Original Article

Knowledge, attitudes and perceptions on infant and young child nutrition and feeding among adolescent girls and young mothers in rural Bangladesh

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Abstract

Improved infant and young child feeding (IYCF) practices have the potential to improve child health and development outcomes in poorly resourced communities. In Bangladesh, approximately 60% of rural girls become mothers before the age of 18, but most interventions to improve IYCF practices target older mothers. We investigated the knowledge, attitudes and perceptions regarding IYCF among adolescent girls and young women aged 15–23 years old in two rural regions in north-west Bangladesh and identified the main points of concordance with, or mismatch to, key international IYCF recommendations. We compared qualitative data collected during interviews and focus groups with participants who were unmarried, married without a child and married with at least one child, and stratified by region. Qualitative indicators of concordance with international recommendations suggest that IYCF knowledge of participants was limited, irrespective of marriage or maternity. Young mothers in our study were no more knowledgeable about feeding practices than their nulliparous peers. Some participants were well aware of an IYCF recommendation (e.g. to exclusively breastfeed for 6 months), but their interpretation of the recommendation deviated from the intended public health message. Notions of insufficient or ‘spoiled’ breast milk, gender-based biases in feeding intentions and understandings of infant needs, and generational shifts in feeding practices were commonly reported. Conclusions are that female adolescence is a window of opportunity for improving health outcomes among future children, and increased investment in early education of adolescent girls regarding safe IYCF may be an effective strategy to promote and support improved infant feeding practices.

Keywords: knowledge, beliefs, breastfeeding, complementary feeding, adolescents, Bangladesh.

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Introduction

Improving the nutrition of infants and young children is a top priority for human development in low-income countries (LICs), as childhood malnutrition causes morbidity, mortality, developmental delays, poor school performance and reduced intellectual capabilities and hampers progress to reach many cross-cutting human and economic development

goals. Inappropriate infant and young child feeding (IYCF) practices, such as early cessation of breastfeeding, non-exclusive breastfeeding and inappropriate complementary feeding, contribute significantly to child malnutrition and death, mostly in poorer countries (Hop *et al.* 2000; Edmond *et al.* 2006; Black *et al.* 2008). One estimate is that improved breastfeeding practices could prevent 13% of deaths in children less than 5 years of age globally, and optimal comple-

mentary feeding could lead to an additional 6% reduction in under-five mortality (Jones *et al.* 2003). Promoting and supporting these practices universally is not a straightforward task because feeding practices are highly variable, and are underpinned by a complex network of personal, biological, socio-cultural and structural factors. Studies have shown, for example, that women's feeding confidence, attitudes and knowledge prior to pregnancy are predictive of actual feeding practices post-partum (Chezem *et al.* 2003; Mossman *et al.* 2008; Wen *et al.* 2012). Thus, research to understand caregivers' knowledge, attitudes and perceptions regarding IYCF is needed to inform the design and implementation of effective, culturally appropriate IYCF interventions.

In 2005, approximately 112 million children under 5 years in low- and middle-income countries were underweight (Black *et al.* 2008). Of these children, 33% lived in south-central Asia, where an estimated 77 million children also suffer from stunting. In Bangladesh, diarrhoea and acute respiratory infections contribute to over two-thirds of all deaths of children less than 1 year of age (Baqui *et al.* 2001). Although breastfeeding initiation is almost universal in Bangladesh, approximately 70% of mothers do not exclusively breastfeed for the recommended first 6 months of life for various environmental, cultural and economic reasons (Giashuddin & Kabir 2004). This is problematic because many families do not have access to clean water or sufficient complementary foods and consequently, babies are fed unhygienic and inappropriate foods before 6 months of age. This pattern undermines child growth and development and contributes considerably to child diarrhoeal disease and death (Arifeen *et al.* 2001).

Much previous research on IYCF has targeted adult women, despite the fact that globally, between 14 and 15 million adolescent girls aged 15–19 years old give birth each year (WHO 2006). These account for 10% of births worldwide, and 90% of them occur in LICs (WHO 2006). Pregnancy during adolescence results in a number of social, health and economic challenges for young mothers and their offspring. Infants born to adolescent mothers are at higher risk of low birthweight, malnourishment, poor development and death (WHO 2006). Adolescent mothers are less likely to complete their education, diminishing future employment opportunities and further jeopardising the health and well-being of their children. While most countries consider prevention of adolescent pregnancies to be an important priority, the care of pregnant adolescents and their infants tends to be given less attention (WHO 2006).

Previous research in Bangladesh has explored the complexities of infant feeding practices among older Bangladeshi mothers (e.g. Huffman *et al.* 1980; Haider *et al.* 1997; Giashuddin & Kabir 2004; Eneroth *et al.* 2009; Rasheed *et al.* 2011). Several studies have considered infant feeding among adolescents in other South Asian contexts (e.g. Kapil & Manocha 1990; Kapil *et al.* 1990); however, to our knowledge, no reports have been published about IYCF perceptions among adolescents in Bangladesh. This is surprising, given that approximately 60% of rural girls become mothers before the age of 18 (UNICEF 2004). Further research targeting young Bangladeshi girls is needed to understand IYCF in the context of adolescent motherhood in Bangladesh.

