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Women's Empowerment and Infant and Young Child Feeding in Bangladesh

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Abstract

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Prevalence of undernutrition partially due to suboptimal infant and young child feeding (IYCF) is a salient issue in the developing world. Women's empowerment is associated with improved child nutritional status but its role in IYCF is not clear. The authors defined women's empowerment specifically for IYCF in the cultural context of Bangladesh, and subsequently examined women's empowerment as a determinant of optimal IYCF. Formative qualitative research done May-August 2012 in Bangladesh suggested that nine domains of women's empowerment are applicable to IYCF: financial, decision-making, mobility autonomy, attitudes towards domestic violence, social support, education, psycho-social well-being, self-efficacy, and negotiation habits. Using a subset of 3,170 mothers from the 2011 Bangladesh Demographic and Health Survey (BDHS), the authors built multiple logistic regression models to test associations between identified domains of empowerment and optimal IYCF. Empowerment was considered both as a dichotomous index and using each domain as a separate exposure in multivariate models. Results indicated positive associations between higher empowerment and optimal complementary feeding practices, but no significant associations between empowerment and breastfeeding practices. Programs and strategies to improve the uptake of effective infant and young child feeding, especially those practices involving complementary feeding, should include a component aimed at bolstering women's empowerment.

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Chapter I: Introduction

Context of Project

The World Health Organization (WHO) estimates that undernutrition is responsible for 35% of deaths in children less than five years of age globally (C. S. T. World Health Organization, 2000). The first two years of life are considered a critical "window of opportunity" for improved nutritional status and growth among infants and young children. Proper nutrition during this critical period, ensured by optimal infant and young child feeding practices, is therefore essential to children's health outcomes (Victora, de Onis, Hallal, Blossner, & Shrimpton, 2010). The standards set by the WHO for optimal feeding and nutrition during this window of opportunity include early initiation of breastfeeding (within the first hour after birth), exclusive breastfeeding for six months, continued breastfeeding until 24 months, introduction of complementary foods at six months, dietary diversity, and meal frequency (World Health Organization, 2010). Taken together, these standards comprise "optimal infant and young child feeding" (IYCF).

Bangladesh's 41% prevalence of undernutrition in children less than five years old is the third highest in the world (Ahmed et al., 2012). A 2012 qualitative study on knowledge, attitudes, and perceptions of infant and young child nutrition and feeding in Bangladesh found that IYCF knowledge in Bangladesh was subpar, which may be commensurate with the large burden of undernutrition in Bangladesh. Although some mothers were aware of the recommendations for IYCF, their interpretations of the optimal practices differed from the WHO recommendations (Hackett, Mukta, Jalal, & Sellen, 2012). According to the 2004 Bangladesh Demographic and Health Survey (BDHS), only 27.5% of mothers initiated breastfeeding within the first hour after birth in Bangladesh, 42% of infants under six months old were exclusively

breastfed, and, among those aged six to nine months, 62.3% received complementary feeding (Mihrshahi et al., 2010). This high occurrence of suboptimal practices is concerning for Bangladesh. The cultural structure of Bangladesh may put women in positions of restricted power and autonomy when it comes to making decisions about the health of their children, as well as about their own health (M. R. Shroff et al., 2011). This may be an important contributor to the high prevalence of undernutrition in Bangladesh. Therefore, exploration of reasons for undernutrition and for challenges to attaining optimal practices could provide essential information leading to improvement of nutrition in Bangladesh.

Problem statement

A growing body of literature suggests that higher levels of women's empowerment result in improved nutritional outcomes in children (Allendorf, 2007; Bhagowalia, Menon, Ouisumbing, & Soundarajan, 2010; Brunson, Shell-Duncan, & Steele, 2009; Doan & Bisharat, 1990; Hossain, Phillips, & Pence, 2007; Sethuraman, Lansdown, & Sullivan, 2006; M. Shroff, Griffiths, Adair, Suchindran, & Bentley, 2009; Simon, Adams, & Madhavan, 2002). Maternal autonomy, for example, was found to have an inverse relationship with child stunting in Andhra Pradesh, India, with mothers scoring higher on the scale of financial autonomy being about 27% less likely to have a stunted child than those who scored lower (M. Shroff et al., 2009). Research has also demonstrated that mothers with higher decision-making autonomy have better-nourished and healthier children. In Shroff et al.'s 2011 study in India, and Doan & Bisharat's research in Jordan (1990), the ability of mothers to make household decisions was significantly associated with children's weight-for-age z-scores (WAZ), showing that mothers with higher participation in decision-making in the household had both infants and young children (under five years old)

that were significantly less underweight and less wasted than those with less decision-making participation (Doan & Bisharat, 1990; M. R. Shroff et al., 2011).

Although the link between several women's empowerment dimensions and children's nutrition and health outcomes has been fairly well established, with much of the research focused on Southeast Asia, limited research has explored the link between women's empowerment and optimal IYCF practices. To date, only one study examines the relationship between women's autonomy and exclusive breastfeeding. Shroff et al. found a significant association between financial autonomy and the practice of exclusive breastfeeding (M. R. Shroff et al., 2011). The outcome measure of this study, however, is limited to only a singular IYCF outcome (exclusive breastfeeding), failing to consider the multidimensional nature of IYCF. This gap in knowledge prevents a compelling assessment of the causal path between empowerment and nutritional outcomes. More complete quantification of the effects of women's empowerment on optimal infant and young-child feeding practices will provide empirical evidence for assessing the causal path between women's empowerment and optimal IYCF behaviors. We can then use this evidence to inform improved programming for women's empowerment specifically for IYCF. Programs worldwide can use evidence-based data to support their empowerment interventions in the areas of IYCF. The research done in this project will also help to identify new areas of interest for behavioral interventions for infant and young child feeding. Understanding of specific associations may allow determination of focal areas of empowerment that can be used to guide interventions and help programs to allocate their resources effectively.

Purpose of project

In this study, therefore, we investigate whether and how the different dimensions of women's empowerment (both separately and collectively represented as a comprehensive

dichotomous variable) are associated with optimal infant and young child feeding practices. The specific aims of the study are twofold: 1) to describe measures of women's empowerment pertinent to IYCF in the specific cultural context of Bangladesh; and 2) to examine the association between levels of women's empowerment and uptake of optimal IYCF practices in Bangladesh, using the most recent Bangladesh Demographic and Health Survey (BDHS) from 2011.

Chapter II: Literature Review

The following literature review will provide necessary context to the aims and objectives of the research. The review will first discuss global child undernutrition, demonstrating the necessity for enhanced understanding of the mechanisms that impede improvements in this area, particularly in Southeast Asia. Second, the literature review will offer an overview of optimal infant and young child feeding, as the outcome of interest in the study. Third, the review will explore the existing definitions of women's empowerment specifically as it relates to infant and young child feeding, and investigate the associations seen in the literature between women's empowerment and infant and young child health outcomes. Last, the review will elucidate the knowledge gap in the research and explain why we must explore the role of women's empowerment in optimal IYCF.

Global Child Undernutrition

Child undernutrition is a challenging and important global public health issue. Definitions of undernutrition include low height-for-age z-scores (stunting), low weight-for-height z-scores (wasting), and micronutrient deficiencies (Black et al., 2008). The World Health Organization (WHO) estimates that undernutrition is responsible for 35% of deaths in children

less than five years of age globally (C. S. T. World Health Organization, 2000). Maternal and child undernutrition account for 3.5 million deaths worldwide annually, and 11% of total global disability adjusted life years (DALYs). In 2005, 20% of the world's children under five were considered underweight, with weight-for-age z-scores (WAZ) of less than -2. The prevalence of children less than five years old who were under this cut-off for WAZ (two standard deviations below the mean) was even greater in South-central Asia, at about 33%. In terms of stunting, about 32% of children under five who live in developing countries have a height-for-age (HAZ) of less than -2. In congruence with the geographic trend for low WAZ, South-central Asia is the region with the greatest number (74 million) and the second-highest prevalence (37%) of children affected by stunting (United Nations Children's Fund, 2012). Furthermore, South-central Asia is also the region with the greatest prevalence of wasting (16%), defined by a weight-for-height z-score (WHZ) of less than -2 (Black et al., 2008).

Optimal Infant and Young Child Feeding

Risk of death increases with descending z-scores, reflecting the impact of undernutrition on mortality. The first two years of life are considered a critical "window of opportunity" for improved nutritional status and growth among infants and young children. This is because proper nutrition during this period is essential to health outcomes of the children (Victora et al., 2010). Prevalence of severe wasting is highest at the younger ages and starts declining at around 24 months, while stunting prevalence steadily increases until it plateaus at 24 months, highlighting the importance of nutrition during this critical window (Black et al., 2008). The standards set by the WHO for optimal feeding and nutrition during this window of opportunity include early initiation of breastfeeding (within the first hour after birth), exclusive breastfeeding for six months, continued breastfeeding until 24 months, introduction of complementary foods at

six months, dietary diversity, and meal frequency (World Health Organization, 2010). Taken together, these standards comprise "optimal infant and young child feeding" (IYCF).

IYCF throughout the world tends to be subpar. Although the global prevalence of exclusive breastfeeding has increased from 33% in 1995 to 39% in 2010, the practice is far from widespread and universal. Only modest improvements were seen in South Asia – 40% in 1995 to 45% in 2010 (Cai, Wardlaw, & Brown, 2012).

Optimal IYCF is essential for infant health and development. Breast-milk carries antibodies from the mother to the child, which cannot be obtained any other way and are essential in protecting the child from illnesses such as diarrhea and acute respiratory infections. In addition, breast-milk plays an important role in stimulating the child's immune system and bolstering responses to vaccination, as well as providing cognitive benefits (Arifeen et al., 2001; Cai et al., 2012). The WHO estimates that each year optimal IYCF practices could save the lives of 1.5 million children under five years old (C. S. T. World Health Organization, 2000). Interventions focused on infant and young child feeding are some of the most effective programs to reduce child mortality, and are thus an important focus for research (Jones, Steketee, Black, Bhutta, & Morris, 2003). Arifeen et al. (2001) estimated that doubling the prevalence of exclusive breastfeeding, to 78%, would result in the reduction of infant mortality by almost one-third (Arifeen et al., 2001).

Risks due to Suboptimal IYCF

A number of studies deal with the risks of morbidity and mortality from suboptimal IYCF, and underscore the importance of optimal IYCF for health outcomes. Suboptimum breastfeeding is estimated to be responsible for 1.4 million child deaths per year, and 44 million DALYs. This constitutes 10% of all DALYs in children under five (Black et al., 2008; Cai et al.,

2012). The relative risk for all-cause mortality associated with partial breastfeeding or no breastfeeding compared to exclusive breastfeeding reflects the importance of optimal IYCF for mitigating mortality. Babies who are only partially breastfed have 2.85 times the risk of death compared with those who are exclusively breastfed (95% CI: 1.59-5.10). For those not breastfed at all, this risk increases substantially to 14.4 times that of those exclusively breastfed (95% CI: 6.09-34.05) (Black et al., 2008).

The WHO Collaborative Study Team investigated effects of differing levels of breastfeeding, beyond the binary predictor of exclusive breastfeeding or no exclusive breastfeeding. They found no significant difference in health outcomes between babies who were predominantly breastfed (minimal other liquids given) and exclusively breastfed. However, they found significant protective effects against both acute respiratory infections (ARIs) (OR=2.4, 95% CI: 1.6-3.5) and diarrhea (OR=6.1, 95% CI: 4.1-9.0) among babies exclusively or predominantly breastfed for the first six months of life compared to those with any other level of breastfeeding or no breastfeeding (C. S. T. World Health Organization, 2000). Bahl et al. (2005) used survival analysis to model the effects of differing levels of breastfeeding on mortality. The results agree with the WHO Collaborative Study Team results, showing no significant difference between babies exclusively breastfed and those predominantly breastfed (HR=1.46; 95% CI: 0.75-2.86) (Bahl et al., 2005). Bahl et al. (2005) also showed that non-breastfed infants had a higher risk of dying than did those who had been predominantly breastfed (HR = 10.5; 95% CI = 5.0–22.0; $P < 0.001$); partially breastfed infants also had a higher risk of dying (HR = 2.46; 95% CI = 1.44–4.18; $P = 0.001$). These findings are consistent with those of a study from Bangladesh that infants who were either only partially breastfed or not breastfed at all had a higher risk of post-neonatal mortality than did infants who were exclusively breastfed for

the first four months of life (Arifeen et al., 2001). Infants who had been partially breastfed were 2.23 times more likely to die than infants who had been exclusively breastfed. Cause-specific hazard ratios for ARIs (HR=2.4) and diarrheal deaths (HR=3.94) showed a greater hazard for infants who were partially breastfed than for those exclusively breastfed. The groups at highest risk for diarrheal deaths were those who were not breastfed at all and those who received energy-containing foods prior to six months (Arifeen et al., 2001).

Factors Associated with IYCF

To plan programs and interventions that will decrease morbidity and mortality due to suboptimal IYCF practices, one must understand the factors associated with these practices. Numerous investigators have studied the predictors of optimal IYCF practices, and, conversely, the predictors of suboptimal practices.

In a community-based cross-sectional study in Ethiopia, age of the infant was identified as a significant predictor of exclusive breastfeeding (Setegn et al., 2012). Infants less than two months old were six times more likely to be exclusively breastfed than infants four to five months old. As the age of the infant approached six months, the rate of exclusive breastfeeding decreased significantly. This difference may be related to post-partum care. If the mother generally stays at home during the first months, she may have more time to practice exclusive breastfeeding, or may feel more comfortable doing so. The authors also speculate that mothers might have started complementary feeding early due to the belief that breast-milk alone is insufficient for the child. In addition to age as a significant predictor, a significant difference was seen between employed and unemployed mothers. Mothers who were unemployed were more likely to exclusively breastfeed their babies. This may also be explained by more time at

home allowing for more comfort breastfeeding, and more free time with which to breastfeed (Setegn et al., 2012).

