UPPSALA
UNIVERSITET

Women's status and child nutrition

Findings from community studies in Bangladesh and Nicaragua

SHIRIN ZIAEI

Abstract

Ziaei, S. 2016. Women's status and child nutrition. Findings from community studies in Bangladesh and Nicaragua. *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1252. 61 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-554-9675-3.

The importance of women's status for child nutrition has recently been recognized. However, pathways through which women's status can affect their caretaking practices and child nutrition have not been fully determined. The aim of this thesis was to evaluate associations between aspects of women's status – including exposure to domestic violence and level of autonomy and social support – with their level of stress, feeding practices and child nutritional status in two different cultural settings: Bangladesh and Nicaragua.

Data were acquired from population-based studies. For Study I we used data from the Bangladesh 2007 Demographic and Health Survey, and Study II was embedded in the 2009 Health and Demographic Surveillance System conducted in Los Cuatro Santos, rural Nicaragua. Studies III and IV were part of the MINIMat study, conducted in rural Bangladesh. In-person interviews were conducted and validated questionnaires were used in each of the studies. Anthropometric characteristics of the children were recorded based on standardized World Health Organization techniques.

In Bangladesh, we found women with lifetime experience of domestic violence to be more likely to report emotional distress during pregnancy, cease exclusive breastfeeding before 6 months and have a stunted child. Further, we found a negative association between experience of domestic violence and duration of excusive breastfeeding to be mitigated with breastfeeding counseling. In Nicaragua, a lower level of maternal autonomy was associated with more appropriate breastfeeding practices such as higher odds of exclusive breastfeeding and longer continuation of breastfeeding. Further, a maternal lower level of social support was associated with better child nutritional status.

In conclusion, this investigation showed that different dimensions of women's status were associated with their feeding practices and child nutritional status and also revealed that the strength and direction of these associations may vary by the child's age, setting and other contextual factors. These findings suggest that women's status might have an important public health impact on child health and its role should be considered in programs and policies aiming to improve child health and nutrition.

Keywords: Women's status, Domestic violence, Autonomy, Social support, Feeding practices, Child nutrition, Bangladesh, Nicaragua

Shirin Ziaei, Department of Women's and Children's Health, International Maternal and Child Health (IMCH), Akademiska sjukhuset, Uppsala University, SE-75185 Uppsala, Sweden.

To my beloved parents

List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

I   Ziaei S, Naved RT, Ekstrom EC. (2014) Women's exposure to intimate partner violence and child malnutrition: findings from demographic and health surveys in Bangladesh. *Maternal & child nutrition*, 10(3):347-59.

II   Ziaei S, Contreras M, Zelaya Blandon E, Persson LA, Hjern A, Ekstrom EC. (2015) Women's autonomy and social support and their associations with infant and young child feeding and nutritional status: community-based survey in rural Nicaragua. *Public Health Nutr*, 18(11):1979-90.

III Ziaei S, Frith AL, Ekstrom EC, Naved RT. (2016) Experiencing lifetime domestic violence: associations with mental health and stress among pregnant women in rural Bangladesh. The MIN-IMat randomized trial. *Submitted*

IV   Frith AL, Ziaei S, Naved RT, Khan AI, Kabir I, Ekstrom EC. (2016) Breastfeeding counseling mitigates the negative association of domestic violence on exclusive breastfeeding duration in rural Bangladesh. The MINIMat randomized trial. *Submitted*

Reprints were made with permission from the respective publishers.

Contents

Abbreviations

APRODESE	Asociación para el Desarrollo Económico y Social El Espino
BAZ	BMI-for-Age Z-score
BDHS	Bangladesh Demographic and Health Survey
BF	Breastfeeding
BFC	Breastfeeding Counselling
BMI	Body Mass Index
CBF	Continued Breastfeeding
CTS	Conflict Tactic Scale
DV	Domestic Violence
EBF	Exclusive Breastfeeding
FFQ	Food Frequency Questionnaire
GEE	Generalized Estimated Equations
HAZ	Height-for-Age Z-score
HDSS	Health and Demographic Surveillance System
HP	Highly Processed
HPA	Hypothalamic-Pituitary-Adrenocortical
ICDDR, B	International Center for Diarrheal Diseases Research, Bangladesh
IPV	Intimate Partner Violence
LA	Latin America
LBW	Low Birth Weight
MAD	Minimum Acceptable Diet
MDD	Minimum Dietary Diversity
MINIMat	Maternal and Infant Nutrition Intervention, Matlab
MMF	Minimum Meal Frequency
PTSD	Post-Traumatic Stress Disorder
SA	Southern Asia
SD	Standard Deviation
SSA	Sub-Saharan Africa
SSB	Sugar-Sweetened Beverages
SRQ	Self-Reported Questionnaire
UHM	Usual Health Message
UNICEF	United Nations Children's Emergency Fund
WAZ	Weight-for-Age Z-score
WHO	World Health Organization
WHZ	Weight-for-Height Z-score

Glossary and Definitions

Controlling behavior: Any behavior, such as isolation, monitoring one's movement, or restricting his/her access to resources and information, enacted for the purpose of controlling any other individual (1, 2).

Emotional violence: Any behavior, such as insult, humiliation or threat, that causes emotional harm or trauma (2).

Emotional distress: Having symptoms of depressive and anxiety disorders, such as headache, tiredness, crying and suicidal thoughts, which are typically encountered in community and primary care settings (3).

Food insecurity: Limited access or uncertain availability of food needed for a healthy and active life for all household members in terms of quantity, quality, safety, cultural acceptance and future expectation (4).

Growth faltering: A situation where a child's growth pattern moves downward from the World Health Organization's standard growth curve (5).

Low birth weight: Having a birth weight of less than 2500g (6).

Nutritional transition: The change in the dietary pattern from a traditional, locally produced diet to a globalized, imported diet which tends to and increases the risk of overweight/obesity (7).