This study was conducted with the goal of assessing adolescent girls' and young women's current knowl-

Key messages

- Knowledge of infant and young child feeding (IYCF) guidelines among adolescent girls and young mothers in our study was generally poor, as has been shown previously for older women.
- Young mothers did not necessarily have greater IYCF knowledge than their even younger nulliparous peers.
- Key knowledge gaps identified were: misinterpretations of the meaning of 'exclusive breastfeeding'; confusion regarding appropriate timing of initiation and duration of breastfeeding; negative expectations regarding breast milk production; and confusion about appropriate complementary feeding practices.
- Future IYCF programming in rural Bangladesh should target girls during early adolescence, and implementation science and operational research should focus on identifying lessons learned from ongoing targeted approaches.

edge and perceptions on IYCF, and generating qualitative findings to inform the development of an infant feeding and nutrition module for an established community-based programme aimed at supporting adolescent girls in Bangladesh. It was designed and conducted as a collaboration between the host communities, the nutrition unit of Building Resources Across Communities' (BRAC, formerly Bangladesh Rural Advancement Committee) Research and Evaluation Division (RED), and the University of Toronto's Laboratory for the Study of Constraints on Child Nutrition and Care.

Materials and methods

Ethical approval

The final study protocol received ethical approval from the Social Sciences, Humanities and Education Research Ethics Board at the University of Toronto. Local ethical approval was received from the BRAC University Research Ethics Board.

Country setting

Bangladesh is one of the most densely populated countries in the world, with almost 150 million people living in an area of 557 570 km² (NIPORT, Mitra and Associates & Macro International 2009). This translates to more than 920 persons per square kilometre (NIPORT, Mitra and Associates & Macro International 2009). The average annual income in Bangladesh is \$600.00, and many of the country's extreme poor earn less than the equivalent of \$1.00 per day. The under-five mortality rate is 65 per 1000 live births, and approximately 55% of the population is literate (NIPORT, Mitra and Associates & Macro International 2009). The country ranks 93rd out of 108 developing countries on the Human Poverty Index and 140th among nations on the Human Development Index (HDI). Within South Asia, Bangladesh outranks only Nepal, which is 142nd on the HDI (NIPORT, Mitra and Associates & Macro International 2009).

Estimates of the prevalence of early marriage and childbearing in Bangladesh vary widely among sources, but all are high. According to a 2007 national

survey, 21% of Bangladeshi girls were married by age 15, and one-third of adolescent girls between the ages of 15 and 19 had begun childbearing (NIPORT, Mitra and Associates & Macro International 2009). Early marriage and childbearing among teenagers is even more common in rural areas. Despite the existence of laws forbidding marriage before 18 years for women and 21 years for men, a majority of adolescent girls in rural Bangladesh enter arranged marriages much sooner, often in their early teens (International Centre for Diarrhoeal Disease Research, Bangladesh 2007). When married, many girls are expected to leave school and work full-time in their husband's parental household. While 79% of girls aged 15–19 years in Bangladesh are now literate (NIPORT, Mitra and Associates & Macro International 2009), literacy rates tend to be lower in rural areas, and most rural adolescents are uninformed about reproductive health issues (Amin *et al.* 2002; Uddin & Choudhury 2008). It is likely that motherhood places high demands on many rural girls and that, because of often limited maternal autonomy and mobility, many of their own children are at high risk for adverse health outcomes.

Programmatic context

This study was conducted within the context of a community-based intervention programme known as *Social and Financial Empowerment of Adolescents* (SoFEA). This programme was recently implemented by BRAC, a large international non-governmental organisation committed to alleviating poverty through economic and social empowerment of the poor. The SoFEA programme targets girls 11–21 years of age in rural Bangladesh with a goal of achieving sustainable positive outcomes for adolescent girls. The SoFEA programme aims to establish a total of 500 community-based clubhouses for adolescent girls across rural Bangladesh with a total membership of 20 000 girls by 2014. At the time of the study, the SoFEA programme operated 360 clubs throughout four districts of rural Bangladesh. Each clubhouse provided a secured place to socialise, a small library, livelihood skills training, credit facilities and financial literacy education, and a life skills programme targeting critical social and health issues. Club activities

provided adolescent girls with education about various aspects of adulthood, as well as an opportunity to socialise and interact with other girls their age.

Study design and selection of study sites

We employed a descriptive, cross-sectional design to capture information from a subset of SoFEA club members at one point in time. To test for differences at various life stages, we stratified participants into three groups: (1) unmarried; (2) married without a child; and (3) married with at least one child. We included unmarried girls in the study because they are the country's upcoming generation of mothers and are often responsible for feeding and caring for their younger siblings in this context. To test for regional congruency in IYCF knowledge and perceptions, we collected data in two north-western, rural districts approximately a day's drive from the capital (Rajshahi and Pabna, 197 and 122 km from Dhaka, respectively). Rajshahi and Pabna are similar socially and culturally, and in 2001, had populations of 2.3 and 2.2 million, respectively (Bangladesh Bureau of Statistics 2011). Adolescents in both areas have comparable access to SoFEA programme services.

Participant eligibility

The United Nations defines adolescents as individuals between the ages of 10 and 19 years, youths between 15 and 24 years and groups both adolescents and youths together into the category of 'young people' (United Nations 2007). However, in studies of adolescents in Bangladesh, definitions vary widely, with some identifying adolescents based on reproductive maturity, and others based on local cultural definitions (Bhuiya *et al.* 2004; Huq *et al.* 2005; Gani & Ahmed 2006). SoFEA club members between the ages of 15 and 23 years were eligible to participate. We chose the upper age limit of 23 years because this was the maximum age of young women enrolled in the SoFEA programme at the time of the study, and results were intended to be representative of SoFEA programme members. We did not exclude older girls on the rationale that it would be inequitable to include some members, but not others. Although

SoFEA recruits girls as young as 11 years old, we excluded girls younger than 15 years because it was not feasible to seek consent from the parents of those considered children. Other exclusion criteria were mental disability, visible illness or inability to comfortably participate for the duration of a focus group or interview.