A similar cross-sectional study in Pakistan was an investigation of another aspect of IYCF, early initiation. Hazir et al. (2013) found that working mothers were 1.48 times more likely not to give breast-milk to their children within the first hour after birth than non-working mothers (OR=1.48; 95% CI: 1.15, 1.87). Those who deliver by caesarian section also have a significantly higher probability of not initiating breastfeeding within an hour of birth (OR=1.95; 95% CI: 1.3, 2.9). The authors also found that mothers who delivered in the presence of a traditional birth attendant were more likely to predominantly breastfeed (PBF) their infants (OR=1.93; 95% CI: 1.62, 3.58) as opposed to exclusively breastfeeding or bottle-feeding them. Because this measure is not a direct comparison of EBF to PBF, whether or not children of mothers who delivered in the presence of a traditional birth attendant were at greater or lesser risk for negative health effects is unclear. Although the mothers who did not practice PBF may have been practicing either EBF or bottle-feeding, they were not practicing optimal IYCF. Predominant breastfeeding, which may include feeding the child water or water-based drinks in addition to breast-milk, significantly increases morbidity; thus traditional birth attendants may counter-productively encourage mothers to adopt this negative practice (Hazir et al., 2013).

In a secondary analysis of DHS data to find significant determinants of IYCF behaviors in Bangladesh, Mihrshahi et al. (2010) identified risk factors for suboptimal IYCF practices and facilitators of optimal practices. Risk factors identified for infants not being exclusively breastfed were higher socioeconomic status, higher maternal education, and living near the Dhaka region. It is likely that those of higher socioeconomic status also have a higher maternal education, and, further, have more access to resources for bottle-feeding. This is consistent with

findings that risk factors for bottle-feeding were higher education level, greater maternal age, and being in upper wealth quintiles. Factors associated with increased rates of exclusive breastfeeding were higher birth order and female sex of the child. In terms of early initiation, urban mothers were at higher risk for not breastfeeding their infants within the first hour after birth than rural mothers. Antenatal care was a significant predictor of early initiation, as was being in the higher wealth quintiles (Mihrshahi et al., 2010).

These factors that have previously been shown to be associated with infant and young child feeding are a good start to understanding how to target IYCF promotion programs to the greatest-risk groups; however, they do not tell us much about the content of the programs. To design programs that will work well to inspire behavior change for optimal IYCF, factors likely to influence behavior should be understood. To diminish undernutrition in the future, interventions should focus on its underlying determinants, one of which is a lack of women's empowerment (Bhutta et al., 2008). Women's empowerment is at the forefront of many large organizations' programming addressing a multitude of issues. Gender-sensitive programming is becoming more and more important for large developmental organizations. Evidence shows an association between levels of empowerment and children's health outcomes, but little evidence indicates a link between empowerment and optimal IYCF practices.

One study was an investigation of whether a program of Knowledge Sharing Practices with Empowerment Strategies (KSPES), focusing on antenatal education and postnatal support strategies, elicited improved rates of exclusive breastfeeding, compared with Routine Standard Knowledge of Breastfeeding Techniques (RSKBT) (Kupratakul, Taneepanichskul, Voramongkol, & Phupong, 2010). Though the authors did not use a comprehensive index of empowerment indicators, and did not look at associations with all practices encompassed in

IYCF, the results are a helpful first step in breaking down the relationship between empowerment and IYCF practices. Rates of exclusive breastfeeding in the experimental group (KSPES) were significantly higher than in the control group at six months postpartum (20% vs. 0% (p=0.0005). This study shows that programs that use knowledge-sharing practices and empowerment strategies together, defined as the transmission of sensations, feelings, or values, play a role in increasing rates of exclusive breastfeeding. The specific role of empowerment in this study is unclear, as it is confounded by the knowledge-sharing practices.

Association between Women's Empowerment and Infant and Young Child Health

The breadth of the concept of women's empowerment leads to its conceptualization by a wide and ever-expanding definition, which is not always agreed upon by scholars. In fact, a proclivity appears in the literature to marry the term "empowerment" with "autonomy," instead of recognizing the nuances that differentiate the two. For the purposes of this research, we will consider empowerment a broader umbrella term that encompasses autonomy. Broadly speaking, empowerment is the process through which individuals or organizations garner control over certain issues (Varkey, Mbbs, Kureshi, & Lesnick, 2010). As an aspect that falls under this umbrella, autonomy will be defined, based on consensus gleaned from the literature, as one's ability to obtain freedom from oppression and recognize one's rights as an individual (Kabeer, 2011).

Previous research has indicated associations between comprehensive empowerment measures and infant and young child health outcomes. Additionally, individual components of empowerment have been associated separately with some measures of optimal IYCF. Whether an association can be found between all infant and young child feeding practices and a

comprehensive empowerment index, involving multiple indicators of autonomy, decision - making, self-efficacy, and social relations, however, has yet to be explored.

Before considering the association between women's empowerment and optimal IYCF, we must decide how to define empowerment in terms of IYCF. In the large body of literature on women's empowerment, a small subset of articles addresses the subject as it relates specifically to infant and young child feeding practices (IYCF). The literature defines the dimensions of women's empowerment as it relates to IYCF in various ways based on different contexts. A number of domains appear commonly throughout the literature and will thus be considered essential aspects of defining empowerment as it relates to IYCF. These aspects are financial autonomy and control over assets; decision-making autonomy; mobility autonomy; attitudes towards domestic violence, social relations and support; education/knowledge; and self-efficacy. We will explore each of these in detail, as the different dimensions of women's empowerment have the potential to impact child health and nutritional outcomes separately (M. R. Shroff et al., 2011). A conceptual framework situating these domains of IYCF empowerment in the broader context of general empowerment demonstrates visually the proposed link between empowerment and optimal IYCF, and how this is postulated to affect health outcomes (Figure 1). This framework was developed based on CARE's theory and framework of women's empowerment, put forth in their "Strong Women, Strong Communities" document, which identifies the three main areas of empowerment as individual agency, societal structure, and relationships (CARE, 2010).

Financial Autonomy/Control over Assets

Women's financial autonomy and control over material assets recurs as an essential domain in the literature on women's empowerment, and IYCF empowerment is no exception.

Financial autonomy has been found to be associated with positive breastfeeding practices as well as complementary feeding and maternal nutrition, likely due to the fact that higher financial autonomy gives mothers more negotiation powers with regard to food purchases (M. Shroff et al., 2009). In a separate study investigating the connection between (a) maternal autonomy and (b) feeding practices and infant growth conducted by Shroff et al. (2011) in rural India, the authors found that financial autonomy was significantly associated with exclusive breastfeeding. In their conclusions from their study on women's empowerment and child nutrition in Bangladesh, Bhagowalia et al. (2010) emphasized the importance of food-purchasing ability on the availability of dietary diversity in households. Shroff et al. (2009) found an inverse relationship between maternal autonomy and child stunting in Andhra Pradesh, India, with mothers scoring higher on the scale of financial autonomy being about 27% less likely to have a stunted child than those who scored lower.

Multiple studies mention women's ability to earn cash, as well as the availability of cash, as positive influences on their children's growth and nutritional status. Women who participate in decision-making regarding expenses on health care, or those who have formal cash earnings are able to provide their children with environments that are more advantageous to their growth (Bhagowalia et al., 2010). In a recent case study from Bangladesh, Schuler et al. (2010) explore how women's empowerment indicators have changed in the past 15 years due to changes in social and economic context. The authors strive to update the empowerment indicators to make sure they remain relevant to the time period. They discuss the ability to make small purchases as an outdated indicator. Though their assertion is notable that spending money is no longer only done by empowered women, because most women in Bangladesh these days do not need permission from others to make small purchases, the authors do not deny the importance of cash

availability in a woman's ability to make these purchases. They state that women's ability to purchase items depends on the availability of cash and not on their ability to exercise agency. This enforces the idea that financial autonomy remains an important aspect of women's empowerment as it relates to IYCF practices. In addition, the same authors put forth that engagement in paid work outside the home, which allows women to have a contribution to family support, is also related to financial autonomy and is considered a variable that can predict empowerment (Schuler, Islam, & Rottach, 2010).

This link between financial autonomy and women's employment status is essential to explore in gaining a full picture of how financial autonomy is related to IYCF. Although ample evidence indicates a positive association between women's financial autonomy and optimal IYCF, we must not overlook the known negative associations between women's employment and breastfeeding practices. As previously discussed, women who are employed have formal cash earnings which allow them more control over decisions made in regard to their children's health (Bhagowalia et al., 2010; Schuler et al., 2010). However, in a study about the frequency and duration of breastfeeding among rural Bangladeshi women, maternal workers had a significantly lower frequency and duration of breastfeeding than housewives (Ghosh, Mascie-Taylor, & Rosetta, 2006). Working mothers spend less time with their infants, thus naturally are unable to breastfeed at optimal frequency. This must be considered as a potential effect measure modifier between women's financial autonomy and optimal IYCF.

Management of or control over other family assets such as houses, land, accounts, and investments is also an important aspect of women's empowerment and is closely related to financial autonomy. Schuler et al. (2010) recognize land ownership, house ownership, and productive assets, as well as cash savings, as important aspects of economic security, which they

set forth as an independent indicator of women's empowerment. In Nepal, researchers showed that Nepali women who owned land were more likely to have the final say in household decisions, and less likely to have severely underweight children. This association makes sense in light of the fact that resources such as food products are more likely to be under the control of women who own land than of those who do not. The probability that a child was severely underweight for mothers that owned land was half that of those who did not (Allendorf, 2007).

Decision-making autonomy

The ability to make decisions of one's own accord, without needing to consult another person, is at the core of empowerment, and is included in most, if not all, definitions of empowerment. In their recent update of women's empowerment indicators from Bangladesh, Schuler et al. (2010) include "involvement in major household decisions" as one of their final indicators. Though these indicators are not specifically geared towards IYCF related empowerment, women's decision-making autonomy is important for child nutrition. Studies done in the 1990s found important differences in the way that men and women spend money (Kabeer, 1999). Men tend to make investments in themselves and in the overall worth of the household, whereas women prioritize spending more on the basic food and healthcare needs of their children. This means that women's decision-making autonomy is especially important for children's health and nutrition in resource-poor areas where food and other necessary items are not readily available (Brunson et al., 2009; Hossain et al., 2007). Additionally, even if a woman has ample resources, knowledge, education, and socio-economic status to keep her children well-nourished and nutritionally sound, she will be unable to utilize these skills to her children's benefit if she has no ability to make decisions regarding feeding practices (M. R. Shroff et al., 2011).

Research has demonstrated that mothers with more decision-making autonomy have better-nourished and healthier children. In Shroff et al.'s 2011 study in India, and Doan & Bisharat's 1990 research in Jordan, the ability to make household decisions was significantly associated with weight-for-age z-scores (WAZ), showing that mothers with higher participation in decision-making in the household had both infants and young children (under five years old) that were significantly less underweight and less wasted than those with less decision-making participation (M. R. Shroff et al., 2011) (Doan & Bisharat, 1990). Providing additional evidence, Hossain et al. (2007) used a proportional hazards model to show that greater levels of autonomy were significantly associated with decreased post-neonatal mortality in Bangladesh. Their model predicted that infants of women with enhanced autonomy and authority in the household would have a one-third decrease in post-neonatal mortality hazard, and child mortality hazard would decrease by nearly one half (Hossain et al., 2007).

Women's autonomy is important not only for infant nutrition, but it continues to be critical as children get older, as well. The magnitude of a woman's decision-making autonomy was shown to determine whether or not a child is given a properly varied and nutritious diet, and whether or not they receive medical attention when needed (Bhagowalia et al., 2010). A study conducted in northern Kenya further demonstrates the implications of women's empowerment on the nutrition of older children. Greater women's decision-making autonomy was significantly associated with improved nutrition based on weight-for-height z-scores (WHZ) among children between the ages of three and ten years (Brunson et al., 2009).

Mobility Autonomy

Women's mobility autonomy has been linked with improved infant-feeding practices and infant growth. Mobility autonomy fits nicely into the UNICEF conceptual framework for child

nutrition and health (Inter Agency Standing Committee Global Nutrition Cluster, 2011). Not only does greater mobility allow market access to purchase foods, medicines, and other essentials, but it also permits visits to a health center in case of illness (Bhagowalia et al., 2010). This provides additional support for the centrality of mobility autonomy to empowerment for optimal IYCF choices. The framework, which is widely accepted among scholars as an appropriate representation of the base, underlying, and immediate causes of undernutrition in children, depicts how household food security as well as lack of health services and an unhealthy household environment can cause undernutrition (Inter Agency Standing Committee Global Nutrition Cluster, 2011). In rural India, Shroff et al. (2009, 2011) observed a significantly positive influence of mobility autonomy on length-for-age z-scores (LAZ; equivalent to HAZ), and that mothers with higher physical autonomy were 40% less likely to have stunted children.

Important to note, however, is Schuler et al.'s (2010) conclusion about mobility autonomy in Bangladesh. They observe that travelling alone no longer seems to be a principal issue in rural Bangladesh; women are most often allowed to do so, but choose not to because they prefer to travel with a companion (either male or female). Many empowered women may also choose not to leave the home for long periods of time due to their responsibilities. Although this complicates mobility autonomy as an indicator of empowerment in Bangladesh, it cannot be ignored in light of the fact that women were still commonly found to avoid going to the market due to its unwelcoming nature towards women. As Schuler et al. (2010) concluded, going to the market is the current "frontier" for women's mobility autonomy in Bangladesh. Due to the fact that market access is essential to IYCF, mobility autonomy remains a salient issue.