Overweight: Having a BMI-for-height Z-score>2 SD in relation to the World Health Organization's reference population. This indicator mainly reflects a child's over-nutrition (8).

Physical violence: Intentional use of physical force with the potential for causing death, injury or harm (9).

Sexual violence: Any kind of harmful or unwanted sexual behavior that is imposed on an individual (9).

Stunting (Shortness): Having a height-for-age Z-score<-2 SD in relation to the World Health Organization's reference population. This indicator mainly reflects failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions (8, 10).

Underweight: Having a weight-for-age Z-score<-2 SD in relation to the World Health Organization's reference population. This indicator reflects body mass relative to chronological age and can be influenced by both the height of the child (height-for-age) and his or her weight (weight-for-height) (8, 10).

Wasting (Thinness): Having a weight-for-height Z-score<-2 SD in relation to the World Health Organization's reference population. This indicator mainly reflects a severe process of weight loss, which is often associated with acute starvation and/or severe diseases (8, 10).

Introduction

Global burden of child undernutrition

Child undernutrition remains a major public health problem and is responsible for 45% of deaths in children aged under 5 in the world (11). Globally, an estimated 165 million children under 5 years of age are stunted and 52 million are wasted with the highest prevalence located in Sub-Saharan Africa (SSA) and Southern Asia (SA) (12). Undernutrition during early life is associated with childhood mortality and morbidity and higher risk of non-communicable diseases in later life. Furthermore, nutritional deficiencies can limit the mental and physical development of children and negatively affect their later productivity and working capacity (13, 14).

The causes of child undernutrition

According to the UNICEF conceptual framework (*Figure 1*), inadequate dietary intake and diseases are two immediate causes of childhood undernutrition which manifest at the individual level. In turn, they are influenced by underlying factors manifesting at the household level, including caregiving practices, food security, and access to health care services and a healthy environment. Finally, basic causes of childhood undernutrition manifest at societal level and include environmental, technological and human resources and the way that these are utilized and controlled (15).
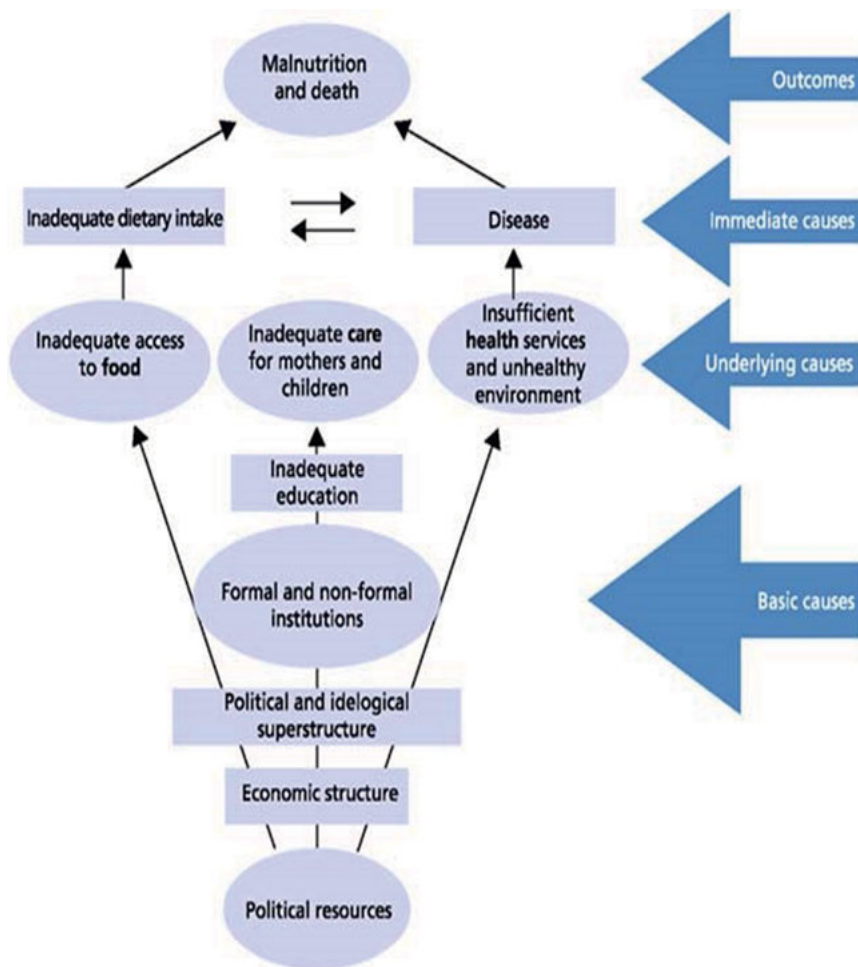
Figure 1. UNICEF conceptual framework for the causes of child undernutrition.
(Source: Food and Agriculture Organization, keynote paper: Measuring hunger and malnutrition).

The importance of care

The significance of care, along with food security, a healthy environment and health care services, has been highlighted in the UNICEF framework. "Care" has been defined as the provision of time, attention and support within the household or in the community in order to meet physical, mental and social needs of the growing child and other household members (16). Care manifests in various activities, including feeding practices, particularly breastfeeding (BF) and the feeding of young children, food preparation and storage, hygienic practices, psychosocial stimulation, providing care for the

children during illnesses and care for women, including care for pregnant and lactating women (17).

In circumstances where poverty causes limited access to food and health care services, the importance of care becomes more prominent. In such situations, proper caregiving activities can enhance the use of existing resources to improve health and nutrition, both in women and children (18).

Child care and nutrition during the first years of a child's life

The first 1000 days of life, from conception to the second birthday, has been recognized as being a critical period for child growth and development. During this period, a child is more susceptible to growth faltering, micronutrient deficiencies and common childhood diseases (19). Results from epidemiological studies have suggested that linear growth faltering that occurs during this period might be irreversible after 2 years of age (20, 21).