Recruitment

We recruited participants through the SoFEA programme's enrolment records, using a purposive, stratified sampling protocol (Huberman & Miles 2002). Programme area managers in Rajshahi and Pabna arranged for the data collection team to meet with 10–12 eligible participants in established SoFEA clubhouses at the beginning of each research day. SoFEA club training staff ensured that at least 6–8 of these participants were from one of the three marital and reproductive strata of interest, and these SoFEA club members were invited to participate in a focus group. Other SoFEA club members were invited to participate in semi-structured interviews (SSIs).

Qualitative data collection

We adopted an exploratory approach, utilising focus group discussions (FGDs) and SSIs as a means of methodological triangulation. This procedure allows investigators to look for convergence among multiple sources of information in order to form themes or categories in a study (Creswell & Miller 2000). We chose to conduct focus groups because they provide a richness of data at a reasonable cost (Krueger 1988) and allow researchers to understand complex issues by observing how participants debate and respond to one another (Krueger & Casey 2009).

We conducted one FGD within each stratum of participants, in each of the two districts, for a total of six focus groups. We used the focus group methodology described by Huberman & Miles (2002) as a guide. Small focus groups allow researchers to gain a more in-depth understanding of what participants have to say (Morgan *et al.* 1998), so we limited our discussions to groups of six to eight adolescents. This

ensured ample opportunity for each participant to elaborate on personal accounts when necessary.

We also conducted three SSIs with a participant from each stratum, in each district, for a total of 18 interviews. Interviews ensured coverage of relevant topics that may not have surfaced in FGDs. Interviews and focus groups were conducted in Bangla, the local language, by UM. To achieve investigator triangulation, the lead author (KH) conducted additional SSIs in both regions, with the aid of an interpreter. Investigator triangulation is considered good practice as it typically increases both the validity and reliability of a study (Denzin & Lincoln 2000).

Initial questions were generated based on dominant IYCF themes in the literature and covered two broad topics: breastfeeding (initiation, duration, exclusivity) and complementary feeding (timing of introduction of complementary foods, food types, food hygiene, responsive feeding and psychosocial aspects of feeding). Preliminary versions of interview and focus group instruments were pre-tested with a group of SoFEA club members external to the present study. Questions were then modified to reflect local cultural meanings and interpretations.

Data management and analysis

A team of six research assistants transcribed all digital recordings of interviews and focus groups in Bangla, then translated these transcripts into English. As a quality control measure, UM monitored the work of the research assistants and made corrections where necessary. The team leaders (UM and KH) also compared transcripts to field notes to ensure that no information was misinterpreted or omitted.

We approached data analysis in the three concurrent stages outlined by Huberman & Miles (2002): data reduction, data display and conclusion drawing/verification. During the initial data reduction phase, we identified broad themes using thematic content analysis. We used questions from focus group and interview scripts as a preliminary guide in a directed content analysis, because these scripts were based on previous studies suggesting relevant content areas (Hsieh & Shannon 2005). We further reduced the data by coding transcripts into sub-themes. During this

Table 1. Summary of data collected

Data collection method	Rajshahi	Pabna
Semi-structured interviews (conducted by UM)		
Unmarried	3	3
Married without child	3	3
Married with child	3	3
		Total = 18
Semi-structured interviews (conducted by KH)		
Unmarried	2	2
Married without child	1	1
Married with child	3	2
		Total = 11
Focus group discussions		
Unmarried	1	1
Married without child	1	1
Married with child	1	1
		Total = 6

phase we *coded up*, allowing categories to emerge from the data rather than *coding down*, or forcing pre-determined sub-themes onto the data (Forrest Keenan *et al.* 2005). To test and verify coding validity, team leaders coded separately in English and Bangla. We compared coding for each transcript and discussed any discrepancies until agreement on appropriate codes was reached. This process not only ensured consistent coding, but also drew attention to any translation errors and omissions, and differences in cultural interpretations. All data were coded manually, then summarised and displayed in spreadsheets organised by themes and sub-themes.

We interpreted data and drew conclusions based on a combination of coding summaries, contextual field notes and descriptive data provided by direct quotes from participants. Content analysis results are presented under subcategories of two major IYCF themes: breastfeeding and complementary feeding.

Results

We collected data over the course of 1 week in April, 2010. A total of 70 adolescent girls and young women took part in 1 of 29 SSIs or one of six FGDs. Table 1 summarises the collected data and Table 2 summarises the demographic profile of study participants. Participants in Rajshahi were older in each study cat-

Table 2. Demographic characteristics of participants

Demographics	Mean (SD), year		
	Rajshahi	Pabna	Overall
Age (range 15–23 years)			
Unmarried	17.4 (2.3)	16.8 (1.8)	17.0 (2.1)
Married without child	19.3 (2.6)	17.9 (1.9)	18.6 (2.4)
Married with child	21.3 (2.3)	19.5 (0.8)	20.3 (1.9)
Marital age (range 10–21 years)	15.5 (2.9)	14.4 (2.7)	15.0 (2.9)
Age at birth of first child (range 12–21 years)	16.7 (2.4)	15.3 (2.3)	16.0 (2.5)
Years of school education (range 0–16 years)	8.5 (4.1)	7.2 (3.3)	7.8 (3.7)

SD, standard deviation. Values are presented as mean (SD).

egory than those in Pabna, and a higher proportion had not completed high school.

Concordance with international IYCF guidelines

Common findings from our assessment of IYCF knowledge among all three reproductive strata and two regions are summarised in Table 3. Our results suggest that young mothers are not necessarily more appropriately informed about feeding practices than their nulliparous peers. In both Rajshahi and Pabna, qualitative indicators of concordance with international recommendations (WHO/UNICEF 2003) suggest that IYCF knowledge of adolescent girls and young women was limited, irrespective of marriage or maternity. In some cases, participants were well aware of an IYCF recommendation, but their interpretation of the recommendation deviated from the intended public health message.