Attitudes towards domestic violence

The discourse in the literature often posits issues related to women's attitudes towards domestic violence as integral indicators of overall empowerment for infant and young child feeding. Although the literature is not as clear-cut in this domain due to the fact that in many research studies "attitudes towards domestic violence" is not explicitly stated as an indicator itself, thorough investigation of the research elucidates attitudes towards domestic violence as an appropriate catch-all term for the ideas expressed in this area.

One argument for attitudes towards domestic violence being included as an indicator of IYCF empowerment comes from Bhagowalia et al. (2010). Their findings from Bangladesh show that children of women who accept domestic violence have 7% greater likelihood of being stunted than those of women who do not justify domestic violence (OR=1.07, $p<0.05$). Although this odds ratio is relatively small, its significance corroborates that attitudes towards domestic violence do in some way impact children's health and nutrition outcomes. The authors of this study attribute this to the physical and psychological effects of abuse that decrease a woman's capacity to take care of her children (Bhagowalia et al., 2010). Further support of a connection between domestic violence and children's nutritional health, offered by Ziaei et al. (2012), is that children of women in Bangladesh who had experienced physical intimate partner violence (IPV) had higher odds of being stunted compared to children of women who had never experienced IPV (OR=1.48; 95% CI (1.23-1.79). They found a similar effect among children of those who had experienced sexual violence (OR=1.28; 95% CI (1.02-1.61) (Ziaei, Naved, & Ekstrom, 2012). Additionally, in South India, mothers who had endured domestic abuse and sexual coercion were at greater risk for malnutrition than those who had not, as were their children (Sethuraman et al., 2006). Perhaps experience of IPV parallels high levels of a partner's

controlling behavior, and associated low levels of autonomy and self esteem (Ziaei et al., 2012). In turn, this may impair a mother's ability to care for and properly nourish her child, both physically and emotionally (M. Shroff et al., 2009).

The remaining evidence in the literature is less straightforward, though important to note nonetheless. In the previously referenced study Schuler et al. (2010) cite "political participation" as an indicator of women's empowerment. In their explanation of this, the authors propound among other things that women who participate in public protests against a man beating or abandoning his wife are considered to be empowered women. This can therefore be placed under the domain of "attitudes towards domestic violence" and be considered additional support of the importance of this indicator in IYCF empowerment in Bangladesh. Additionally, in a study exploring gender relations and malnutrition in Western Kenya, Whyte and Kariuki (1991) found that conflict between husband and wife or between a mother and other adults was associated with malnutrition in children. These studies add to a strong rationale for inclusion of attitudes towards domestic violence as a critical domain in empowerment for IYCF.

Social relations and support

In many resource-poor settings, women's empowerment and female autonomy cannot be defined simply as an individual circumstance. It is instead understood in the context of the larger family or community (Hendrickson et al., 2002). Perhaps best stated by Whyte and Kariuki (1991), maternal autonomy is "irrelevant if it means independence in the sense of the ability to manage without the help of others. That kind of independence is only possible for people with a stronger economic situation."

Support for this notion is evident in the literature. Social relations and support are heavily tied to decision-making ability regarding IYCF practices. At the simplest level,

increased opportunities for information sharing allow key IYCF messages to be spread throughout communities (Hendrickson et al., 2002). In the same vein, if women have forums for exchange of information, such as going to the market or attending group meetings and social gatherings, they are able to gain nutrition knowledge and advice which could be beneficial to feeding and maintaining children's health (M. Shroff et al., 2009).

In Mali, Simon et al. (2002) highlighted crucial ties between (a) women's social power and connections and (b) their self-efficacy and decision-making skills around child nutrition. The authors state that women with supportive husbands, mothers-in-law, and other family members had greater influence in household decision-making that impacted the health of their children. Emotional support from natal kin was also found to be an important aspect of child survival. In terms of self-efficacy, the researchers found that women who had supportive and cognitive networks had improved self-esteem and thus improved influence both inside and outside of their households. In addition, women who have greater social connections and more social power have better access to material and informational resources that they need to meet the nutritional needs of their children (Simon et al., 2002).

According to Whyte and Kariuki (1991), social support networks are even more important to health in developing countries than they are in more-developed countries. The problem lies in distinguishing what is supportive in a social network from what is oppressive and can be detrimental. If autonomy is simply defined as individualism, women would be unlikely to strive to be autonomous, as they seek and need support from their families and communities. Women in Whyte and Kariuki's (1991) study did not desire independence from their husbands and families; instead, they desired their husbands' and families' support. Whyte and Kariuki (1991) describe a previous study by Feireman (1981), in which the children who died were those

of socially isolated mothers. These mothers, though possibly autonomous in the individual sense, did not have the social resources necessary for their children's survival (Whyte & Kariuki, 1991).

Schuler's et al.'s (2010) study on women's empowerment indicators in Bangladesh underscores the importance of social connections in the culturally specific context. They retain three indicators of empowerment in Bangladesh that are connected with women's social support networks; access to media and phone, social support, and participation in microcredit or savings programs. Social support is self-explanatory in this context and needs no further description. Access to media such as radio and television has greatly increased women's awareness of health and nutrition issues in Bangladesh, such as hygiene, early marriage, family planning, and nutrition. Women with mobile phones were able to keep in touch with their husbands and other family members, which allowed them to garner further support. Participation in microcredit or savings programs not only offers more financial autonomy, but is connected to social support as well, as meetings of this kind allow women to speak with their peers weekly and share ideas and knowledge (Schuler et al., 2010).

Knowledge and education

Education has long been used as a proxy for maternal autonomy. Some argue that it is completely discrete from autonomy, but others maintain that the two are closely intertwined when it comes to empowerment (M. R. Shroff et al., 2011). According to Hendrickson (2002), increased knowledge is strongly related to increased confidence and self-efficacy, thus it should also be considered an important indicator of women's empowerment. In their Bangladeshi study, Bhagowalia et al. (2010) found that maternal education directly affects the mother's IYCF knowledge, which in turn affects her abilities to care for her children. They support this with

evidence that higher levels of women's empowerment and education are significantly associated with higher height-for-age z-scores (HAZ) and greater food variety in diets. Further evidence from Jordan shows that completion of a secondary education for mothers has a positive influence on children's WAZ in both nuclear and extended families (Doan & Bisharat, 1990).

Compelling evidence supporting knowledge and education as an independent indicator of IYCF empowerment in Bangladesh comes from Schuler et al. (2010), who recently included education as one of their updated indicators of women's empowerment. They argue that because of the increases in access to education for women over the last 15 years, education has become even more important of a source of empowerment for the younger generation of women in Bangladesh (Schuler et al., 2010).

Self-Efficacy

Self-efficacy in terms of IYCF empowerment can be defined as how confident a woman is in her beliefs in her own effectiveness in IYCF practices and in problem solving. In the cultural context of Bangladesh, this may also mean confidence in disagreeing with a husband or other family member who may encourage sub-optimal practices (Schuler et al., 2010). The Breastfeeding Self Efficacy Theory, and corresponding Breastfeeding Self-Efficacy Scale, developed by Cindy Lee Dennis, defines breastfeeding self-efficacy as a "mother's perceived ability to breastfeed her newborn" (Blyth et al., 2002). According to this theory, confident and efficacious mothers are more likely to choose to breastfeed their children, and persist in the face of adversity.

According to Shroff et al. (2011), maternal autonomy can lead to long-term behavioral changes that increase child health and well-being, by increasing mothers' motivation and self-determination. In addition, evidence from Mali supports the importance of self-efficacy and

confidence in the context of IYCF practices. Researchers report that women who scored higher in passivity/helplessness were more likely to have wasted and/or stunted children than those who scored lower on the scale. Mothers who felt like they had more control and thus exhibited greater confidence were more likely to have children who fell in the normal ranges for WHZ (Simon et al., 2002). Also important to consider is a study from Bangladesh that shows that increase in age at the first marriage is related to a lower probability of stunting in children of these mothers, and correlated with more dietary diversity. This relates to the domain of self-efficacy, as younger mothers are likely to have less confidence (Bhagowalia et al., 2010). In Blyth et al.'s (2002) study on self-efficacy and breastfeeding, one-fourth of mothers interviewed reported perceived insufficient milk supply at four months. Self-efficacy scores that incorporate such perceptions were associated with breastfeeding outcomes; those scoring higher on the self-efficacy scale breastfed for longer duration and had optimal exclusivity and initiation. Self-efficacy is clearly an important domain of IYCF empowerment.

Contextual Considerations

Not only do definitions of empowerment differ greatly from study to study, but the language and terminology used to define empowerment may vary greatly by country and culture. Perhaps one empowerment indicator or term may be interpreted differently in different cultures; or similarly, distinct cultures may have different indicators or terms for the same meaning or explanation of empowerment. This can make finding an accepted way of assessing IYCF empowerment challenging, and emphasizes the importance of culturally specific indicators to measure empowerment. An obvious limitation to this literature review in determining definitions of empowerment in Bangladesh is its inclusion of data from countries that may differ greatly in culture and resources from Bangladesh. Though this is recognized, many of the

studies discussed above come from areas in Southeast Asia, which can be presumed to be comparable to Bangladesh in culture, tradition, and resources. Additionally, while literature exists on the definitions of women's empowerment in rural Bangladesh, none of this is directed specifically at the issues of IYCF. With this in mind, and based on the body of literature surrounding the subject of women's empowerment as it relates specifically to IYCF, culturally tailored indicators to assess women's empowerment in this sphere can be considered a necessity if one is to get an accurate picture of how this empowerment impacts IYCF practices in any specific population. While the literature provides a good basis for understanding how to measure empowerment specifically for IYCF, it also underscores the importance of defining empowerment for IYCF in the specific cultural context under which it is to be explored – in this case, that of Bangladesh.

Exploring the Role of Women's Empowerment in Optimal IYCF

Though the connections between women's empowerment and children's nutritional outcomes have been well documented in the literature, little evidence exists to show whether or not a connection exists between women's empowerment and optimal IYCF practices. Because nutritional status is directly tied to infant and young child feeding practices (UNICEF framework) unpacking the potential role of women's empowerment in infant and young child feeding is important. This study aims to diminish this gap in knowledge.

This gap in knowledge is a missing connecting piece between women's empowerment and health outcomes. Without knowledge of whether or not empowerment is affecting people's practices, understanding of the causal path between empowerment and nutritional outcomes is incomplete. If we are able to quantify the effects of women's empowerment on optimal infant and young child feeding practices, we will have empirical evidence for a causal path between

women's empowerment and optimal IYCF behaviors. We can thus use this evidence to support and justify improved programming for women's empowerment specifically for IYCF. Depending on the outcome of the study, programs worldwide can use evidence-based data to support their empowerment interventions in the areas of IYCF.

The research done in this project will also help to identify new areas of interest for behavioral interventions for infant and young child feeding. Specific associations found may allow identification of focal areas of empowerment that can be used to guide interventions and help programs to allocate their resources effectively. The ultimate objective of the study is to investigate the influence of women's empowerment on optimal infant and young child feeding practices. The association between levels of women's empowerment and uptake of optimal IYCF practices in Bangladesh will be explored, using the most recent data from the 2011 Bangladesh Demographic and Health Survey (BDHS).

Chapter III: Manuscript

Title Page

Women's Empowerment and Infant and Young Child Feeding in Bangladesh

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I was involved in this project from the beginning. I conducted the formative, qualitative research in Karimganj, Bangladesh, over the summer of 2012, and subsequently performed the quantitative data analysis using the 2011 Bangladesh Demographic and Health Survey (BDHS) data. My role in the qualitative research was to write the guides for participatory learning and action (PLA) activities, as well as in-depth interview guides (IDI), supervise and manage the facilitation of these activities and interviews, analyze the data from the activities and interviews, and write up the findings. For the quantitative analysis of BDHS data, my role was to obtain the data, clean the data, and perform all subsequent analyses. I was also responsible for writing and preparing the manuscript for publication, including the creation of all figures and tables.

Abstract

Prevalence of undernutrition partially due to suboptimal infant and young child feeding (IYCF) is a salient issue in the developing world. Women's empowerment is associated with improved child nutritional status but its role in IYCF is not clear. The authors defined women's empowerment specifically for IYCF in the cultural context of Bangladesh, and subsequently examined women's empowerment as a determinant of optimal IYCF. Formative qualitative research done May-August 2012 in Bangladesh suggested that nine domains of women's empowerment are applicable to IYCF: financial, decision-making, mobility autonomy, attitudes towards domestic violence, social support, education, psycho-social well-being, self-efficacy, and negotiation habits. Using a subset of 3,170 mothers from the 2011 Bangladesh Demographic and Health Survey (BDHS), the authors built multiple logistic regression models to test associations between identified domains of empowerment and optimal IYCF. Empowerment was considered both as a dichotomous index and using each domain as a separate exposure in multivariate models. Results indicated positive associations between higher empowerment and optimal complementary feeding practices, but no significant associations between empowerment and breastfeeding practices. Programs and strategies to improve the uptake of effective infant and young child feeding, especially those practices involving complementary feeding, should include a component aimed at bolstering women's empowerment.