Optimal infant and young child feeding practices have been acknowledged as being some of the key aspects of child care as well as important determinants of child growth and development (18, 19). Exclusive breastfeeding (EBF) for 6 months, timely introduction of suitable complementary food and continuation of breastfeeding until the age of 2 or beyond have been recommended ways to promote optimal nutrition and health benefit for children during this period (22).

Breastfeeding

Breastfeeding has been shown to provide numerous health benefits for both infants and mothers. A recent meta-analysis indicated lower incidence of infection and mortality and higher intelligence among children who were breastfed (23). There is also some evidence suggesting that BF might protect children from being overweight and developing diabetes later in life (23, 24).

While practicing EBF for the first 6 months has been recommended for child survival, health, growth and development (25, 26), only 37% of children in low- and middle-income countries are exclusively breastfed and the duration of BF is even lower in high income countries (23). Breastfeeding promotion interventions, including education, counseling and support, are suggested as key components for improving breastfeeding practices (27). Such interventions have been shown to increase the rate of EBF by 90% and reduce the rate of non-breastfeeding by 18% at age 1–5 months (28).

Complementary Feeding

Complementary feeding refers to the introduction of safe and highly nutritious food in addition to breast milk at the age of 6 months until 24 months (29, 30). The period of complementary feeding coincides with the time of peak incidence of childhood malnutrition and growth faltering (21, 31). According to the World Health Organization (WHO), complementary feeding should be timely, adequate, safe and given in an appropriate way (32). Proper complementary feeding interventions have been suggested to be one of the most efficient strategies to promote childhood growth and development during this period (33, 34).

Women's status and child undernutrition

While several determinants of child undernutrition, such as inadequate dietary intake, infectious diseases and lack of proper health services, have previously been recognized, not until recently has the importance of women's status in relation to child nutrition been considered. It was only when scientific efforts were made to understand the higher prevalence of undernutrition in SA compared to SSA, despite better economic growth and better indicators of food security in SA, that the significance of women's status was exposed. This phenomenon has been labeled the "Asian enigma" by Ramalingaswami et al (35), and, in trying to explain these differences, they identified that lower women's status and disempowerment in Asia is one of the main contributors to child undernutrition in the region. They suggested that the promotion of equal freedom, opportunities and rights – including rights in decision making participation – within and outside the household is necessary in order to reduce child undernutrition (35).

Definition of women's status

Women's status is a complex term and no consensus has yet been reached on a standard definition of one's status. The term has been used interchangeably and in association with "empowerment", "equality", "agency" and "power". Women's status refers to women's overall position in society, which can affect their authority, rights and privileges (36). This status can be gained through birth, increasing age, education, economic position and adherence to the expected behaviors (37).

Smith et al defined women's status as "women's power relative to men's in the households, communities, and nations in which they live" (36). They

noted three important aspects regarding this definition: first, women's status is always considered relative to the status of men rather than being absolute or relative to the other women; second, it is based on their power and ability to make choices; and third, this definition has both intra-household and extra-household dimensions (36).

Pathways between women's status and child nutrition

Women's status is a multidimensional concept and it can affect different domains of their lives, therefore, pathways through which women's status can affect child nutritional status are complex.

Going back to the UNICEF conceptual framework (*Figure 1*), women's status can be included as both a basic and/or underlying cause of childhood undernutrition, however, its effects ultimately manifest at the household level and can potentially affect child nutritional status through food security, health environment and, in particular, through women's caretaking capacities (36) .

In the majority of societies women are the primary caretakers of children. In order to provide effective care they require certain resources, such as: appropriate education, knowledge and beliefs; good physical health and nutritional status; good mental health, including self-confidence and lack of stress and depression; autonomy and control over resources; a reasonable workload and adequate time; and social support (17). The ability of women to provide proper care ultimately depends on their access to and usage of these resources as well as the quality of care that they themselves received.

Women with lower status might be more likely to experience domestic violence (DV), have little social support and limited access to and control over household resources, and tighter time constraint (36, 38). They also might have stricter constraints on their freedom of movement and, subsequently, limited access to health care services and information (39). Further, they might have poor physical health and nutritional status as well as poor mental health and lower self-esteem and self-confidence (35, 40). These situations can negatively influence the quality of care that the women can receive and/or provide through limiting their access to necessary resources and/or by impairing their mental and physical health, all of which ultimately affect their pregnancy outcomes as well as the nutritional status of their children (36) (*Figure 2*).
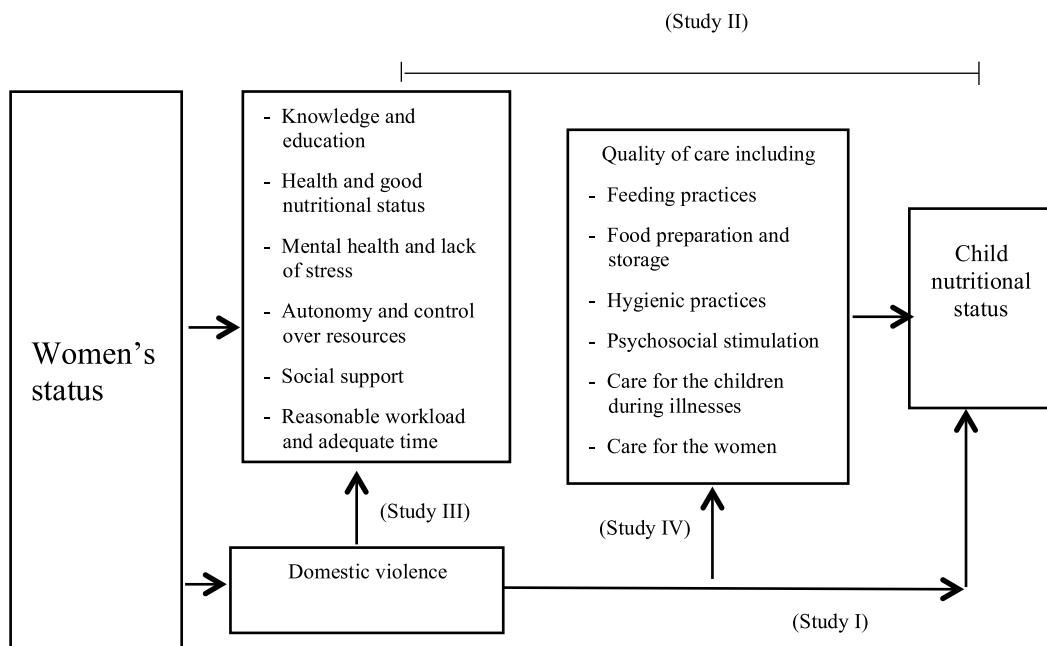
Figure 2. Pathways through which women's status may affect child nutritional status

In this thesis we tried to addresses potential associations between some of these pathways – including women's exposure to DV, women's level of autonomy and social support – and their child feeding practices and nutritional status.