Breastfeeding

Initiation of breastfeeding

Among all three strata, approximately half of the participants reported with confidence that breast milk is produced 2–3 days after birth, while some believed that milk becomes available sometime before birth, or immediately afterwards. A majority of participants believed that breastfeeding should be initiated shortly after birth, but were unsure of the precise recom-

mended timing. Most participants without children (strata 1 and 2) estimated within several hours after birth, whereas timing reported by married participants with children (stratum 3) ranged from 1 h to 3 days post-partum. These answers corresponded with the participants' beliefs about the timing of breast milk production. None of the participants who believed that breastfeeding should be initiated shortly after birth added explanations as to why early initiation is important, although interviewers did not probe on this subject specifically.

Many participants reported that breast milk should be the first substance fed to babies after birth, but noted that in practice, mothers often give pre-lacteal feeds such as water, honey, tinned milk and fruit juice. Participants explained that water is placed on the lips of newborns to keep them cool and to hydrate their mouths, while honey is fed so that the child will grow up to 'speak sweetly' and be well behaved. However, several participants in each stratum mentioned a perception that feeding honey is less common nowadays than in previous generations because doctors advise mothers not to feed it. According to the participants, tinned milk (infant formula) is commonly fed according to the advice of doctors, or when mothers give birth via caesarean section because they are too weak to breastfeed. Birth complications were also reported to prevent early initiation of breastfeeding because mothers are in 'too much pain' to breastfeed. Participants reported that in these situations, a family member will usually feed the baby other liquids including cow's milk, infant formula or fruit juice.

Knowledge and perceptions of breast milk and colostrum

Participants generally had very little knowledge of the benefits of breast milk. While all participants agreed that breast milk is good for babies, many were unsure of any specific reasons why. Some participants reported that breast milk is good for babies because it 'is nutritious', 'contains vitamins', 'keeps the baby healthy' or 'provides energy', but very few discussed its economic or maternal benefits.

When asked to discuss their knowledge and perceptions of colostrum, participants revealed a diverse range of opinions on the topic. Many participants

Table 3. Adolescent perception and knowledge of key international IYCF recommendations

IYCF guideline (WHO 2009)	Concordance or discordance in perceptions/knowledge?	Content analysis – key findings
Initiate breastfeeding within 1 h after birth	Discordance (particularly among mothers)	Many (72%) suggested 'shortly after birth'. Others (13%) were unsure of the appropriate timing. Among mothers (stratum 3), answers ranged from 10 min to 3 days post-partum.
Refrain from giving pre-lacteal feeds	Discordance	Forty-two per cent of participants mentioned the feeding of pre-lacteal feeds. These included: cow's milk, water, honey, sugar milk, tin milk, fruit juice and infant formula. Reasons reported: inability to produce breast milk, breast milk not produced until after 3 days, caesarean section, cultural practices (i.e. honey fed first so that child will grow up to 'speak sweetly'; refrain from feeding colostrum because it's 'spoiled milk').
Breastfeed exclusively for the first 6 months	Discordance	Most participants (86%) knew this message but many assumed this definition means only breast milk and other liquids (usually water or cow's milk) during the first 6 months. Common reasons to feed other liquids: <ul style="list-style-type: none"> • Breast milk not produced or insufficient • Extreme heat (must feed breast milk with water) • Spoiled breast milk (due to 'bad air') • Cow's milk is good for baby
Continue frequent, on-demand breastfeeding until 2 years of age or beyond	Concordance/Discordance, with gender differences	Most participants (83%) reported that mothers should try to feed babies on demand (when they cry), with no set number of feeds per day. Most common breastfeeding duration reported was 2.5 years (69% of participants), but duration varied depending on the child's gender.
Practice responsive feeding, applying the principles of psychosocial care	Discordance	Approximately 50% of participants claimed that children should be force-fed and/or beaten when they refuse to eat, while others advocated for more positive techniques (i.e. distracting the child, offering a variety of foods) instead.
Practice good hygiene and proper food handling	Partial concordance	Many participants (67%) emphasised safe preparation and storage of child's food (must be washed, thoroughly cooked and kept covered). Only four participants mentioned the importance of hand washing before and during feeding.
Gradually introduce complementary foods starting at 6 months of age, while maintaining frequent breastfeeding	Partial concordance	Most participants (63%) believed solid foods should be fed starting at 6 months, but reported that other 'softer' foods may be given before this time. Participants who knew this message reported that complimentary feeding usually begins much earlier than 6 months because of insufficient breast milk.
Feed a variety of nutrient-rich foods to ensure that all nutrient needs are met.	Discordance	Many participants (67%) believed that vegetables were good because they contain vitamins, but very few (14%) suggested feeding meat or fish (and other animal-source foods) to young children.
Increase fluid intake during child illness (including more frequent breastfeeding)	Discordance	While some participants (14%) said mothers should continue breastfeeding as much as possible when the child is ill, others (26%) reported that breastfeeding should stop completely and cow's milk should be fed instead. This reflects the common perception that 'spoiled' breast milk is often the cause of child illness.

IYCF, infant and young child feeding; WHO, World Health Organization.

regarded colostrum as 'the yellowish milk that first comes out' and some mentioned that this milk was 'full of vitamins' and 'must be fed to babies because it's good for their health'. A smaller proportion of participants had the opposite opinion, insisting that colostrum was 'bad milk' and must never be fed to

infants. One participant noted that 'the children who can't digest it, they may get diarrhoea or cholera'. Participants sharing this opinion explained that mothers should delay breastfeeding until 2–3 days after birth when the 'real' breast milk comes in, and could feed cow's milk or tinned milk in the interim.