Research Highlights [requirement of Social Science & Medicine]

- Defines culturally specific domains of women's empowerment for IYCF in Bangladesh
- Quantifies association between women's empowerment and optimal IYCF in Bangladesh
- Confirms mechanism by which women's empowerment influences child health
- Indicates key role for empowerment in reducing undernutrition in South Asia

Keywords: Bangladesh, nutrition, women's empowerment, infant and young child feeding

I. Introduction

The World Health Organization (WHO) estimates that undernutrition is responsible for 35% of deaths in children less than five years of age globally (C. S. T. World Health Organization, 2000). The first two years of life are considered a critical "window of opportunity" for improved nutritional status and growth among infants and young children. Proper nutrition during this critical period, ensured by optimal infant and young child feeding practices, is therefore essential to children's health outcomes (Victora et al., 2010). The standards set by the WHO for optimal feeding and nutrition during this window of opportunity include early initiation of breastfeeding (within the first hour after birth), exclusive breastfeeding for six months, continued breastfeeding until 24 months, introduction of complementary foods at six months, dietary diversity, and meal frequency (World Health Organization, 2010). Taken together, these standards comprise "optimal infant and young child feeding" (IYCF).

Bangladesh's 41% prevalence of undernutrition in children less than five years old is the third highest prevalence in the world (Ahmed et al., 2012). According to the 2004 Bangladesh Demographic and Health Survey (BDHS), only 27.5% of mothers initiated breastfeeding within the first hour after birth in Bangladesh, 42% of infants under six months old were exclusively breastfed, and among those aged six to nine months, 62.3% received complementary feeding (Mihrshahi et al., 2010). This high occurrence of suboptimal practices is concerning for Bangladesh. The cultural structure of Bangladesh puts women in positions of restricted power and autonomy when it comes to making decisions about the health of their children, as well as about their own health (M. R. Shroff et al., 2011). This may be an important contributor to the high prevalence of undernutrition in Bangladesh. Therefore, exploration of reasons for

undernutrition and for challenges to attaining optimal practices could provide essential information leading to improvement of nutrition in Bangladesh.

A growing body of literature suggests that higher levels of women's empowerment result in improved nutritional outcomes in children (Allendorf, 2007; Bhagowalia et al., 2010; Brunson et al., 2009; Doan & Bisharat, 1990; Hossain et al., 2007; Sethuraman et al., 2006; M. Shroff et al., 2009; Simon et al., 2002). Maternal autonomy, for example, was found to have an inverse relationship with child stunting in Andhra Pradesh, India, with mothers scoring higher on the scale of financial autonomy being about 27% less likely to have a stunted child than those who scored lower (M. Shroff et al., 2009). Research has also demonstrated that mothers with higher decision-making autonomy have better-nourished and healthier children. In Shroff et al.'s 2011 study in India, and Doan & Bisharat's research in Jordan (1990), the ability of mothers to make household decisions was significantly associated with children's weight-for-age z-scores (WAZ), showing that mothers with higher participation in decision-making in the household had both infants and young children (under five years old) that were significantly less underweight and less wasted than those with less decision-making participation (Doan & Bisharat, 1990; M. R. Shroff et al., 2011) .

Although the link between several women's empowerment dimensions and children's nutrition and health outcomes has been fairly well established, with much of the research focused on Southeast Asia, limited research has explored the link between women's empowerment and optimal IYCF practices. To date, only one study examines the relationship between women's autonomy and exclusive breastfeeding. Shroff et al. (2011) found a significant association between financial autonomy and the practice of exclusive breastfeeding (M. R. Shroff et al., 2011). The outcome measure of this study, however, is limited to only a singular IYCF outcome

(exclusive breastfeeding), although IYCF is multi-dimensional. This gap in knowledge prevents a compelling assessment of the causal path between empowerment and nutritional outcomes. More complete quantification of the effects of women's empowerment on optimal infant and young child feeding practices will provide empirical evidence for assessing the causal path between women's empowerment and optimal IYCF behaviors. Understanding of specific associations may allow determination of focal areas of empowerment that can be used to guide interventions and help programs to allocate their resources effectively.

In the current study we investigate whether and how the different dimensions of women's empowerment (both separately and collectively represented as a comprehensive dichotomous variable) are associated with optimal infant and young child feeding practices. The specific aims of this study were twofold: (1) to describe measures of women's empowerment pertinent to IYCF in the specific cultural context of Bangladesh; and (2) to examine the association between levels of women's empowerment and uptake of optimal IYCF practices in Bangladesh, using the most recent Bangladesh Demographic and Health Survey (BDHS) from 2011.

II. Methods

We conducted a cross-sectional mixed-methods study to determine Bangladeshi women's definitions of women's empowerment for infant and young child feeding, and whether or not levels of empowerment were related to infant and young child feeding practices. Formative qualitative research was conducted using participatory learning and action (PLA) activities and semi-structured in-depth interviews (IDIs) to determine contextually specific indicators of women's empowerment for IYCF, and to inform the development of appropriate empowerment domains. These empowerment domains were then used in analysis of the 2011 Bangladesh Demographic and Health Survey (DHS) to explore associations between women's

empowerment and indicators of optimal IYCF. This study was deemed exempt from IRB approval by the Emory University IRB, as the qualitative data was originally collected and analyzed for internal use by CARE Bangladesh, thus did not qualify as human research. Both de-identified qualitative and quantitative data were analyzed as secondary data in this study.

Study Setting and Participants

Study Setting

Bangladesh was chosen as the target of this research due to its high prevalence of undernutrition (41%) (Ahmed et al., 2012), and the need for improvement in IYCF practices. The region where the formative qualitative research was conducted, Kishoreganj District, was chosen due to its especially high prevalence of undernutrition (55%), and the presence of CARE Bangladesh's "Window of Opportunity" program, which promotes infant and young child feeding (CARE, 2012).

Sample

Participants in PLA activities were recruited from the CARE Window of Opportunity intervention villages. Activities were conducted with groups of elderly women, pregnant and lactating mothers, and men, with 7-8 participants per focus group. The Windows of Opportunity nutrition intervention takes place in 11 geographical areas (unions); four of these unions were chosen as locations for the formative research based on their performances in the mid-term report. The two highest performing unions and the two lowest performing unions were selected. Participants from these unions were selected purposively by community leaders using inclusion criteria designed to provide a heterogeneous sample, aiming for a range of opinions and perspectives. Twelve PLA activities were conducted in each union, totaling to 48 PLA groups.

IDIs were conducted in two program unions that had not done PLA activities as well as in two regions outside of the Window of Opportunity intervention area. Regions outside the intervention area were chosen to gain perspective from those who had not been exposed to Window of Opportunity's specific programs, thus increasing the validity, reliability, and generalizability of the data. Eligible participants for the IDIs were lactating mothers with children under two years old. Eligible participants were selected from a community by starting at the center of the village and choosing every 10th household. If a chosen individual was unable to participate, or not present, the team continued to the next 10th household. A total of 12 IDIs were conducted. All participants, for both IDIs and PLAs gave informed consent before participating.

Quantitative analysis was conducted using data from the 2011 BDHS. Women 10-49, and men 15-54 were eligible to be interviewed. For the purposes of this study, analysis was restricted to women 15-39, who had children less than 24 months of age.

Data Collection

Qualitative Data Collection

Qualitative methods included participatory learning and action (PLA) activities and semi-structured in-depth interviews (IDI). The PLA activities allowed participants to explore their personal attitudes and opinions on women's empowerment through an active and flexible means. Four different PLA activities were employed; social mapping, pile sorting, problem tree, and 10-seed technique. Facilitators for both the PLA activities and the IDIs were the community mobilizers of the Windows of Opportunity project, who were given two half-day training sessions, one for PLA activities, and one for IDIs. Guides for the PLA activities and IDIs were translated into Bangla and back-translated into English to ensure proper translation and

reliability. The research occurred through an iterative process; guides and probing questions were adapted throughout data collection to allow the researchers to probe further into relevant topics as they came up in the activities. Discussion during each of these activities was recorded using multiple note-takers who took notes in Bangla. The notes were translated each day into English for review of the researcher.

Quantitative Data Collection

The BDHS uses a multi-stage stratified cluster sample design; at the first stage of sampling, 361 primary sampling units (PSU) were chosen from an enumerated list provided by the census enumeration areas (EAs). Selection of PSUs was done independently for each stratum (urban/rural) with probability proportional to size. Urban areas were over-sampled to achieve statistical precision comparable to that of the rural areas. In the second stage of sampling, a household listing operation provided the sampling frame for selection of 30 households from each PSU.

Data Analysis

Qualitative Analyses

Data from the PLA activities and the IDIs were transcribed, coded, and analyzed using standard qualitative analysis techniques including memoing, and both a priori and inductive coding, to find patterns, connections, parallels, or divergent points. A list of key themes was developed and later grouped into broader domains of empowerment as defined by study participants.

Quantitative Analyses

Cross sectional data from the women's re-coded 2011 BDHS dataset, which contains one record for each woman interviewed, were analyzed and adjusted for cluster sampling and sampling weights in Sudaan version 11. The sample was restricted to the most recent child born to each woman between 15-39 years of age.

Outcome Variables: IYCF practices

The outcome variables were measures of IYCF as defined by the WHO recommendations and included: early initiation of breastfeeding (children 6-23 months old), exclusive breastfeeding for six months (children less than six months old), continued breastfeeding for up to 24 months (children 20-23 months old), introduction of complementary feeding at six months (children 6-8 months old), dietary diversity scores (children 6-23 months old), and meal frequency (children 6-23 months old). In addition, a summative index of dietary diversity and meal frequency was created to form a dichotomous variable for minimum acceptable diet (World Health Organization, 2010). We represented each of the outcome measures as a dichotomous variable equal to 0 if the IYCF practice was not completed for the subpopulation in question, and equal to 1 if the practice was considered optimal.

Exposure Variables: Domains of women's empowerment for IYCF

Choice of indicators to be included in the formation of exposure variables and covariates was informed by the qualitative arm of the study as well as a comprehensive literature review conducted prior to quantitative data analysis. Domains of empowerment related to infant and young child feeding with corresponding available data in the BDHS 2011 were as follows: financial autonomy, decision making, mobility autonomy, social relations and support, attitudes towards domestic violence, and education. Each of these domains was coded as a binary predictor variable equal to 0 if the conditions were not satisfied, and equal to 1 if the conditions

were satisfied. In addition, two dichotomous exposure variables involving each of the domains were created. The first variable was coded as empowerment = “low” if less than 4 of the domains were satisfied, and empowerment = “high” if 4 or more of the domains were satisfied. The second variable excluded the education domain from the formula, and was coded as “low” if less than 4 of the remaining domains were satisfied, and as “high” if 4 or more of the remaining domains were satisfied. Additional detail regarding the definition of these variables is found in Table 1.

Modeling strategy

We used multiple logistic regression models to examine the association between the women’s empowerment domains with each of the infant and young child feeding practice outcomes. As each IYCF outcome involves a specific sub-population, some of which are mutually exclusive, the outcomes were each assessed as separate models. Models were built employing three methods; method one utilized the dichotomous predictor variable measuring empowerment as low or high, method two, a multiple exposure model, allowed each of the domains to control for each other as separate predictors, and method three removed the education domain from the dichotomous empowerment variable, and controlled separately for education as a covariate. All models were assessed for interaction, and subsequently confounding, using sequential backwards elimination. Interaction was evaluated using likelihood ratio tests; p values less than 0.05 were considered significant, and interaction terms kept in the model if found to be significant. Confounding was evaluated based on whether or not removing the covariate changed the odds ratio from the fully saturated model by more than 10%. Even if 10% changes in the odds ratio were not seen, covariates that were statistically significant in the model were retained. Covariates were chosen as potential confounders based on their significance in chi-square and t-

tests, when compared with each of the empowerment domains, and included maternal age, religion, place of residence, birth order, caesarian mothers, food security (index based on composite score of how often families ate three square meals in the last year, how often they skipped meals in the last year, how often they ate less food in the last year, and whether or not they had to ask for food from neighbors or relatives in the last year) , wealth index (quintiles), antenatal care attendant, number of antenatal care appointments, and delivery attendant. The method one models were assessed for interactions involving the main exposure and each of the covariates, while interactions between the education domain and each of the other domains were assessed for the method two and three models. Adjustments for the appropriate covariates were made prior to selection of final models. Models were checked for multi-collinearity with cut-offs of condition indices over 30, and at least two corresponding variance decomposition proportions (VDPs) over 0.5, before being finalized. Odds ratios and their 95% confidence intervals were examined for significance and precision, with p-values of less than 0.05, and confidence intervals that did not include the null value considered significant. SAS 9.3 was employed for collinearity assessment, as Sudaan does not support the use of the appropriate collinearity macro.

Quality Control

Qualitative data were anonymous; no identifying information was stored. DHS data were downloaded from measuredhs.com, and are publicly available. Nevertheless, the data were password-protected to prevent use by those without permission to do so.

III. Results

Formative Qualitative Research Findings

Detailed results and write up of the formative research in Bangladesh can be found in the final report regarding this research, prepared for CARE Bangladesh and available upon request from the author (Cliffer, 2012 (Unpublished Results)). Important for the purposes of this mixed-methods study are the nine major domains identified from this qualitative research as relevant to women's empowerment specifically for IYCF in the cultural context of Bangladesh. These are as follows: financial autonomy, decision-making autonomy, mobility autonomy, social relations and support, attitudes towards domestic violence, knowledge and education, psycho social well-being, self-efficacy, and negotiation/accommodation habits. A conceptual framework situating these domains of IYCF empowerment in the broader context of general empowerment demonstrates visually the proposed link between empowerment and optimal IYCF, and how this is postulated to affect health outcomes (Figure 1). This framework was developed based on CARE's theory and framework of women's empowerment, put forth in their "Strong Women, Strong Communities" document, which identifies the three main areas of empowerment as individual agency, societal structure, and relationships (CARE, 2010). Six of these nine domains had data available for quantitative analysis in the 2011 BDHS, while self-efficacy, psycho-social well-being, and negotiation/accommodation habits were unavailable.

