-27.

26. Abukari I Issaka1, Kingsley E Agho, Penelope Burns, Andrew Page, Michael J Dibley. Determinants of inadequate complementary feeding practices among children aged 6-23 months in Ghana. Public Health Nutrition: 18(4), 669-678.

27. Engle P, Bentley M, Pelto G. The role of care in nutrition programmers: current research and a research agenda. Proc Nutr Soc 2000; 59:25-35.

28. Pelto GH, Levitt E, Thairu L. Improving feeding practices: current patterns, common constraints, and the design of interventions. Food Nutr Bull 2003;24:45-82.

29. Lukman H, Kaswadharma KC, Lubis IZ, Manoeroeng SM, Lubis CP. Factors influencing the practice of bottle feeding in infants at the well-child clinic Dr. Pirngadi Hospital, Medan Pediatr Indones. 1991; 31(3-4):8375-8332.

30. Bhosle NA, Deshpande SG, Zodpey SP, Jog SN. Infant feeding practices in urban population- A clinic based study. Indian J Med Sci. 1997; 51: 396-398.

31. Banapurmath CR, Nagaraj MC, Banapurmath S, Kesaree N. Breast-feeding practices in villages of central Karnataka. Indian Pediatr: 1996; 33:477-479.

32. Reddy R, Subba G, Dutta S. Infant and young child feeding practices: a cross sectional study in Sikkim. Int J Contemp Pediatr. 2016; 3(4):1244-1248.

33. Trivedi BY, Vyas SN, Dave BN, Desai KA. Complementary feeding practices among mothers of Wagholi Taluka of Vadodara: a knowledge, attitude, and practice study. International Journal of Medical Science and Public Health 2015; 4:647-651.

34. 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.

35. Kumudha A, Khan ME, Hazra A. Increasing appropriate complimentary feeding in rural Uttar Pradesh. The Journal of Family Welfare. 2010; 56: 51-56.

36. Zulkifli A, Kyi DW, Rahman AI. Breast feeding and weaning practices in rural communities of Kelantan, Malaysia. Mal J Nutr. 1996; 2: 148-154.

37. Islam MZ, Farjana S, Masud JHB. Complimentary feeding practices among the mothers of a rural community. Northern International Medical College Journal. 2012; 3(2): 204-207.

38. Akhtar K, Hoque ME, Islam MZ, Yusuf MA, Sharif AR, Ahsan AL. Feeding Pattern and Nutritional Status of Under Two Years Slum Children. J Shaheed Suhrawardy Med Coll. 2012; 4(1): 3-6.

39. Karim M, Farah S, Dr. Jannat Ferdousi J. Study on feeding practices of infants among the mothers in selected villages, at Dhamrai. J. Dhaka National Med. Coll. Hos. 2012; 18(02): 30-36.

40. Manan WA. Breastfeeding and infant feeding practices in selected rural and semi-urban communities in Kemaman, Terengganu. Mal J Nutr. 1995; 1:51-61.