One mother reported that colostrum should be fed to newborns, but described its insufficiency when fed on its own:

Cows milk must be fed just after birth along with colostrum because the colostrum is not enough to meet baby's demands. Breast milk only comes out in small drops for the first few days so cow's milk must also be given.

Married mother, aged 18 years, Rajshahi

Ten participants had never heard of colostrum or made no differentiation between colostrum and other breast milk, as evident by statements such as 'mothers should feed colostrum up to 6 months'. Some participants had heard of the local term for colostrum, *Gaja Dhud*, but did not understand the meaning, while others highlighted a recent generational shift in local colostrum feeding practices: 'older mothers throw away the first milk, but younger mothers know it has vitamins so they feed it'.

Exclusive breastfeeding

When asked about exclusive breastfeeding, the majority of participants told researchers that babies should be fed only breast milk for the first 6 months. However, when probed further, it became obvious that the term 'exclusive' breastfeeding was perceived to include not only breast milk, but other liquids as well. One unmarried 15-year-old participant explained that, 'until the baby is 6 months the mothers do not give anything else to eat other than breast milk. They can also feed fruit juice, I am not sure whether they feed water or not but during the summer they should definitely feed water'. Water was the most commonly reported non-breast milk liquid fed to babies before 6 months, followed by cow's milk, then fruit juice. According to participants, water must always be fed to young babies in combination with breast milk because 'extreme heat' causes babies' throats to become dry and breast milk is not enough to quench their thirst. The types of fruit juices reportedly fed to babies before 6 months are mango and orange. Participants noted that freshly squeezed juices prepared at home are healthier for babies than store-bought, pre-packaged juices.

Some participants had a clearer understanding of the meaning of exclusive breastfeeding, but reported

that other liquids such as cow's milk and tinned milk can be fed if the mother is unable to produce enough breast milk. Participants also noted that it is common for breast milk to be spoiled by supernatural forces or 'bad air/wind', which results in *mikhe char* (hard breasts, thick milk). When this happens, mothers must feed other types of milk to their babies, regardless of the child's age:

When I first became a mother, people of this area said that "bad wind" spoils breast milk. If you go out for the toilet at night, breast milk may get spoiled. When my baby was 3 months old, it had severe diarrhea. Just after breastfeeding, everything came out. How could we stop that? *Pani pora* (special holy water prescribed by a traditional healer or 'kabaraj') didn't work so we went to the doctor and the doctor advised tinned milk. That worked for my son.

Married mother, aged 21 years, Rajshahi

According to participants, situations like these are quite common. Many participants reported that breastfeeding should stop entirely when babies are sick because child illness is often the result of 'problems in the breast milk'.

Breastfeeding duration, child gender and religion

Most participants shared the belief that all babies should be breastfed frequently and on demand or, 'whenever they cry'; however, major discrepancies in perceptions about breastfeeding duration were reported. Many participants referred to Islamic rules outlined in the book of Hadith, which, according to most study participants, outline specific age cut-offs for boys and girls. There was much disagreement over these age cut-offs, with many participants insisting that boys and girls should be breastfed for 2 and 2.5 years, respectively, and others arguing that boys should be breastfed for longer than girls. Several participants disagreed with these claims completely, noting that it would be 'a sin to breastfeed *any* baby for longer than 1.5 years'. Several non-religious explanations were offered for gender differences in breastfeeding: (1) girls are breastfed for longer because they will eventually leave the home to live with their in-laws, and it is uncertain whether they will be properly fed and cared for in their new homes; and (2)

boys are breastfed for longer because they will earn an income and take care of their parents in the future, whereas girls leave the home at a young age. Despite varying reports of gender discrimination in breast-feeding within their communities, a majority of participants clearly held the opinion that ‘a mother cannot intentionally discriminate while feeding her baby’, and that all children should be cared for equally. Some participants framed this as another generational change, noting ‘mothers today are less likely to favour boys over girls’.

Complementary feeding

Timing of introduction of complementary foods

Perceptions about timing of introduction of complementary foods varied widely both within strata and between the two regions. Unmarried participants demonstrated a great deal of disagreement on this subject with suggested ages ranging from 1 to 10 months, or ‘whenever the baby refuses to drink breast milk’. Some unmarried participants reported that solid foods should not be fed before 6 months, but that softer foods and solids mashed into a paste can be fed. When asked why small infants should not be given solid foods, one participant explained that:

These are very attractive foods. These cannot be given before 4 months because if the child recognizes the taste of these things, then it will not want to drink the breast milk.

Unmarried adolescent, Pabna (FGD)

Although most participants with children knew that the best time to begin feeding solid foods is at 6 months of age, almost all of them reported that in practice, mothers tend to introduce these foods much earlier. The most commonly reported reason for this is the perception that breast milk is insufficient in quantity to meet the growing child’s energy requirements. Participants explained that if babies cry following breastfeeding, it means that they are not yet satisfied so mothers will offer other foods in an attempt to fulfil the baby’s hunger. Reasons for introducing complementary foods after 6 months included: to keep the child quiet and happy, to balance nutrition, to ensure proper body structure, to minimise

diseases, to ensure proper mental growth and ‘so that children become intelligent and social’.

An important region-specific practice was found in Pabna, where participants described a ceremonial first feeding of rice called *Mukh Aita*. Participants disagreed about the appropriate timing of this celebration. While some claimed the celebration occurs at 6 months of age, others insisted that it occurs at 40 days.