Domestic violence

Gender-based DV has been defined as any act of physical aggression, sexual coercion, psychological/emotional abuse and controlling behavior by an intimate/ex-partner or a family member with the intention of inflicting harm or exercising power. In most cases women are victims and the perpetrator is their intimate partner (often referred to as intimate partner violence (IPV)) (41, 42). Globally, 30.0% of women experience physical/sexual IPV during their lifetime. The prevalence is highest in South-East Asia where around 37.7% of women reported having lifetime experience of IPV (42).

Exposure to DV/IPV can bring a broad array of physical and mental health problems to the survivors and can lead to different forms of morbidity and

mortality (43-46). Associations between experience of DV/IPV and women's symptoms of ill physical health, including injuries, chronic pain, gastrointestinal and gynecological disorders, lower nutritional status as well as mental health problems such as post-traumatic stress disorders (PTSD), emotional distress and suicidal ideation, have been constantly reported (45, 47). Such physical and mental health impairment, along with lower autonomy and less social support due to the controlling behavior that accompanies DV/IPV, may compromise women's health and pregnancy outcomes (48, 49) as well as caretaking capacities and might also negatively affect their children's health and development.

Specifically, the negative impacts of DV/IPV on child growth can start during pregnancy. Abused women are more likely to delay or miss prenatal care appointments (50, 51), experience inadequate pregnancy weight gain (52), have sexually transmitted diseases (53) and face pregnancy complications (54, 55). Further, they are more likely to practice risky behaviors such as smoking and substance abuse (50, 56). Impaired maternal health and nutrition as well as engaging in risky behaviors might negatively affect fetal growth and result in low birth weight (LBW), which is a great predictor of poor growth during infancy and childhood (57, 58). Further, stress and psychological trauma associated with experience of violence can disturb women's hypothalamic-pituitary-adrenocortical (HPA) system and normal regulation of stress hormones such as cortisol (59). This alteration can also lead to fetal growth restriction and LBW by suppressing maternal immune function, inducing uterine artery contraction and decreasing blood flow to the fetus (60, 61).

During infancy, the physical and psychological problems induced by DV/IPV may impair women's caretaking abilities, including feeding practices, preventive and curative care seeking, and providing the psychological stimulation that the child needs for healthy growth and development (62). Furthermore, social isolation and limited access to health care services might limit women from accessing the knowledge and support that they need for providing proper care to their children.

In a more direct pathway, witnessing violence between parents can affect children's health and growth by causing a physiological alteration in their stress-response system (63) which can subsequently affect their immune functions (64), metabolic activities and energy release (65). Further, DV/IPV is closely associated with child maltreatment and abuse (66) which can also negatively affect their health and growth (67).

Children of women exposed to DV/IPV are shown to be at higher risk of LBW (68, 69), hospitalization (70), morbidity from diarrheal diseases and pneumonia (71), and mortality (72, 73).

Autonomy

In the same way as status does, autonomy has various definitions. Autonomy has been defined by Dixon as the degree to which women can access and have control over material and social recourses within the household, in the community and in society (74). Dyson and Moore defined autonomy as the ability of the woman to obtain information and use that information as the basis to make decisions for themselves or their children (75). This definition has been expanded by Jejeebhoy and Sathar, who defined autonomy as women's control over their own lives and the extent to which women have an equal voice to their husband's in matters affecting themselves and their families. Jejeebhoy and Sathar suggested following inter-correlated dimensions for autonomy: knowledge autonomy, including education and exposure to outside world; decision making authority; physical autonomy, including freedom of movement; emotional autonomy, including proper spousal communication and power relations; and economic autonomy, including access to and control over economic resources (76).

Women who possess a greater level of autonomy have better access to and control over household resources, which gives them the opportunity to allocate these resources to maintain and improve the health and nutrition of themselves and their children (38, 77). Further, more autonomous women have more freedom of movement and thus might be more likely to use available health care services for themselves and their children. Moreover, having a higher level of movement freedom may allow women to benefit from interaction with others, exchange information and knowledge as well as receive support from friends and family (78-80).

Despite multiple methods of its measurement, a higher level of women's autonomy has been positively associated with their Body Mass Index (BMI) (81), fertility-related behaviors (82) and health care utilization (83, 84). Children of women with lower levels of autonomy have been shown to be at a higher risk of LBW (85), under-immunization (86), morbidity from acute respiratory infections (87) and mortality (88, 89).

Social support

Having access to appropriate social support – including assistance in child care as well as informational, material and emotional support – can provide an enabling environment for child health and development by reducing women's workload, stress and/or lack of resources (17, 90). It has been suggested that having such social support can create a platform for diffusing health-related information and promoting healthy behaviors, increase an individual's mental and physical health (91, 92) and provide a buffer mechanism to avoid adverse circumstances such as food insecurity (93).

Associations between social support and women's health-related quality of life (94), mental health (95) and confidence in infant care practices (96) have been documented. Children of women with low levels of social support have been shown to be at higher risk of LBW (97), life-threatening injuries and illnesses (98), impaired general health (99) and mortality (100).