Quantitative Results

Description of sample

The total BDHS sample consisted of 3,170 mothers with children less than 24 months old from Bangladesh. The sample is predominantly Islamic (91%), and 77% live in rural locations.

About half (53.2%) of the sample qualifies as having “high” empowerment. Each domain of empowerment was also considered independently; high financial autonomy had a lower prevalence than any other domain (22.2%), followed by decision-making autonomy (60.2%), social support (64.1%), mobility autonomy (64.2%), attitudes towards domestic violence (66.7%), and education (77.5%). Roughly half (48%) practiced early initiation of breast-feeding. Among infants 0-5 months old, 64% were exclusively breastfed at the time of the survey. Among those 6-8 months old, 62% had been introduced to complementary feeding, and among those 20-23 months old, 90% were still breastfeeding. Among children 6-23 months old, 52% were receiving the minimum meal frequency, 23% received minimum food diversity, and 19% received the minimum acceptable diet as standardized by the WHO. Detailed demographic data stratified by each IYCF outcome are presented in Table 2.

Association between women’s empowerment and IYCF practices

The outcome of continued breastfeeding up to 24 months was modeled solely as a bivariate model using the dichotomous exposure variable for empowerment (less than four domains satisfied=”low”, four or more domains satisfied= “high”), due to lack of heterogeneity among the strata (91% of the sample practiced continued breastfeeding); therefore multivariate models involving this outcome are over-parameterized and cannot be interpreted. No problems with multi-collinearity were identified in any of the final models chosen.

Single exposure models using the dichotomous variable for empowerment revealed no significant associations between empowerment and early initiation of breastfeeding (Table 3), exclusive breastfeeding (Table 4), continued breastfeeding (Table 5), or introduction of complementary feeding (Table 6). The multivariate models for these outcomes were similarly not statistically significant, with the exception of the unadjusted multi-exposure model for

exclusive breastfeeding, which indicated that those who scored higher on the education domain were 62% more likely to exclusively breastfeed than those who scored lower on education (OR=1.62; 95% CI: 1.06, 2.49). When this model was adjusted for religion and food security, however, no domains of empowerment were statistically significantly associated with exclusive breastfeeding.

We found significant associations between empowerment and complementary feeding frequency (Table 7), minimum food diversity (Table 8), and minimum acceptable diet (Table 9), in both the single exposure models and the multi-exposure models. Those categorized as high empowerment had a 41% higher probability of achieving minimum feeding frequency than those classified as low, when controlling for wealth and religion. Religion was an effect-modifier when considering the association between empowerment as a single exposure, and both complementary feeding minimum diversity, and minimum acceptable diet. Among Islamic women, those with high empowerment had a 40% higher probability of giving their children minimum food diversity when controlling for birth order, food security, wealth, and delivery attendant (OR=1.4; 95% CI: 1.1, 1.79). Islamic women also had a 50% higher probability of giving the minimum acceptable diet when controlling for birth order, caesarian, food security, and wealth (OR=1.5; 95% CI: 1.15, 1.96). Among Hindu women, however, the association between empowerment and IYCF practices was not significant.

When education was removed from the dichotomous empowerment variable, and controlled for as a separate covariate, empowerment was no longer associated with IYCF practices in these models.

IV. Discussion

In our mixed methods study of women's empowerment and infant and young child feeding, we defined women's empowerment specifically for IYCF, in the context of rural Bangladesh. We then used these definitions to model the relationship between the identified domains of empowerment, and each IYCF outcome. Although we identified nine domains of women's empowerment as it relates to IYCF in our formative research, we were only able to test six of these domains quantitatively, as the questions asked by the BDHS 2011 dictated the variables available for analysis.

Women empowered in four or more domains had greater probabilities of providing optimal complementary feeding frequency and minimum food diversity, as well as the index of these two outcomes (minimum acceptable diet), when controlling for appropriate covariates. In addition, mothers with higher levels of decision-making autonomy or education were more likely to achieve optimal complementary feeding frequency and food diversity, independent of the other dimensions of empowerment, and controlling for additional covariates. Infant and young child feeding practices related to breastfeeding were not found to be significantly associated with empowerment measures as individual domains or as a summary measure.

The relationships between measures of empowerment or varying dimensions of autonomy and infant nutritional status outcomes have been previously studied (Allendorf, 2007; Bhagowalia et al., 2010; Brunson et al., 2009; Chakraborty & Anderson, 2011; Doan & Bisharat, 1990; Meshram, A, K, & N, 2012; Sethuraman et al., 2006; M. Shroff et al., 2009; Simon et al., 2002) as has the relationship between autonomy and breastfeeding practices (M. R. Shroff et al., 2011). However, the relationship between multiple dimensions of empowerment and the comprehensive package of WHO-recommended IYCF optimal practices has yet to be directly

studied. The results presented here can help us to understand the pathway between women's empowerment and healthier children.

The demonstrated association between women's empowerment and complementary feeding practices builds on previous findings suggesting a positive association between women's empowerment and infant nutritional outcomes, and may be an aspect of the link between heightened empowerment and favorable nutritional status in children. Our findings are logical in the context of Brunson et al.'s (2009) conclusion that women's autonomy improved the nutritional status of older children (3-10 years old) but not younger children (0-35 months old). Older children are likely to be affected disproportionately more than younger children by a mother's choices around complementary feeding. Our research, which shows decision-making as a specific aspect of empowerment that is positively associated with complementary feeding, confirms the mechanism for improved nutritional status proposed by Brunson (2009). Women with greater decision-making capabilities may have more say in the foods given to their children, as they have more control over nutritional resources (Brunson et al., 2009). Further supporting this idea are studies done in the 1990s that found important differences in the way that men and women spend money (Kabeer, 1999). Although this is perhaps more forthrightly related to financial autonomy, a domain that was not significantly associated with IYCF in our study, it has important implications for decision-making as well. Among other things, our decision-making variable measured whether or not women were involved in decision-making regarding the health of their children, which inherently includes decisions about whether or not to seek medical care in case of illness. According to Kabeer et al. (2009), men tend to make investments in themselves and in the overall worth of the household, whereas women prioritize spending more on the basic food and healthcare needs of their children. This means that women's decision-

making autonomy is especially important for children's health and nutrition in resource-poor areas where food and other necessary items are not readily available such as Bangladesh (Brunson et al., 2009) (Hossain et al., 2007). Additionally, even if a woman has ample resources and knowledge to keep her children well-nourished and nutritionally sound, she will be unable to utilize these skills to the benefit of herself and her children if she has limited ability to make decisions regarding feeding practices (M. R. Shroff et al., 2011). This is pertinent in the context of Bangladesh, where women must often submit to the decisions of their husbands and mothers-in-law (CARE, 2010) (Schuler et al., 2010). Our findings are consistent with this established paradigm, and confirm the channel through which women's empowerment influences nutritional outcomes.

Of additional importance is that when the education domain was removed from the summary empowerment index, no significant associations were found between the index and any of the IYCF outcomes. This suggests a strong effect of the education domain, to which the remaining dimensions of empowerment, including decision-making autonomy, may be subordinate in terms of importance. The role of education in women's empowerment is controversial. Education has long been used as a proxy for maternal autonomy. However, some researchers argue that education is completely discrete from autonomy (Mason, 1986), while others maintain that the two are closely intertwined when it comes to empowerment (Cleland, 2010; M. R. Shroff et al., 2011). The lack of evidence for significant interaction between education and each of the other domains of empowerment in our study suggests that education is not an effect modifier between the domains of empowerment and IYCF practices, thus it should be considered as a domain of empowerment on its own. Regardless, it is clear that the education and empowerment are closely intertwined. Mothers' education levels are more decisive than

fathers' education in determining child survival (Cleland, 2010). According to Hendrickson, increased knowledge stemming from increased education is related to increased confidence and self-efficacy (how confident a woman is in her beliefs in her own effectiveness in IYCF practices and in problem solving); thus, it should also be considered an important indicator of women's empowerment (Blyth et al., 2002; Hendrickson et al., 2002). In the present study, this may be especially relevant, as we were unable to assess relationships involving self-efficacy, due to limitations of the data, and education may be serving as a proxy for self-efficacy. Evidence from Mali supports the importance of self-efficacy and confidence in the context of IYCF practices (Simon et al., 2002). Researchers report that women who scored higher in passivity/helplessness were more likely to have wasted and/or stunted children than those who scored lower on the scale. Mothers who felt like they had more control and thus exhibited greater confidence were more likely to have children who fell in the normal ranges for WHZ (Simon et al., 2002). Further, in their Bangladeshi study, Bhagowalia et al. (2010) found that maternal education directly affects the mother's IYCF knowledge, which in turn affects her abilities to care for her children. They support this with evidence that higher levels of women's empowerment and education are significantly associated with higher height-for-age z-scores (HAZ) and greater food variety in diets. Additional corroborating evidence from Jordan shows that completion of a secondary education for mothers has a positive influence on children's weight-for-age z-scores (WAZ) in both nuclear and extended families (Doan & Bisharat, 1990). Schuler et al. (2010) provide compelling evidence to support education as an independent indicator of IYCF empowerment. They argue that because of the increases in access to education for women over the last 15 years, education has become even more important of a source of empowerment for the younger generation of women in Bangladesh (Schuler et al., 2010). Our findings support this

idea that education is an important aspect of empowering women to achieve optimal IYCF practices.

Strengths and Limitations

Our analysis identified significant associations between the decision-making and education domains of empowerment, when examined as independent predictors in the multivariate logistic regression models; however the remaining domains should not be overlooked as potential influencers of optimal IYCF outcomes, due to the limitations of variable availability in the data, as well as limitations due to the cross-sectional study design. Additionally, the lack of evidence showing a significant association between women's empowerment and the IYCF practices involving breastfeeding does not definitively rule out empowerment as an important factor in achieving these outcomes. Due to limitations of the variables available in the BDHS 2011 data, we were unable to include self-efficacy, psychosocial attitudes, or negotiation habits in our analysis. These three aspects of empowerment in particular may be more likely to be associated with the breastfeeding features of IYCF, as they concern the mother's confidence in her own abilities to provide for her child, and the attitudes she may possess towards breastfeeding (Blyth et al., 2002). The exclusion of these important dimensions of empowerment in our models may have led to an underestimation of the association between women's empowerment and optimal IYCF, especially regarding the outcomes involving breastfeeding. In addition, assumptions were forcibly made in the coding of the variables that did exist in the dataset; each of the variables coded to create the additive domains of women's empowerment were created using multiple variables from the dataset. Because these variables were combined, with assumptions made at every step, the specific decisions made in the coding

of the variables in this study may lead to either over- or underestimations of the effect measures of the association between empowerment and IYCF outcomes.

Further limitations regard the cross-sectional nature of the data used in analysis. Because each of the IYCF practices involves a specific sub-population, which often differs with regard to the age categories involved, some of the outcomes are mutually exclusive. For example, we cannot sample the same population for exclusive breastfeeding as well as complementary feeding, as each excludes the other. This limited us from modeling the relationship between an overall summative score for optimal IYCF and women's empowerment; instead, we examined each aspect of IYCF as a separate logistic regression. In addition, the nature of cross-sectional data allows only for conclusions regarding associations in the data; though we may have evidence of causality due to temporality of education, which occurs before the outcomes of interest, we cannot make strong causal inferences from the data we have available. Longitudinal data would perhaps be more appropriate for this study, and should be considered in the future.

Regardless of the limitations of the study, our results provide important contributions to the growing body of research on the connections between women's empowerment and IYCF and ultimately child health. Our mixed-methods design has allowed us to verify the conclusions of our qualitative data regarding the Bangladeshi perspective on women's empowerment for IYCF using measurable, quantitative means of statistical analysis. In addition, evaluating each IYCF outcome separately allowed us to examine the nuances between how women's empowerment may influence of the IYCF outcomes differently. We presented a more comprehensive picture of how each of the required IYCF outcomes is affected by women's empowerment. In addition, our use of the statistical package Sudaan is a strength of the study, as it uses Taylor series for variance estimation to account properly for the complex sample design used by the DHS. This

ensures that our results are being interpreted properly, and results are not subject to variance estimation errors. Our results make it possible to hone in on the definitions of women's empowerment for infant and young child feeding, from which we can structure intervention programs and policies directed at reducing child undernutrition.

Conclusions

The results presented and discussed in the present study provide three key messages: (1) women's empowerment, as it has been specifically defined to relate to infant and young child feeding, is positively associated with the achievement of optimal complementary feeding practices; (2) decision-making and education are independently associated with optimal complementary feeding practices; and (3) education is clearly an important determinant of IYCF outcomes, regardless of its consideration as a domain of empowerment, or as a separate indicator.

Programs and strategies to improve the uptake of infant and young child feeding, especially those practices involving complementary feeding, should include a component aimed at bolstering women's empowerment, as it has been defined by this study. Further, decision-making, as well as education, should be highlighted as key domains of women's empowerment that have the potential to greatly influence the practice of optimal complementary feeding among women in Bangladesh. Outreach activities regarding girls' education and empowerment, aimed at adolescents and young women, that instill this empowerment from an early age, should be a priority intervention. Although this research was done in the context of Bangladesh, and we can only make strong conclusions for this single country, given the similarities seen in previous studies between countries in South Asia, our findings may reasonably be considered to apply to other countries in this region.