Cultural models of ‘good’ complementary foods

When asked which complementary foods are best for small children, a diverse range of foods was reported. Most participants suggested that vegetables were best because ‘they contain the most vitamins’. Fruits were also considered healthy and are fed because of their ability to ‘make children smarter’. *Khichuri*, a common Bangladeshi dish combining lentils and rice, was also regarded as a good food for babies. Rice was perceived as a good complementary food because of its energy content, as demonstrated by one adolescent mother’s description:

It is rice that is most useful. If we don’t eat rice, how can we fight? Is there anything else that can give such *shokti* (energy) as rice gives! We can eat ‘ruti’ (bread), but we can’t get satisfaction. We can’t do without rice.

Married mother, aged 21 years, Rajshahi

As articulated by this participant and descriptions of *Mukh Aita*, rice is a significant part of Bengali culture and is considered a necessary component of every meal.

When asked to discuss which foods are best for babies, some participants described ‘good’ methods of food preparation rather than naming specific food types. For example, many reported that baby foods should be prepared separately from the shared family pot, with few spices, and should be mashed into a paste to allow for easy chewing and digestion. Many participants also differentiated between foods prepared at home, and those purchased from the market, with varying opinions on the quality of both. Some participants had the perception that ‘foods from the market are good because they are packaged and [therefore] safe’. Participants with this opinion

believed that market foods are more hygienic than home-cooked foods because they are less likely to come into contact with germs. Fruit juices, 'Horlicks' (a malted powdered beverage) and biscuits were perceived to be the best market foods for children not only because they are purchased in packages, but also because they are perceived to be nutritious. Some participants insisted that market foods are good complementary foods simply because 'babies like them, and mothers must feed what babies like'. Others disagreed with these claims, and insisted that home-cooked foods were best for babies because mothers can ensure safe and hygienic food preparation. As one participant remarked, 'mothers must be aware of where foods are produced and how much pesticides are used. If too much pesticide is used, then this is bad for a child's health'. Participants who shared this perception pointed out that not all market foods come packaged and many times they are left uncovered for long periods.

The majority of participants seemed to associate child health with proper hygiene and cleanliness. Most had some knowledge of safe complementary food preparation and stressed the importance of washing all cooking utensils, cooking thoroughly, feeding only freshly prepared food and keeping children's food covered to avoid contact with flies and germs. Very few participants mentioned hand washing as a necessary practice during feeding; however, it is possible that this practice was implied by answers such as '*everything* must be kept clean during complementary food preparation'. It is unclear whether participants failed to mention hand washing because it is an uncommon practice or because it is such an obvious hygienic practice that they felt it unnecessary to mention.

Responsive feeding and psychosocial care

Participants were asked to discuss what mothers should do when children refuse to eat. Mothers said this was a common situation and expressed frustration. As noted by a 19-year-old mother from Pabna: 'It's very frustrating when I try to feed but my baby refuses to eat ... I lose patience easily'. Young mothers were more likely to suggest bringing the

child to the doctor to receive medicinal syrup that increases the child's appetite, whereas participants without children did not mention seeking medical advice as a solution. In both regions, almost all unmarried participants (strata 1 and 2) reported force-feeding and/or beating the child as necessary behaviours: 'children don't understand what is good for them. If they don't want to eat, they should be forced. Often children get beaten or scolded so that they eat properly'. This opinion was less commonly reported by married participants with children (stratum 3), who were more likely to suggest positive responses such as offering a variety of foods, distracting the child or showing more affection during feeding: 'children will eat properly if we distract them with birds, TV, animals, and children outside'. Young mothers were well aware of these techniques, but many noted that only mothers who are financially stable can afford to offer a variety of foods to their children.

Gender and complementary feeding

With respect to gender and complementary feeding, participants made a clear distinction between their personal opinions and what is actually practiced in their communities. A majority of participants held the personal opinion that mothers should not discriminate in complementary feeding and that 'both boys and girls are equal', but noted that even if boys and girls are fed equally, sons will always be fed before daughters. Some participants reported that boys are fed higher-quality food in greater quantities because 'there is no use in feeding girls as they are going to leave us for the in-laws' house'. Others noted that this trend has actually changed in recent years: 'nowadays a girl is fed more because she is a future mother and will be going to a new place. Girls face many changes in their life so they must be fed more'.

Discussion

Our results highlight major gaps in adolescent girls' and young women's knowledge of IYCF recommendations, particularly those concerning early and exclusivity of breastfeeding, and feeding of appropriate,

nutrient-rich complementary foods. Similar findings of knowledge gaps have been found among Ethiopian adolescents (Hadley *et al.* 2008); however, no published studies from Bangladesh have focused specifically on IYCF knowledge among adolescent girls. The study documented a consistent and specific set of mismatches between the intended understanding of public health messages on IYCF and adolescent girls' perception of the recommendations.

Misinterpretation of IYCF guidelines

We found that although adolescents are aware of the recommendation to breastfeed exclusively for 6 months, they interpret 'exclusive' to mean breast milk *and* other liquids. This finding was previously reported among adult mothers in urban Bangladesh (Haider *et al.* 1999). Taken together, these results suggest that misinterpretations of exclusive breastfeeding remain common in Bangladesh and may be similar in urban and rural populations. Participants in all three reproductive strata reported the feeding of non-breast milk liquids such as fruit juice and complementary foods well before 6 months as common practices in their communities. This finding is consistent with previous studies among older mothers (Haider *et al.* 1999; Giashuddin & Kabir 2004), suggesting that adolescent girls are influenced by the perceptions and practices of older women in their communities and that perceptions and practices may be based on cultural models in place by adolescence. Misinterpretation of IYCF guidelines among adolescent girls and young women also points to difficulties in translating knowledge into practice. While we did not observe actual feeding practices, our findings parallel those from studies in other developing countries that document earlier weaning among adolescent mothers (LeGrand & Mbacke 1993; Naanyu 2008).