Rationale for this thesis

While low women's status has been suggested as one of the main contributors to child undernutrition, the specific aspects of women's status that can affect their caretaking practices and child nutrition have not been fully determined. Given the multidimensional nature of women's status, understanding pathways through which it can affect child nutrition is crucial for ensuring effective nutritional interventions. Some of these aspects, such as women's education, have been extensively investigated, however, research evaluating the effects of women's exposure to DV/IPV, autonomy and social support on their feeding practices and child nutrition are limited and the reported results have been conflicting. Furthermore, although the negative impacts of DV/IPV on women and children have been constantly reported, earlier research has mainly focused on physical and sexual DV/IPV. Considering the fact that emotional violence and controlling behavior are the most frequent forms of DV/IPV, it is important to evaluate the effects of such violence on women's health and their caregiving capacities. Finally, while breastfeeding counseling has been shown to improve maternal BF practices, the association of such counseling with the duration of EBF among victims of DV/IPV has not been evaluated.

Aims and objectives

The overall aim of this thesis was to assess associations of women's status with their feeding practices and child nutritional status in two different settings. Specifically, we addressed associations between aspects of women's

status – including exposure to DV/IPV, autonomy and social support – and their level of stress during pregnancy, child feeding practices and nutritional status in Bangladesh and Nicaragua.

Specific objectives of the study are:

- To evaluate the association of women's exposure to lifetime IPV with their children's nutritional status in Bangladesh (Study I);

- To evaluate the associations of women's autonomy and social support with infant and young child feeding and nutritional status in rural Nicaragua (Study II);

- To evaluate associations of specific and multiple forms of lifetime DV with maternal emotional distress and cortisol level during pregnancy in rural Bangladesh (Study III);

- To evaluate the associations of any or specific forms of lifetime DV with duration of EBF in rural Bangladesh and to determine whether BF counseling modifies the association of experience of any lifetime or specific forms of DV with EBF duration (Study IV).

Methods

Study areas

The studies were conducted in two different areas; Bangladesh and Nicaragua, each of which reflects different cultural contexts. Setting, sample size, exposure and outcomes of the papers in this report are summarized in *Table 1*.

Bangladesh (Studies I, III and IV)

Bangladesh is located in Southern Asia. With a population of almost 150 million, Bangladesh is one of the most densely populated countries of the world. The majority of the population of this country are Muslims (90%), and the rest are mainly Hindus (101, 102). Over the past decades the country has made significant economic progress with the national poverty level declining from 56.6% between 1991 and 1992 to 31.5% in 2010. Despite this remarkable progress, more than 47 million people are still living below the poverty line in this country (103). While the country has been successful in reducing maternal and children-under-5 mortality, undernutrition among the children remains a great challenge. Thirty-six percent of the children younger than 5 years of age are stunted, 14% are wasted and around 33% are underweight (104). Prevalence of DV/IPV against women is very high in this country and 53% of ever married women reported lifetime experience of physical and/or sexual DV/IPV by their partners (105).

Matlab is a rural sub-district located 57 km southeast of the capital Dhaka. The area consists of more than 140 villages with a total population of more than 220 000. Around 30% of the population has no formal education and agricultural activities and daily labor are the main source of income in this region (106). The area has been a field site for the International Center for Diarrheal Diseases Research, Bangladesh (ICDDR, B). Since 1966, ICDDR, B has maintained a Health and Demographic Surveillance System (HDSS) in the area, recording demographic and selected health information on a monthly basis.

Nicaragua (Study II)

Nicaragua is located in Central America. With a population of around 6 million, Nicaragua is one of the poorest countries in Latin America (LA). Agriculture is the main economic activity in Nicaragua, contributing to 20% of the country's gross domestic product (107). Despite economic growth in recent years with national poverty declining from 42.5% in 2009 to 26.9% in 2014, the country is still struggling with a high prevalence of poverty, particularly in rural areas (108, 109). While Nicaragua has been successful in reducing mortality in infants and children younger than 5 years of age (110), chronic undernutrition among children remains a challenge. Seventeen percent of children under 5 years of age are stunted (111) and 10% are reportedly anemic (112). In addition, the country is going through a nutrition transition with an overweight prevalence of 55% among adults, of whom 22% are obese (113). The country has male-dominant traditions which has resulted in lower levels of women's autonomy in the households (114).

Los Cuatro Santos is a mountainous rural province located about 250 km Northwest of the capital, Managua. The area consists of four municipalities; Santo Tomás del Nance, San Juan de Cinco Pinos, San Pedro del Norte and San Francisco del Norte, and has about 25 000 inhabitants in total. Most of the population work in agriculture and agro-industrial activities and the rate of unemployment is high in the region. In 2003, a Health and Demographic Surveillance System (HDSS) covering the whole population was established in the area by a local non-governmental organization called Asociación para el Desarrollo Económico y Social El Espino (APRODESE). So far, four rounds of data collection have been performed in this area.

Study design and study populations

Study I

For Study I we used data from the 2007 Bangladesh Demographic and Health Survey (2007 BDHS), representing the whole population living in private dwelling units in Bangladesh. The 2007 BDHS used a standardized two-stage sampling procedure to select and interview adult members of 10 400 households. The details of sampling design have been presented elsewhere (105). In brief, a team of trained field staff conducted face-to-face interviews with eligible adult members of the households during 24 March to 11 August 2007. Socio-economic characteristics of the household members as well as anthropometric measurements of ever-married women and children younger than 5 years were recorded during the interviews. Within each household one ever-married adult member, either a man or a woman, was selected to answer the IPV questionnaire module (105). All ever-married

women with at least one child under the age of 5 who were interviewed for IPV were included in our study.

Study II

The second study was embedded in 2009 HDSS, which was collected from June to November 2009. For our study, two rounds of data collection were conducted. Within the first round, a group of trained local interviewers visited all households in the HDSS area and collected data on socio-demographic conditions and household food insecurity. All identified households with at least one child below 3 years of age were revisited by a second group of trained interviewers, at which time data were collected on women's autonomy and social support, as well as infant and young child feeding practices and consumption of highly processed (HP) snacks and sugar-sweetened beverages (SSB), and anthropometric measurements were performed. In cases where there were two children under the age of 3 in the same household, the last born child was selected. All children under 3 years of age who were registered during the first round of data collection and were selected in the second round of data collection and had a complete set of data were included in this study.