Future Recommendations

Recommendations for further studies on the relationship between women's empowerment and IYCF involve gathering longitudinal data to allow for a more comprehensive analysis. If longitudinal data is collected from pregnancy on a single cohort followed for an extended period of time, researchers could explore a multiple indicators of optimal IYCF practices, and examine a more complete picture of how empowerment affects IYCF from pregnancy through two years of age. Future studies should also gather data on other empowerment indicators that may be related to IYCF, especially breastfeeding, including self-efficacy, psychosocial attitudes, and negotiation techniques. We recommend that studies in the future be designed for the express purpose of testing the indicators suggested as important for IYCF in Bangladesh, instead of utilizing secondary data, which has limitations due to variable availability in the data. The Breastfeeding Self-Efficacy Scale, developed by Cindy Lee Dennis and validated in multiple contexts may be of use in such a study (Blyth et al., 2002).

In conclusion, after examining the relationship between multiple domains of women's empowerment and optimal IYCF practices, we found that empowerment may have a positive influence on the IYCF practices involving complementary feeding; however, further study of the subject is warranted.

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VI. Tables and Figures

Figure 1. Conceptual framework showing relationship between women's empowerment and infant and young child feeding

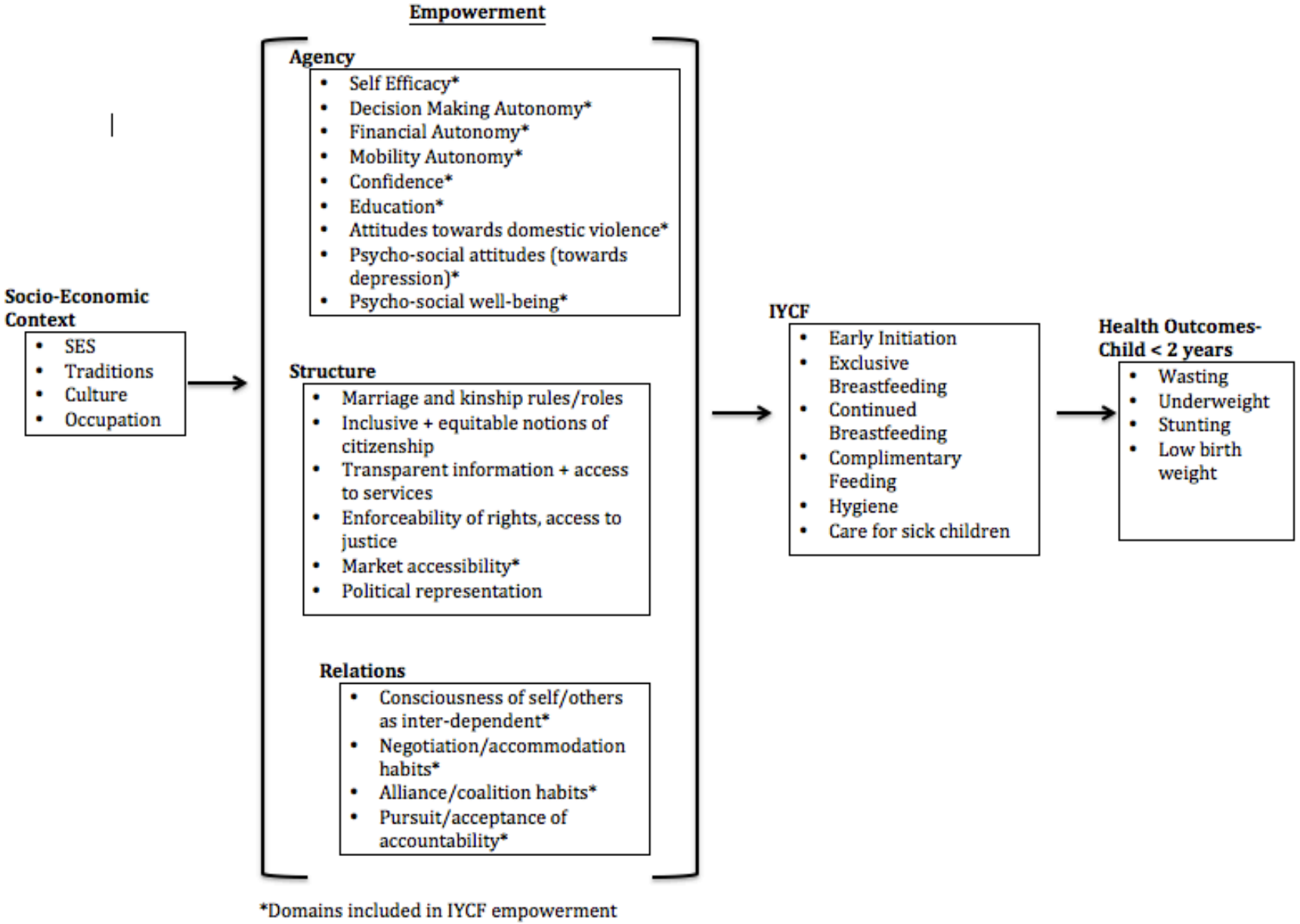

Table 1. Construction of exposure variables for use in modeling the association between women's empowerment and infant and young child feeding practices in Bangladesh

Domain	Yes
Financial Autonomy	2 or more of the following: 1. Woman has a job 2. Woman is involved in deciding how to spend money she makes 3. Woman is involved in decision making about large purchases 4. Woman belongs to a bank or credit union.
Decision Making	3 or more of the following: 1. Woman is involved in decision making regarding child's health 2. Woman is involved in decision making regarding sex 3. Woman is involved in decision making regarding contraception 4. Woman is involved in decision making regarding her own health
Mobility Autonomy	At least one of the following: 1. Woman can visit the health center without permission 2. Woman can visit her family without permission
Social Relations and Support	2 or more of the following: 1. Woman has been visited by a family planning worker in previous month 2. Woman has been visited by a health worker in the previous month 3. Woman has access to a mobile telephone
Attitudes Towards Domestic Violence	Woman disagreed with all of the following: 1. Wife beating is justified if woman leaves the house without permission 2. Wife beating is justified if a woman neglects the kids 3. Wife beating is justified if a woman argues with her husband 4. Wife beating is justified if a woman refuses sex 5. Wife beating is justified if a woman burns the food
Education	2 or more of the following: 1. Woman has completed primary school 2. Woman can read a full sentence 3. Woman has read a newspaper, watched the news on TV, or heard the news on the radio in the previous two weeks
Empowerment	Empowered= scores "yes" for 4 + of the above 6 domains
Empowerment Excluding Education	Empowered = scores "yes" for 4 + of 5 remaining domains, excluding education

Table 2. Demographic characteristics of mothers aged 15-39 in Bangladesh from the 2011 BDHS, by infant and young child feeding outcomes

	Overall (N=3,170)	Outcomes						
		Early Initiation (N=3,134): 0-23 months	EBF (N=789):0-5 months	CF Introduction (N=403): 6-8 months	CF Frequency: (N=2,353): 6-23 months	CF Minimum Diversity: (N=2,348): 6-23 months	Continued Breastfeeding to 24 months (N=476): 20-23 months	Minimum Acceptable Diet (N=2,347): 6-23 months
Variable	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**
OVERALL		**47.7 (1.1)**	**64.1 (2.1)**	**62.1 (2.9)**	**52.3 (1.3)**	**22.8 (1.0)**	**89.8 (1.6)**	**18.6 (1.0)**
Woman's Age, % (CI)								
15-19	22.7 (0.8)	47.2 (2.3)	67.1 (3.9)	66.8 (5.7)	51.1 (2.5)	25.4 (2.2)	82.4 (5.3)	20.9 (2.1)
20-24	37.6 (1.0)	49.7 (1.79)	65.8 (3.3)	63.0 (4.7)	53.6 (1.9)	23.4 (1.6)	90.3 (2.3)	19.4 (1.6)
25-29	24.1 (0.9)	48.3 (2.1)	58.4 (4.1)	57.8 (5.4)	53.1 (2.5)	20.9 (2.0)	93.2 (2.6)	17.2 (1.9)
30+	15.5 (0.7)	42.5 (2.7)	62.2 (5.8)	60.3 (6.6)	49.6 (2.8)	20.8 (2.3)	89.4 (3.6)	16.3 (2.1)
Religion			*		*			
Islamic	91.1 (0.9)	47.4 (1.2)	62.8 (2.3)	62.7 (3.0)	51.2 (1.4)	22.4 (1.1)	89.1 (1.6)	18.1 (1.0)
Hindu	8.5 (0.9)	50.5 (3.6)	77.6 (4.8)	56.8 (9.5)	62.5 (3.4)	25.2 (3.1)	94.3 (3.2)	22.1 (3.2)
Buddhist	0.29 (0.2)	57.2 (2.9)	100.0 (0.0)	100.0 (0.0)	83.3 (7.9)	66.6 (15.8)	100.0 (0.0)	66.6 (15.8)
Residence						*	*	*
Urban	22.7 (0.9)	44.9 (1.9)	64.2 (4.0)	71.7 (5.6)	53.4 (2.4)	34.1 (2.1)	80.5 (4.1)	27.5 (2.1)
Rural	77.3 (0.9)	48.5 (1.4)	64.1 (2.5)	59.9 (3.3)	51.9 (1.5)	19.5 (1.2)	92.8 (1.7)	16.1 (1.1)
Education					*	*		*
No education	16.8 (1.1)	47.5 (2.7)	56.5 (5.1)	56.5 (6.9)	42.1 (2.9)	8.9 (1.6)	92.7 (3.6)	6.8 (1.4)
Primary	29.6 (1.1)	49.8 (2.1)	62.4 (3.8)	57.8 (5.6)	48.7 (2.4)	18.2 (1.8)	93.6 (2.0)	15.4 (1.7)
Secondary	46.4 (1.4)	47.6 (1.5)	66.1 (2.8)	65.2 (3.7)	56.7 (1.7)	26.9 (1.5)	89.5 (2.3)	21.5 (1.4)
Higher	7.1 (0.6)	39.1 (3.5)	76.3 (6.4)	81.0 (9.1)	62.3 (4.2)	48.3 (4.4)	73.3 (8.2)	41.5 (4.3)
Birth Order						*	*	*
1st	36.2 (1.0)	45.3 (1.8)	64.7 (3.3)	64.9 (4.9)	55.4 (1.9)	29.4 (1.8)	84.0 (3.4)	25.2 (1.7)

2nd	29.3 (1.0)	49.3 (1.9)	69.3 (3.6)	65.7 (4.8)	51.6 (2.3)	24.1 (1.9)	89.6 (2.9)	17.5 (1.6)
3rd or 4th	26.5 (1.0)	49.9 (2.0)	59.2 (3.6)	59.0 (6.0)	50.4 (2.3)	16.6 (1.6)	93.6 (2.6)	14.4 (1.6)
5th or higher	8.1 (0.7)	44.8 (3.8)	57.9 (7.9)	50.5 (8.4)	47.3 (4.0)	9.8 (2.2)	99.5 (0.6)	8.4 (2.1)
Delivery by C-section		*	*	*	*	*		*
Yes	17.9 (0.9)	28.2 (2.0)	62.9 (4.3)	75.9 (6.9)	58.3 (2.8)	37.4 (2.8)	86.9 (4.3)	31.7 (2.6)
No	82.1 (0.9)	51.9 (1.3)	64.4 (2.4)	59.4 (3.1)	51.0 (1.4)	19.8 (1.1)	90.4 (1.8)	15.9 (1.0)
Food Security			*			*		*
High	65.7 (1.3)	47.8 (1.2)	68.0 (2.2)	61.4 (3.5)	53.4 (1.5)	26.5 (1.3)	89.1 (2.0)	21.4 (1.2)
Medium	14.4 (0.8)	47.5 (3.0)	62.7 (5.6)	78.0 (6.5)	53.0 (3.4)	22.2 (2.6)	87.9 (4.0)	19.9 (2.5)
Low	6.1 (0.5)	50.4 (3.8)	53.4 (9.6)	42.5 (10.2)	51.4 (4.3)	18.2 (3.2)	94.2 (3.6)	12.0 (2.8)
Severely Low	13.8 (0.9)	45.8 (3.0)	46.3 (6.6)	58.2 (7.4)	47.0 (3.3)	9.2 (1.8)	92.9 (3.5)	8.1 (1.7)
Literacy					*	*	*	*
Literate	63.9 (1.4)	46.6 (1.3)	67.0 (2.4)	63.9 (3.4)	55.8 (1.5)	27.6 (1.3)	88.3 (2.0)	22.2 (1.3)
Somewhat literate	10.7 (0.7)	51.0 (3.1)	57.9 (6.3)	60.1 (9.4)	49.3 (4.1)	17.8 (2.8)	97.6 (1.8)	15.9 (2.7)
Illiterate	25.5 (1.3)	48.9 (2.3)	59.3 (4.8)	58.6 (5.8)	44.7 (2.4)	12.9 (1.7)	91.3 (2.8)	10.9 (1.6)
Wealth Index		*			*	*	*	*
Poorest	22 (1.3)	50.3 (2.6)	56.9 (5.5)	54.1 (5.6)	44.8 (2.5)	9.9 (1.5)	96.3 (2.1)	8.3 (1.5)
Poorer	19.8 (0.9)	47.0 (2.4)	62.2 (4.7)	55.5 (6.4)	52.3 (2.6)	15.5 (1.9)	92.3 (2.9)	13.1 (1.8)
Middle	19.8 (0.9)	49.4 (2.4)	66.4 (4.3)	68.7 (5.3)	57.3 (2.7)	23.6 (2.3)	93.0 (3.1)	18.8 (2.0)
Richer	20.5 (1.0)	49.3 (2.2)	72.2 (3.9)	63.1 (6.5)	53.6 (2.7)	31.2 (2.3)	89.4 (2.8)	25.8 (2.3)
Richest	17.9 (1.0)	41.2 (2.2)	62.4 (4.7)	72.8 (6.2)	54.6 (2.8)	36.9 (2.9)	75.4 (5.3)	29.7 (2.6)
Maternal Employment								
Yes	6 (0.5)	51.4 (3.8)	64.9 (9.4)	69.8 (11.7)	59.3 (4.4)	26.4 (4.1)	84.9 (6.7)	23.3 (3.9)
No	94 (0.5)	47.4 (1.2)	64.1 (2.1)	61.8 (3.0)	51.8 (1.3)	22.5 (1.1)	90.3 (1.6)	18.3 (0.9)
Antenatal Care Attendant		*		*	*	*	*	*
Qualified	57 (1.4)	44.7 (1.3)	63.5 (2.6)	70.5 (3.1)	54.7 (1.6)	28.1 (1.3)	87.2 (2.4)	22.5 (1.3)
Unqualified	11.4 (0.8)	57.7 (3.2)	68.0 (5.4)	57.7 (9.2)	55.6 (3.4)	18.6 (3.0)	96.9 (2.2)	15.2 (2.7)
None	31.6 (1.4)	49.3 (2.1)	64.1 (3.8)	49.1 (5.3)	46.8 (2.3)	14.9 (1.5)	91.8 (2.6)	13.0 (1.4)
Delivery Attendant		*		*		*	*	*
Qualified	32.9 (1.2)	40.3 (1.6)	66.2 (3.1)	71.2 (4.7)	55.2 (2.0)	34.3 (1.9)	84.5 (3.4)	28.1 (1.8)
Unqualified	66.8 (1.2)	51.3 (1.4)	62.6 (2.8)	58.0 (3.6)	51.0 (1.6)	17.5 (1.2)	92.2 (1.7)	14.3 (1.1)
None	0.32 (0.1)	54.1 (18.7)	100 (0.0)	.	43.1 (24.6)	0.0 (0.0)	.	0.0 (0.0)