Perceived milk insufficiency: a major barrier to infant feeding

Perceived insufficient milk (PIM) was a commonly reported barrier to breastfeeding, even by participants who did not yet have children. This finding is

consistent with previous research reporting PIM as a key barrier to optimal breastfeeding practices in Bangladesh (Haider *et al.* 2010) and Nepal (Moffat 2002). PIM is widespread not only in Bangladesh; it is the most common reason for early supplementation and/or discontinuation of breastfeeding cited by women worldwide (Dykes & Williams 1999; Sacco *et al.* 2006; Gatti 2008). Research indicates that in reality, very few mothers are physically unable to produce breast milk; therefore, PIM might not be based on a true inadequacy in milk production, but rather on lack of maternal motivation or understanding of basic lactation physiology (Segura-Millan *et al.* 1994). Food insecurity may also influence perceptions of insufficient milk (Webb-Girard *et al.* 2012). In contrast to perceptions about breast milk and infant thirst, and even in hot regions where undernutrition is prevalent, healthy infants do not need additional water during the first 6 months if they are exclusively breastfed. Breast milk itself is 88% water, and is enough to satisfy a baby's thirst (WHO 2009).

Insufficient milk can be used as a rationale not to breastfeed or can even become a reality because of infrequent suckling, the stimulus required for continued production of breast milk (Dykes & Williams 1999). The fact that adolescent girls in this study anticipated this problem even prior to childbearing suggests that they are socialised to lack confidence in their ability to lactate. This has negative implications for future breastfeeding outcomes because reports of insufficient milk have been associated with lowered confidence in breastfeeding (Dykes & Williams 1999). Further, breastfeeding self-efficacy theory (Dennis 1999) denotes that a woman's perceived ability to breastfeed her infant is predictive of: (1) whether she chooses to breastfeed or not; (2) how much effort she will expend; (3) whether she will have self-enhancing or self-defeating thought patterns; and (4) how she will respond emotionally to breastfeeding difficulties (Blyth *et al.* 2002).

Participants often reported that when babies cry after breastfeeding, it is perceived that the baby is still hungry as a result of insufficient breast milk. There is clearly a need to educate girls on interpreting cues from infants, and the fact that crying does not necessarily indicate hunger. In addition, teaching girls how

to identify whether an infant is consuming enough milk (i.e. by observing the passing of urine at least six times per day; WHO 2009), and educating adolescents about ways to stimulate milk production (increased suckling or regular expressing of milk) may reduce anxieties regarding milk insufficiency. If adolescent girls are given the opportunity to engage with IYCF programmes prior to childbearing, they may be more confident in their ability to breastfeed and thus better prepared for motherhood later on.

Perceived generational shifts in feeding practices

A recurring theme that emerged from this study was the perception of generational shifts in infant feeding practices. While the perception that mothers breastfed for longer in the past may be worrisome, some perceived generational shifts reported by participants would be quite encouraging if they reflect reality. The perception that colostrum was discarded in the past, but is commonly fed to babies nowadays suggests that recent efforts to promote safe infant feeding in Bangladesh have been effective in changing some suboptimal feeding practices. This finding parallels recent data from Bangladesh that indicates that 92% of Bangladeshi infants received first milk or colostrum at the time of the study (NIPORT, Mitra and Associates & Macro International 2009).

Also encouraging is the common perception that today's mothers are less likely to discriminate against girls, particularly with respect to quality and quantity of complementary foods. Sex-based differences in nutritional status of Bangladeshi infants have been documented previously and attributed to gender biases in feeding (Chen *et al.* 1981); however, later studies in Bangladesh have found little gender discrimination in feeding practices (Giashuddin & Kabir 2004).

With respect to breastfeeding, results from this study provide conflicting evidence. While some participants claimed that boys are breastfed for longer, many reported the opposite, and others still perceived no discrimination in their locality. The large proportion of adolescents who believed that girls and boys should be breastfed differently based on religious grounds reflects a major misinterpretation of the

Islamic book of Hadith, which in reality, does not in any way suggest that breastfeeding practices should be gender-based (Giladi 1999). It is unclear why or how these misperceptions among adolescents arise in the first place, but given the potential for sex-biased feeding to dramatically affect infant nutritional status, this issue warrants further investigation. Future research in this area might provide a clearer picture of issues of gendering and feeding through observation of actual practices rather than depending on participant reports alone. It is also possible that participants reported less instances of gender discrimination in feeding because their involvement in the SoFEA programme has increased their awareness of gender rights and equality.

Stratification by reproductive and marital status, and region

It is necessary to consider participant and setting characteristics when discussing transferability of findings to other groups or settings (Steinman *et al.* 2010). Findings demonstrate that despite demographic differences between participants in the two regions (Table 2), there exists a great deal of similarity in adolescents' knowledge and perceptions of infant feeding. The ceremonial feeding of rice to infants in Pabna after 40 days ('*Mukh Aida*') is one notable exception. This finding has not been published previously, and warrants further investigation. We suspect that the timing of this practice might be dependent on religious beliefs, and thus may vary among villages; however, we could not confirm this in our results.