Study III and Study IV

Studies III and IV were part of a larger study, the Maternal and Infant Nutrition Intervention, Matlab trial (MINIMat-Trial reg#ISRCTN16581394). MINIMat is a large food and multiple micronutrient supplementation trial of pregnant women in Matlab, which also included a breastfeeding counseling intervention. The study procedure and design have been described elsewhere (115). In brief, during November 2001–October 2003, all women who were identified and confirmed pregnant in the study area were invited to attend the MINIMat study. Enrolled pregnant women (n=4436) were randomly allocated into 2 types of food supplementation and 3 types of micronutrient supplementation regimes in a randomized 2 by 3 factorial design. For the third intervention, at week 30 of pregnancy, 3186 women were randomly assigned to receive either the standard ongoing monthly usual health messages (UHM) or the standard ongoing monthly usual health messages with the additional breastfeeding counseling (BFC). Women were followed up monthly at home by the interview team and revisited at clinics at week 14, 19 and 30 of pregnancy. Through these household/clinic visits, data on women's socio-demographic characteristics, experience of DV and emotional distress were collected. From June 2003 until March 2004, community health workers visited a sub-sample (n=1300) of pregnant women (week 28–32 of pregnancy) at home and collected their morning salivary samples for

cortisol measurement. After delivery, women were followed up on a monthly basis and data on their infant feeding practices were collected.

Table 1- Setting, sample size, exposure and outcomes of four studies included in this thesis

Study	Settings	Sample	Exposure/ explanatory variables	Outcome
I	Nationally representative data from 2007 BDHS	2042 ever married women who have been selected and interviewed for IPV and had at least one children younger than 5 years of age	Lifetime exposure to physical, sexual, and physical and/or sexual IPV	Child nutritional status including stunting, wasting and underweight
II	Los Cuatro Santos area, rural Nicaragua.	1371 women and their children under the age of 3	Women's level of autonomy and social support	Child nutritional status including HAZ, WHZ, WAZ and BMI for age Child feeding practices including EBF, CBF, MMF,MDD, MAD and consumption of HP snacks and SSB
III	Matlab, rural Bangladesh	3504 pregnant women and a subsample of 1212 pregnant women	Lifetime exposure to physical, sexual, emotional DV and controlling behavior	Women's experience of emotional distress and level of morning salivary cortisol
IV	Matlab, rural Bangladesh	2795 women and their infant	Lifetime exposure to physical, sexual, emotional DV and controlling behavior and BF counseling	Duration of EBF

BDHS, Bangladesh Demographic and Health Survey; BF, Breast Feeding; BMI, Body Mass Index; CBF, Continued Breast Feeding; EBF, Exclusive Breastfeeding; DV, Domestic Violence; HAZ, Height-for-Age Z-score; HP, Highly Processed; IPV, Intimate Partner Violence; MAD, Minimum Acceptable Diet; MDD, Minimum Dietary Diversity; MMF, Minimum Meal Frequency; SSB, Sugar-Sweetened-Beverage; WAZ, Weight-for-Age Z-score; WHZ, Weight-for-Height Z-score.

Data collection

In all four studies, the data were collected by trained field staff through in-person interviews and mainly took place at women's homes. For Studies III and IV, data on DV and emotional distress were collected in private at health care units. All instruments were translated from English to Bengali or Spanish and pilot tested in a similar context and modified before use.

Assessment of exposure and outcomes

Exposures/explanatory variables

Domestic/ Intimate Partner Violence (Studies I, III and IV)

A modified version of the conflict tactic scale (CTS) was used to record women's experience of DV/IPV. The CTS is the most widely used measure of DV/IPV which has been developed and validated by Straus et al (9, 116). The questionnaire is characterized by having direct and behaviorally explicit questions in order to reduce variation in the interpretation and understanding of what violence comprises. The respondents were asked about their experience of specific forms of violence, including physical (Studies I, III and IV), sexual (Studies I, III and IV), emotional (Studies III and IV) DV/IPV and controlling behavior (Studies III and IV). The questions used to record women's experience of DV are listed in *Table 2*.

Table 2. Questions used to document women's experience of lifetime physical, sexual, emotional DV/IPV and controlling behavior

Physical DV/IPV

Moderate

Has your husband or anyone else from your family ever slapped you or threw something at you that could hurt you?

Has your husband or anyone else from your family ever pushed you or shoved you?

Has your husband ever twisted your arm or pulled your hair?[1]

Severe

Has your husband or anyone else from your family ever hit you with his fist or with something else that could hurt you?

Has your husband or anyone else from your family ever kicked you, dragged you or beat you up?

Has your husband or anyone else from your family ever choked or burnt you on purpose?

Has your husband or anyone else from your family ever used a knife, gun or other weapon against you?

Sexual DV/IPV

Has your husband or anyone else from your family ever forced you to have sex or perform any sexual act when you did not want to?

Emotional DV/IPV

Has your husband or anyone else from your family ever insulted you or made you feel bad about yourself?

Has your husband or anyone else from your family ever belittled or humiliated you in front of other people?

Has your husband or anyone else from your family ever done things to scare or intimidate you on purpose?

Has your husband or anyone else from your family ever threatened to hurt you or someone you care about?

Controlling behavior

Has your husband or anyone else from your family ever tried to restrict your contact with your family of birth?

Has your husband or anyone else from your family ever tried to restrict your contact with your friends and neighbors?

Has your husband or anyone else from your family ever ignored you and treated you indifferently?

Has your husband or anyone else from your family ever got angry if you spoke with another man?

Has your husband or anyone else from your family often been suspicious that you were unfaithful?