*p<0.05

Table 3. Odds ratios (OR) and 95% confidence intervals (CI) for associations between early initiation of breastfeeding and empowerment among mothers 15-39 with infants 0-23 months in Bangladesh, 2011

Early Initiation (N=3,134): 0-23 months	Crude OR	95% CI	Full Model OR	95% CI
Model 1: Single Exposure				
Empowered (Ref=Low)^	0.88	0.74, 1.05	0.88	0.73, 1.05
Religion (Ref=Islam)				
Hindu			1.25	0.92, 1.69
Buddhist			1.54*	1.09, 2.19
C-section (Ref=no)			0.37*	0.3, 0.46
Antenatal care attendant (Ref=No Attendant)				
Qualified			1.03	0.85, 1.24
Unqualified			1.43*	1.07, 1.92
Model 2: Multiple Exposures				
Financial Autonomy	1.19	0.99, 1.44	1.15	0.95, 1.39
Decision Making	0.85	0.71, 1.03	0.85	0.70, 1.02
Mobility	0.91	0.75, 1.09	0.93	0.77, 1.12
Social Support	1.06	0.88, 1.27	0.92	0.77, 1.11
Attitudes Towards Domestic Violence	0.87	0.72, 1.04	0.9	0.75, 1.08
Education	0.98	0.79, 1.21	1.12	0.9, 1.38
Religion				
Hindu			1.24	0.91, 1.67
Buddhist			1.54*	1.05, 2.27
C-section			0.35*	0.29, 0.44
Model 3: Education Separate				
Empowered	0.93	0.77, 1.14	0.93	0.77, 1.14
Education (Ref=Low)	0.94	0.76, 1.16		

*p<0.05

^Empowerment coded as <4 domains = ”low”, > 4 domains = “high”

Table 4. Odds ratios (OR) and 95% confidence intervals (CI) for associations between exclusive breastfeeding and empowerment among mothers 15-39 with infants 0-23 months in Bangladesh, 2011

EBF (N=789) :0-5 months	Crude OR	95% CI	Full Model OR	95% CI
Model 1: Single Exposure				
Empowered (Ref=Low)^	0.97	0.69, 1.37	0.93	0.66, 1.33
Religion (Ref=Islam)				
Hindu			2*	1.11, 3.61
Food Security (Ref=Severely Low)				
High			2.41	1.4, 4.13
Medium			1.92	0.93, 3.96
Low			1.32	0.52, 3.32
Model 2: Multiple Exposures				
Financial Autonomy	1.18	0.72, 1.93	1.2	0.72, 1.99
Decision Making	1.02	0.69, 1.51	1.02	0.68, 1.52
Mobility	0.77	0.52, 1.15	0.79	0.53, 1.17
Social Support	1.2	0.84, 1.72	1.28	0.89, 1.84
Attitudes Towards Domestic Violence	1.41	0.98, 2.01	1.35	0.94, 1.95
Education	1.62*^	1.06, 2.49	1.35^	0.94, 1.95
Religion (Ref=Islam)				
Hindu			1.91*	1.06, 3.45
Food Security (Ref=Severely Low)				
High			2.27*	1.31, 3.93
Medium			1.9	0.91, 3.97
Low			1.36	0.54, 3.42
Model 3: Education Separate				
Empowered	1.31	0.88, 1.93	1.31	0.88, 1.94
Education (ref=low educ)	1.61*	1.06, 2.46		

*p<0.05

^Empowerment coded as <4 domains = ”low”, > 4 domains = “high”

Table 5. Odds ratios (OR) and 95% confidence intervals (CI) for associations between continued breastfeeding and empowerment among mothers 15-39 with infants 0-23 months in Bangladesh, 2011

Continued Breastfeeding Up to 24 months (N=476): 20-23 months	Crude OR	95% CI
Model 1: Single Exposure		
Empowered (Ref=Low)^	1.52	0.76, 3.04

^Empowerment coded as <4 domains = ”low”, > 4 domains = “high”

Table 6. Odds ratios (OR) and 95% confidence intervals (CI) for associations between introduction of complementary feeding and empowerment among mothers 15-39 with infants 0-23 months in Bangladesh, 2011

CF Introduction (N=403): 6-8 months	Crude OR	95% CI	Full Model OR	95% CI
Model 1: Single Exposure				
Empowered (Ref=Low)^	0.9	0.57, 1.41	0.85	0.53, 1.35
Number Antenatal Appointments			1.23*	1.11, 1.37
Model 2: Multiple Exposures				
Financial Autonomy	1.01	0.58, 1.76	1.01	0.57, 1.79
Decision Making	1.15	0.66, 1.98	1.16	0.68, 2.00
Mobility	1.28	0.76, 2.15	1.3	0.77, 2.2
Social Support	1.01	0.61, 1.66	1.13	0.67, 1.89
Attitudes Towards Domestic Violence	0.57	0.35, 0.91	0.53	0.33, 0.87
Education	1.41	0.80, 2.49	1.01	0.56, 1.83
Number of Antenatal Appointments			1.24*	1.12, 1.38
Model 3: Education Separate				
Empowered	0.96	0.6, 1.54	0.96	0.6, 1.54
Education (Ref=Low)			1.33	0.75, 2.33

*p<0.05

^ Empowerment coded as <4 domains = ”low”, > 4 domains = “high”

Table 7. Odds ratios (OR) and 95% confidence intervals (CI) for associations between minimum complementary feeding frequency and empowerment among mothers 15-39 with infants 0-23 months in Bangladesh, 2011

Minimum Complementary Feeding Frequency: (N=2,353): 6-23 months	Crude OR	95% CI	Full Model OR	95% CI
Model 1: Single Exposure				
Empowered (Ref=Low)^	1.43*	1.19, 1.72	1.41*	1.16, 1.70
Religion (Ref=Islam)				
Hindu			1.56	1.13, 2.13
Buddhist			4.19*	1.44, 12.16
Wealth (Ref=Poorest)				
Poor			1.34*	1.01, 1.77
Middle			1.6*	1.21, 2.13
Richer			1.37*	1.03, 1.84
Richest			1.44*	1.07, 1.94
Model 2: Multiple Exposures				
Financial Autonomy	1.12	0.88, 1.42	1.11	0.87, 1.4
Decision Making	1.32*	1.07, 1.64	1.31*	1.05, 1.63
Mobility	1.06	0.84, 1.33	1.07	0.85, 1.35
Social Support	1.12	0.91, 1.37	1.13	0.92, 1.38
Attitudes Towards Domestic Violence	0.94	0.77, 1.13	0.93	0.77, 1.12
Education	1.62*	1.29, 2.03	1.63*	1.30, 2.03
Religion				
Hindu			1.58*	1.15, 2.16
Buddhist			4.35*	1.43, 13.23
Model 3: Education Separate				
Empowered	1.21	0.99, 1.48	1.22	0.99, 1.49
Education (Ref=Low)			1.59*	1.28, 1.99

*p<0.05

^ Empowerment coded as <4 domains = ”low”, > 4 domains = “high”

Table 8. Odds ratios (OR) and 95% confidence intervals (CI) for associations between complementary feeding minimum diversity and empowerment among mothers 15-39 with infants 0-23 months in Bangladesh, 2011

CF Minimum Diversity: (N=2,348): 6-23 months	No Interaction Models:				Interaction Model:			
					Islamic		Hindu	
	Crude OR	95% CI	Full Model OR	95% CI	Full Model OR	95% CI	Full Model OR	95% CI
Model 1: Single Exposure								
Empowered (Ref=Low)^	1.35*	1.1, 1.69	1.29*	1.0, 1.63	1.4*	1.1, 1.79	0.54	0.25, 1.17
Religion (Ref=Islam)								
Hindu			0.99	0.69, 1.41				
Birth Order (Ref=5th born+)								
First Born			2.46*	1.4, 4.4	2.35*	1.3, 4.24	14.05	1.0, 192.74
Second Born			1.96*	1.1, 3.50	1.88*	1.0, 3.42	13.03	1.0, 174.6
3rd or 4th Born			1.51	0.83, 2.7	1.51	0.82, 2.8	4.76	0.33, 68.3
Food Security (Ref=Severely Low)								
High			1.87*	1.2, 2.94	2.17*	1.4, 3.41	0.43	.09, 2.08
Medium			2.06*	1.3, 3.36	2.07*	1.3, 3.42	1.79	0.37, 8.78
Low			2.11*	1.1, 3.96	2.53*	1.3, 4.85	0.27	0.04, 1.72
Wealth (Ref=Poorest)								
Poor			1.39	0.9, 2.18	1.51	0.9, 2.42	0.47	.08, 2.72
Middle			2.08*	1.4, 3.13	2.11*	1.4, 3.27	2.06	0.56, 7.65
Rich			2.74*	1.8, 4.22	2.81*	1.8, 4.46	2.04	0.54, 7.73
Richest			3.12*	1.98, 4.9	3.01*	1.86, 4.9	5.24	1.3, 21.4
Delivery Attendant (Ref=Unqualified)								
Qualified			1.6*	1.2, 2.1	1.6*	1.2, 2.11	1.93	.96, 3.88
Model 2: Multiple Exposures								
Financial Autonomy	0.98	0.75, 1.30	1.21	0.9,1.62				
Decision Making	1.38*	1.07, 1.79	1.4*	1.08, 1.82				
Mobility	1.02	0.79, 1.32	1	0.77, 1.31				
Social Support	0.66	0.53, 0.83	0.9	0.71, 1.14				
Attitudes Towards Domestic Violence	0.96	0.76, 1.22	0.85	0.66, 1.08				
Education	2.76*	1.96, 3.88	1.35	0.91, 1.99				
Birth Order (Ref=5th born+)								

First Born			2.29*	1.29, 4.08
Second Born			1.73	0.98, 3.05
3rd or 4th Born			1.34	0.75, 2.40
Food Security (Ref=Severely Low)				
High			1.78*	1.13, 2.79
Medium			1.94*	1.18, 3.19
Low			2.02*	1.07, 3.83
Wealth (Ref=Poorest)				
Poor			1.3	0.82, 2.05
Middle			1.88*	1.23, 2.87
Rich			2.61*	1.67, 4.06
Richest			2.85*	1.78, 4.58
Delivery Attendant (Ref=Unqualified)				
Qualified			1.54*	1.19, 1.99
Model 3: Education Separate				
Empowered (Ref=Low)^	1.01	0.8, 1.26	1.01	0.8, 1.28
Education (ref=low educ)			2.99*	2.14, 4.20

*p<0.05

^ Empowerment coded as <4 domains = ”low”, > 4 domains = “high”

Table 9. Odds ratios (OR) and 95% confidence intervals (CI) for associations between receipt of minimum acceptable diet and empowerment among mothers 15-39 with infants 0-23 months in Bangladesh, 2011