Stratification of participants into three distinct life stages demonstrated that adolescent girls with children do not necessarily have a more accurate IYCF knowledge than their unmarried peers. For some IYCF topics, the knowledge of unmarried participants was actually more concordant with key recommendations than that of young mothers. For example, more unmarried participants knew that mothers should initiate breastfeeding within 1 h after giving birth, while many mothers believed that initiation should be delayed until the 'real' milk arrives 2–3 days later. A possible explanation for this finding is that after marriage, girls tend to leave school to begin

full-time work in their husband's household. In this context, in-laws may give married girls different advice about IYCF. This is a strong possibility in our study, as participants commonly reported seeking infant feeding advice from older female relatives and in-laws. Previous research has documented negative influences of husbands and mothers-in-law on maternal decision making and care seeking (Barua & Kurz 2001; Simkhada *et al.* 2010). Thus, any efforts to educate young girls about IYCF must also engage other members of their community and link messages in schools to messages in communities.

Associations between maternal education and improved infant feeding practices are well documented (Huffman 1984; Guldán *et al.* 1993; Kalanda *et al.* 2006). Given that many young Bangladeshi girls enter into arranged marriages, become young mothers and consequently drop out of school (International Centre for Diarrhoeal Disease Research, Bangladesh 2007), public policy must address these underlying problems if infant feeding and nutrition are to improve. This study lends further support to recent calls for improved child protection policies in Bangladesh (UNICEF 2009). One approach might be for the government to provide financial incentives for parents who allow their daughters to complete high school. Such a policy may not only improve infant feeding knowledge and practices, but could also help prevent early marriage and teenage pregnancy.

Implications for behaviour change communication

These findings suggest ways forward in designing more effective interventions for behaviour change communication on IYCF practices among girls and young women based on whether they have entered marriage and begun childbearing or not. Identifying the specific details and types of misunderstanding offers an opportunity to tailor IYCF messages to directly address and reduce mismatched perceptions among girls and young women, and to utilise the knowledge of local cultural beliefs to ensure that the true meaning of the recommendation is understood and followed.

IYCF is relevant to adolescent girls because they are often on the verge of motherhood themselves, and also play a prominent role in the upbringing and care giving of younger siblings. For these reasons, early education and discussion of IYCF topics with young, unmarried girls may be an effective way to improve dominant infant feeding behaviours, as well as the nutrition and development of future generations of children. Indeed, indications are that dissemination of IYCF messages without any discussion or interaction with this demographic group may be less effective in promoting healthy behaviour change. Community-based programmes that train female health workers could play a pivotal role in improving IYCF knowledge in Bangladesh by facilitating nutrition and care giving education and counselling sessions with adolescent girls specifically. In Bangladesh, this model has resulted in improved breastfeeding techniques (Mannan *et al.* 2008), increased initiation and duration of exclusive breastfeeding (Haider *et al.* 2000; Haque *et al.* 2002), improved feeding of hygienic, energy-enriched complementary foods (Brown *et al.* 1992) and reduced neonatal mortality (Baqui *et al.* 2008). Peer counselling is another effective approach that has led to improved rates of breastfeeding initiation, duration and exclusivity in many low-income settings (Chapman *et al.* 2010). In this model, 'breastfeeding peer counsellors are local community women who have successfully breastfed, received training in breastfeeding education, and work with their peers to improve breastfeeding outcomes' (Chapman *et al.* 2010).

Knowledge translation activities

Key findings of this research were reported to the SoFEA programme's management team, who then used this information to develop a life skills training module on IYCF. The benefit of this approach is that modules can be implemented programme-wide, thus even SoFEA club members who did not participate in our study could potentially benefit from the information. Currently, the SoFEA programme has about 300 clubs reaching 13 000 girls, 80% of whom are in the process of completing the life skills training course, which includes the IYCF education module. The

course is delivered using a peer-to-peer learning methodology whereby one girl from each club is trained on the life skills training course and she then delivers the materials to her peers through 27 sessions.

Study limitations

This study limited its focus to young female participants enrolled in BRAC's SoFEA programme and sampled from two relatively similar districts of rural Bangladesh. It would be interesting to extend this research to capture the IYCF perceptions of adolescents who are not SoFEA club members and compare IYCF perceptions of rural vs. urban-dwelling adolescents. As this study was conducted within the context of an existing community-based programme, it is anticipated that findings cannot be generalised. However, given the poor knowledge among those attending a programme that provides life skills training and aims to empower adolescent girls, it would be expected that those not allowed to attend the programme would have even more limited knowledge of IYCF practices. Further limitations are the purposive sampling approach, the small number of FGDs and the short time frame in which data were collected (although each of these aspects of study design had certain advantages as described in the methods previously mentioned). It is possible that random sampling, a larger sample size, additional focus groups and further probing by interviewers may have produced additional information and different results. Despite its limitations, this study is timely because it documents important knowledge gaps among a cohort of young women who have gone largely understudied with respect to IYCF.

Conclusion

Universal uptake of international IYCF recommendations is difficult to achieve without understanding the day-to-day experiences and realities of vulnerable individual caregivers within specific communities. Documentation of adolescent girls' knowledge, attitudes and perceptions on IYCF is an important research priority because they are likely to influence feeding behaviours when adolescent girls become

mothers, and thus the health of future children. Results from this study identified specific IYCF knowledge gaps that can be addressed by targeting interventions at adolescent women with differing reproductive history in rural Bangladesh. We view adolescence as a window of opportunity for influencing unborn child health outcomes, and increased investment in early education of girls on safe IYCF may be an effective strategy to promote and support improved infant feeding practices. When coupled with social and financial empowerment, delivery of infant feeding education to adolescent girls could play a significant role in the building of healthier communities throughout Bangladesh.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

All authors were equally involved in the conceptualisation and design of the study. KH and US led data collection, analysis and interpretation with substantive inputs from DS and CJ. KH drafted the paper with substantive input from DS.

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