[1]This question was only used in Study I

Based on women's answers to the questionnaire, the following binary variables (yes/no) were developed: the experience of any form of DV/IPV including moderate physical violence (Studies III and IV), severe physical violence (Studies III and IV), physical (either moderate or severe) violence (Studies I, III and IV), sexual violence (Studies I, III and IV), emotional violence (Studies III and IV), and controlling behavior (Studies III and IV).

Lifetime experience of any DV/IPV (yes/no) was defined based on women's experience of one or more acts of violence. The variable "cumulative number of different forms of DV" was created by summing up different forms of DV (i.e., physical, sexual, emotional and controlling behavior) that an individual experienced (Studies III and IV). Study I only included women's lifetime experience of violence by their husband (IPV). Studies III and IV included women's lifetime experience of violence by their husband and/or family members (DV).

Women's level of autonomy (Study II)

Women's level of autonomy was measured by a constructed seventeen-item questionnaire. Five of the seventeen questions were adapted from the demographic and health survey women's questionnaire (117). Twelve other questions were elaborated for the study context. The final questionnaire measured different dimensions of women's autonomy, including financial independence, household-, child-, reproductive and health-related decision making as well as freedom of movement. The answers ranged from values of 1 to 5 with the highest score indicating higher level of autonomy. A continuous score was created for the instrument by summing up women's responses to the individual questionnaire items. Based on their total score (which ranged from 34–85), women's level of autonomy was further divided into tertiles of lowest (34–65), middle (66–74) and highest (75–85).

Women's level of social support (Study II)

Women's level of social support was measured by a modified version of the Duke-UNC Functional Social Support Questionnaire, and consisted of fifteen questions. The questionnaire measured different dimensions of social support, including confidant (having someone to share and discuss important matters in life), affective (being shown love and caring) and instrumental (such as having help with money during an emergency) (118).

The answers ranged from values of 1 to 5 with the highest score indicating higher level of social support. A continuous score was created for the instrument by summing up women's responses to the individual questionnaire items. Based on their scores (which ranged from 19–72) women's level of

social support was further divided into tertiles of lowest (19–36), middle (37–41) and highest (42–72).

Health and exclusive breastfeeding counseling (Study IV)

In the MINIMat trial, all enrolled pregnant women with viable fetuses were randomly divided into two groups at around week 30 of pregnancy to receive either the standard ongoing monthly usual health messages (UHM) or the standard ongoing monthly usual health messages with the additional breast-feeding counseling (BFC). The standard ongoing monthly UHM were delivered by ICDDR, B health staff during women's antenatal clinic visits and included the benefits of breastfeeding, colostrum feeding, the initiation of breastfeeding within one hour after birth as well as the importance of continuing EBF for up to 6 months and timely introduction of complementary feeding with continued BF until the age of 2 years. BFC was provided by recruited local women who had at least 14 years of education and personal experience of BF and who had been given training based on the WHO breastfeeding counseling module (119). BFC included at least 8 visits, starting with 2 visits in the last trimester of pregnancy (30 and 34 weeks), and continuing postnatally with 1 visit from 0 to 7 days after giving birth, and then 5 visits monthly between months 1 and 6 in the participants' homes. Each visit was typically 20 to 40 minutes in length. The counseling included assessing the position and attachment of the babies during BF, listening to the mothers about their difficulties and providing them with information and practical help when they needed as well as giving them support and building their confidence.

Measured outcomes

Child nutritional status (Studies I and II)

Nutritional status of children was determined on the basis of their anthropometric characteristics. Based on the WHO child growth standards (8), the following anthropometric outcomes were calculated:

Height-for-Age Z-scores (HAZ) (Studies I and II); this indicator represents linear growth of the children and reflects long-term nutritional status. HAZ <-2 is classified as stunting and reflects chronic undernutrition (8, 10).

Weight-for-height Z-scores (WHZ) (Studies I and II) is a marker of current nutritional status. WHZ<-2 is classified as wasting and reflects mainly recent events such as illnesses and food shortages (8, 10).

Weight-for-Age Z-scores (WAZ) (Studies I and II) is a composite index representing overall nutritional status of the children. WAZ<-2 is classified as underweight and reflects both chronic and /or acute undernutrition (8, 10).

BMI-for-Age Z-score (BAZ) (Study II) is an index used to capture relative adiposity among children (8, 120). BAZ>2 is classified as overweight and reflects over-nutrition.

Infant and young child feeding practices (Studies II and IV)

a) Infant and young child feeding indicators (Study II)

In Study II, infant and young child feeding practices were assessed by a 24-hour food frequency questionnaire (FFQ) which was developed in accordance with the WHO-recommended key indicators (121-123). The questionnaire consisted of seventy food items, eleven beverages and six of the most common HP snacks and SSB in the study area.

In line with the WHO recommended guidelines (122, 123), the following feeding indicators were developed and used in the study:

Exclusive breastfeeding (EBF): the proportion of infants 0–5 months of age who received only breast milk during the previous day.

Continued breastfeeding (CBF): the proportion of children 12–15 months of age who received breast milk during the previous day.

Minimum dietary diversity (MDD): the proportion of children 6–23 months of age who received food from four or more food groups during the previous day. The following seven food groups have been used for the tabulation of this indicator: grains, roots and tubers; legumes and nuts; dairy products; flesh foods; eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables.

Minimum meal frequency (MMF): the proportion of breastfed and non-breastfed children 6–23 months of age who received solid, semi-solid or soft foods the minimum number of times or more. Minimum is defined as two times for breastfed infants aged 6–8 months, three times for breastfed children aged 9–23 months and four times for non-breastfed children during the previous day.

Minimum acceptable diet (MAD): the proportion of breastfed children 6–23 months of age who had at least the minimum diet diversity and minimum meal frequency during the previous day, and the proportion of non-breastfed children 6–23 months of age who received at least two milk feedings and

had at least minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day.