Minimum Acceptable Diet: (N=2,348): 6-23 months	**No Interaction Models:**				**Interaction Model:**			
					Islamic		Hindu	
	Crude OR	95% CI	Full Model OR	95% CI	Full Model OR	95% CI	Full Model OR	95% CI
Model 1: Single Exposure								
Empowered (Ref=Low)^	1.44*	1.1, 1.83	1.38*	1.1, 1.77	1.5*	1.2, 1.96	0.59	0.27, 1.29
Religion (Ref=Islam)								
Hindu			1.14	0.77, 1.71				
Birth Order (Ref=5th +)								
1st born			2.49*	1.4, 4.6	2.34*	1.3, 4.4	12.39	0.9, 179.5
2nd born			1.55	0.8, 2.9	1.47	0.8, 2.84	8.72	0.6, 124.3
3rd or 4th born			1.53	0.8, 2.86	1.51	0.8, 2.87	4.33	0.28, 65.9
C-section (Ref=No)			1.6*	1.2, 2.20	1.64*	1.2, 2.31	1.64	0.77, 3.52
Food Security (Ref=Severely Low)								
High			1.73*	1.1, 2.8	2.07*	1.3, 3.39	0.37	0.07, 1.86
Medium			2.14*	1.3, 3.5	2.18*	1.3, 3.67	1.73	0.36, 8.43
Low			1.51	0.8, 3.1	1.85	0.9, 3.88	0.27	0.04, 1.82
Wealth (Ref=Poorest)								
Poor			1.39	0.9, 2.3	1.52	0.9, 2.56	0.47	0.08, 2.64
Middle			1.92*	1.2, 3.0	1.98*	1.2, 3.21	1.66	0.46, 6.02
Rich			2.64*	1.6, 4.3	2.66*	1.57, 4.5	2.35	0.62, 8.9
Richest			2.9*	1.8, 4.8	2.84*	1.7, 4.85	4.09	0.92, 18.29
Model 2: Multiple Exposures								
Financial Autonomy	1.02	0.76, 1.37	1.23	0.91, 1.67				
Decision Making	1.57	1.18, 2.08	1.59*	1.2, 2.12				
Mobility	0.98	0.75, 1.30	0.99	0.74, 1.32				
Social Support	0.75	0.58, 0.96	1	0.77, 1.29				
ATDV	0.98	0.76, 1.27	0.86	0.66, 1.13				
Education	2.65	1.81, 3.87	1.46	0.96, 2.24				
Birth Order (Ref=5th +)								
1st born			2.35*	1.28, 4.33				

2nd born			1.45	0.78, 2.70
3rd or 4th born			1.41	0.76, 2.62
Wealth (ref=poorest)				
Poor			1.35	0.81, 2.24
Middle			1.87*	1.18, 2.95
Rich			2.69*	1.65, 4.39
Richest			2.84*	1.73, 4.67
Delivery Attendant (ref=unqualified)				
Qualified			1.51*	1.16, 1.97
Model 3: Education Separate				
Empowered (Ref=Low)	1.1	0.87, 1.4	1.11	0.87, 1.42
Education (Ref=Low Educ)			2.84*	1.95, 4.15

*p<0.05

^Empowerment coded as <4 domains = ”low”, > 4 domains = “high”

Chapter IV: Conclusion and Recommendations

The results presented and discussed in the present study can be summarized in three key messages: (1) women's empowerment, as it has been specifically defined to relate to infant and young child feeding, is positively associated with the achievement of optimal complementary feeding practices; (2) decision-making and education are independently associated with optimal complementary feeding practices; and (3) education is clearly an important determinant of IYCF outcomes, regardless of its consideration as a domain of empowerment, or as a separate indicator.

Programs and strategies to improve the uptake of infant and young child feeding, especially those practices involving complementary feeding, should include a component aimed at bolstering women's empowerment, as it has been defined by this study. Further, decision-making, as well as education, should be highlighted as key domains of women's empowerment that have the potential to greatly influence the practice of optimal complementary feeding among women in Bangladesh. Education may be more difficult than decision-making for implementation programs to address in the short term, due to its roots in the infrastructural system of Bangladesh. However, outreach activities regarding girls' education and empowerment, aimed at adolescents and young women so as to instill this empowerment from an early age, should be a priority intervention. Although this research was done in the context of Bangladesh, we can only make strong conclusions for this single country. However, given the similarities seen in previous studies among countries in South Asia, our findings may be transferable to other countries in this region.

Recommendations for Future Research

Recommendations for further studies involving the relationship between women's empowerment and IYCF involve gathering longitudinal data to allow for a more comprehensive analysis. If longitudinal data is collected from pregnancy on a single cohort followed for an extended period of time, researchers could explore multiple indicators of optimal IYCF practices, and examine a more complete picture of how a woman's empowerment affects IYCF from pregnancy through her child's reaching two years of age. Future studies should also gather data on other empowerment indicators that may be related to IYCF, especially breastfeeding, including self-efficacy, psychosocial attitudes, and negotiation techniques. We recommend that studies in the future be designed for the express purpose of testing the indicators suggested as important for IYCF in Bangladesh, instead of utilizing secondary data, which has limitations due to variable availability in the data. The Breastfeeding Self-Efficacy Scale, developed by Cindy Lee Dennis and validated in multiple contexts may be of use in such a study (Blyth et al., 2002).

Public Health Implications

As the first study (a) to define contextually specific indicators for women's empowerment specifically for IYCF, and (b) to explore how women's empowerment is associated with the comprehensive package of IYCF outcomes, the research here contributes to the field of public health's understanding of the mechanism by which women's empowerment influences children's nutritional health. Although our results are inconclusive about the effects of women's empowerment on breastfeeding practices, associations are clearly shown between women's empowerment and optimal complementary feeding. This elucidates the importance of policy and programming that

focuses on women's empowerment as a key factor in instigating behavior change for optimal infant and young child feeding.

In light of the results discussed, we propose the following for IYCF programming:

1) Contextualization of women's empowerment for IYCF. Although we imagine that empowerment for IYCF can be generalized to some degree, as discussed above, different cultures with varying traditions and societal norms may view and define empowerment for IYCF in different ways. Before any interventions, programs, or policies are put into place, empowerment for IYCF should be contextualized and defined, as it was here, for the specific region in which programs are to occur. This will allow programs to be tailored specifically to helping women work on the aspects of empowerment deemed important by that community.
2) Promotion of community groups aimed at instilling decision-making power and self-efficacy in women. Though we were unable to study associations involving self-efficacy and IYCF practices in our analysis, it should be included here, as it was identified by the formative qualitative research (Cliffer, 2012 (Unpublished Results)), and the previous literature (Blyth et al., 2002; M. R. Shroff et al., 2011), as an important aspect of women's empowerment for IYCF. Such groups, which should involve both men and women (mothers and grandmothers), would play not only to the importance of decision-making, as it was identified as one of the key domains of empowerment responsible for increased odds of optimal complementary feeding, but also to social relations and support. The importance of including grandmothers in these groups, especially in South Asian countries, is apparent based on the hierarchical pattern of authority in South Asia, which dictates that the mother-in-

law holds the most influential role in household decision making (Aubel, 2012). If mothers, fathers, and grandmothers are brought together in groups to collectively discuss their role in decision-making, and participate in activities designed to foster women's involvement in the decision-making processes, we may see a profound impact on children's health and nutritional status. Suggested activities are interactive, and involve participants role-playing with each other, to gain ease and comfort in, and familiarity with immersion in the decision-making process.

3) Promotion of girls' education at the community level. We suggest that girls' education and empowerment be a focus starting at early ages. As education was identified as a stand-alone significant dimension of empowerment for optimal IYCF, girls should become empowered to achieve high educational standards. Promotion of girls' education should target parents, grandparents, and children themselves. Focus should be placed on enrolling girls in school, and maintaining high attendance rates.
4) Promotion of self-sustaining micro-finance groups. Such groups should involve no outside loans, but rather should be comprised of small groups of women who come together weekly to contribute their own money to a communal pot, while socializing and learning about important health topics. Women in the group will then be able to ask for loans from the collective group money to conduct income-generating activities, with intent to pay the loan back with earnings from their proposed activity. These groups will not only allow women to garner their own income source, stimulating financial autonomy, but will also foster social support and relations, thus hitting on two major domains of empowerment for IYCF. Regardless

of the status of social relations and support and financial autonomy as significant predictors of IYCF practices, they should not be excluded as important domains of empowerment.

The incorporation of these suggestions into the current programs for IYCF could greatly increase the efficacy of these programs in promoting behavior change for optimal IYCF. Behavior change for optimal IYCF is paramount to reducing child morbidity and mortality due to undernutrition, a problem that remains salient in South Asian countries, including Bangladesh. We learned in our analysis that women's empowerment could be pivotal to ensuring that mothers practice optimal IYCF during the critical window of opportunity for child nutrition and health. Thus, our research indicates a potentially key role for the recommendations here in reducing undernutrition in the developing world, especially South Asia.

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Appendix

Appendix A: Executive summary from final report on formative qualitative research

Development of indicators of women's empowerment for optimal infant and young child feeding and related maternal nutrition practices in rural Bangladesh

Executive Summary

Although research has been done to identify ways of measuring levels of women's empowerment in general, little has been done to relate these indicators specifically to infant and young child feeding and related maternal nutrition (IYCF and rMN) prior to this report. Additionally, CARE Bangladesh's Strategic Impact Inquiry (SII) on Women's Empowerment addresses empowerment in Bangladesh, but does not include the specifics of how it relates to the ability of women to practice optimal IYCF and rMN. Based on the body of literature surrounding the subject of women's empowerment as it relates specifically to IYCF and rMN, it is evident that culturally tailored indicators to assess women's empowerment in this sphere are imperative in order to get an accurate picture of how empowerment impacts IYCF and rMN practices in any specific population.

This report establishes domains of empowerment and culturally specific indicators that measure women's empowerment as it relates specifically to IYCF and rMN in rural Bangladesh. It provides CARE Bangladesh with the tools needed to assess the impact of their women's empowerment interventions on optimal IYCF practices.
Qualitative research was conducted using participatory learning and action (PLA) activities and in-depth interviews (IDI). Four different PLA activities were employed; social mapping, pile sorting, problem tree, and 10-seed technique. Thematic analysis of the PLA and IDI data revealed nine distinct domains of women's empowerment: financial autonomy/control over assets, decision making autonomy, mobility autonomy, attitudes towards domestic violence, social relations and support, knowledge/education, self-efficacy, negotiation/accommodation habits, and psycho-social well-being.

Financial Autonomy/Control over Assets: Women's control over finances was an important aspect of women's ability to practice optimal IYCF and rMN. If women have no cash available in their possession, or have no means of making their own money, then they have no way of purchasing foods for themselves and their children. This lack of purchasing power was seen by the communities interviewed as a restriction to women's capabilities in optimal complementary feeding of her children, as well as her own nutrition during pregnancy and lactation.

Decision Making Autonomy: Respondents underscored the importance of mothers being the primary decision makers when it comes to IYCF and rMN, as they are the chief care-takers of the children. Women whose husbands or mother-in-laws were no longer around often felt empowered to make their own decisions regarding IYCF and rMN, and attributed this to the absence of their traditionally more powerful husbands or mothers-in-law.

Mobility Autonomy: Mobility is heavily interconnected with each of the other identified domains

of women's empowerment. If a mother has no mobility autonomy to reach a health center, she is severely restricted in her ability to reach a doctor or hospital in the case of her child's illness or to ensure a safe delivery for her child. Market accessibility becomes much more difficult if a woman has no mobility autonomy to reach the market. Restrictions on mobility also influence a mother's social connectedness and her ability to seek advice and suggestions regarding IYCF from those outside of her family.

Attitudes towards Domestic Violence: Community members discussed the fact that women who felt fear of their husbands or of their mother in laws were less likely to feel empowered to practice optimal IYCF and rMN. Participants observed that mothers that accepted aggressive deprivation of food or support by either their husbands or mothers-in-law were less likely to have satisfactory IYCF and rMN behaviors.

Social Relations and Support: Social relations were found to encourage and empower women to improve their IYCF and rMN practices. Social networks lead to information sharing about IYCF and rMN, which empowered women to achieve optimal practices. Family members were said to empower a mother through suggestions and advice about feeding. Mothers who receive this type of support from their family feel more emotionally equipped to manage their children's nutritional health.

Knowledge and Education: Formal education and literacy allow mothers the ability to gather information from posters and pamphlets, and gives them the obvious advantage of having learned about health and nutrition in school, thus empowering them to make positive choices in their practices. Community members underscored the fact that once a woman feels she has sufficient knowledge about IYCF and rMN, she feels empowered to practice what she has learned, as well as teach it to others.

Self-Efficacy: A woman's self-efficacy in terms of IYCF and rMN is a measure of her confidence in own abilities to achieve optimal practices. Women were perceived by the community to be empowered for IYCF and rMN if they had no feelings of discomfort or embarrassment in making changes in their behavior that ran contrary to their social and cultural norms. When speaking about women who had not achieved empowerment, participants explained that some women are not confident that they will produce enough breast-milk to sustain their child, or that they can get their child to eat complementary feeding if the child does not appear interested in the food. This lack of confidence hinders these women in their IYCF and rMN capabilities.

Negotiation/Accommodation Habits: Mothers in the rural villages of Bangladesh have extremely heavy work-loads, which sometimes interferes with their ability to perform optimal IYCF and rMN. Discussion between participants revealed that mothers who showed negotiation skills in asking for help with their housework were perceived as being more empowered, and those who persist with their work without asking for help were less empowered.

Psycho-Social Well-Being: The idea of stress and tension came up often as a negative impact on a woman's empowerment for IYCF and rMN. Participants agreed that mothers who often felt annoyed by their children, or mothers who were unhappy due to stress or tension were seen as

less empowered in the area of IYCF and rMN. Tension was a common term used to describe something that could stop a mother from breastfeeding or from cooking nutritious complementary foods for her child.

The findings presented in this report reflect the common perceptions, definitions, and terminology used by the population of rural Bangladesh to represent women's empowerment specifically for IYCF and rMN. CARE Bangladesh can use these identified domains, and their sub-indicators presented in this report to assess the impact of the empowerment components of their IYCF interventions, as well as to inform future interventions focused on women's empowerment. We recommend that the domains and sub-indicators be validated using quantitative data, to ensure that the sub-indicators for empowerment will properly correspond to optimal IYCF.