For children older than 24 months, we applied the guidelines for 12–23 month-old children.

b) Duration of exclusive breastfeeding (Study IV)

During monthly home visits after delivery, trained female interviewers collected data on women's infant feeding practices. The data were collected approximately 1–3 days before BF counseling sessions. The mothers were asked to describe their feeding practices during the last 30 days and the data were recorded for 2 separate periods; during the first and last 15 days before the interview. Additional questions were asked to determine whether the infants had been given additional food besides breastmilk, including water, sugar water, other milks, other liquids and semi-solid or solid food. Based on the WHO definition of EBF (123), women were considered to be exclusively breastfeeding if they were giving only breast milk to the infant, with the exception of oral rehydration solution, liquid medicines and vitamins.

Women's mental health and stress (Study III)

a) Women's level of emotional distress

During week 30 of pregnancy, women's level of emotional distress was measured using a self-reported questionnaire (SRQ-20). The instrument was developed by the WHO to screen for common mental health symptoms, including depression, anxiety and psychosomatic problems, especially in developing countries (124). The questionnaire consists of twenty yes/no questions with the maximum score of 20 and a higher score reflecting a higher level of emotional distress. A continuous score was created for the instruments by summing up women's responses to the individual questionnaire items. Based on previous studies conducted in Bangladesh (125, 126), women with a score of 7 or higher were regarded as being emotionally distressed.

b) Women's level of cortisol

Women's level of salivary cortisol was measured during week 28–32 of pregnancy. A field worker visited each participant in their home between 7 and 8 am (approximately 30 minutes to 1 hour after awakening) and one salivary sample was collected from each woman. Participants were given a cylindrical cotton swab to chew on for 30–45 seconds or until it was fully saturated and the field workers placed these in a test tube sealed with a cap. Collected samples were frozen and stored at -20ºC on the same day. The concentration of cortisol was further analyzed by using solid phase I radioimmunoassay by the laboratory of Dirk Hellhammer, University of Trier, Trier, Germany.

Statistical analyses

All statistical analyses were performed with statistical software packages IBM SPSS Statistics and openEpi. In all studies, descriptive characteristics of the study participants were presented as frequency and percentage for categorical and/or mean and standard deviation (SD) for continuous variable. We used *chi-square* tests to compare proportions and/or *t*-tests/analysis of variance (ANOVA) followed by Bonferroni *post hoc* tests to compare means and evaluate factors associated with selected outcomes. Potential confounders were identified based on previous research and our knowledge of the settings. The identified potential confounders then remained in the final models if they were associated with both exposure and outcome variables ($p<0.10$) and influenced the model parameters. Some potential confounders remained in the models regardless, as they were considered as key predictors. In all of the studies, multi-variate analyses were used to evaluate associations between explanatory variables and selected outcomes.

Study I

Logistic regression models were used to evaluate associations between women's lifetime exposure to IPV and their under-5 children's nutritional status. Generalized estimated equations (GEE) were used to account for the cluster sampling design of the study. Final models were adjusted for women's and their husbands' educational level, household wealth index and maternal height.

Study II

Logistic regression for binary (feeding practices) and general linear model for continuous (children's nutritional status) outcomes were used to estimate associations with maternal autonomy/social support. All models were adjusted for municipality, housing quality, food insecurity, women's education, women's age (years) and child age (months). In order to evaluate the independent effects of social support and autonomy, additional models were created where these two factors were both added to the previously mentioned confounders. To account for differences in feeding and care needs, we evaluated the anthropometric characteristics of the children in two different age strata: below 6 months of age and aged 6 months and above.

Study III

Similar to Study II, logistic regression for binary (emotional distress) and general linear model for continuous (level of cortisol) outcomes were used to estimate associations with women's lifetime exposure to any or specific forms of DV. All models were adjusted for the women's age, education and

socio-economic status (SES). Models evaluating level of cortisol were additionally adjusted for women's BMI.

Study IV

In this study, we used Kaplan Meier survival curves and log rank tests to compare duration of EBF by exposure to lifetime DV within each counseling groups. Cox regression models were used to estimate association of exposure to any or specific forms of DV with duration of EBF in each counseling group. Further, the interaction between experience of any or specific DV and counseling groups with duration of EBF was evaluated. All models were adjusted for maternal education, SES and BMI.

Ethics

Study I

The original survey was conducted in accordance with the WHO ethical and safety guidelines for research on IPV. These included attaining individual informed consent and ensuring privacy and confidentiality in order to protect the safety of both respondents and field staff. Interviewers were all provided with a list of organizations helping women in difficult situations. Because the study was a secondary analysis of BDHS and identifiers of the participants were not available in the dataset, no ethical approval was needed.

Study II

The study was conducted in accordance with the World Medical Association Declaration of Helsinki. Mothers were informed about the study and gave their verbal consent before participation. The study protocol was approved by the Biomedical Research Ethics Committee at the University of León in Nicaragua.

Studies III and IV

The studies followed WHO ethical and safety guidelines for research on DV. Informed written consent was obtained from participating women at enrollment. Interviews regarding DV were conducted in private by trained paramedics. Women who reported having experience of physical or sexual violence or suicidal ideation or attempt were offered mental health counseling. The study protocol was approved by ethical review committee at the IC-CRD, B.

Results

Study I

Participants' general characteristics

The study included 2042 women and all of their children aged under 5 years (*n*=2480). Around 65% of the women were living in rural areas and they were mainly in their mid-20s with a mean age of 26 years. Almost 30% had no formal education and one-third were underweight with BMI<18.5 kg/m^2. More than half of the women (53.4%) reported lifetime experience of physical and/or sexual IPV. Lifetime prevalence of sexual partner violence among women was considerably less than physical (18.4% compared to 49.4%, respectively). In addition, a high prevalence of undernutrition was observed among their children; 44.3% were stunted, 18.4% were wasted and 42% were underweight.

Association between women's exposure to lifetime IPV and child nutritional status

Having any stunted child was significantly associated with women's lifetime experience of any physical (OR$_{adj}$ 1.48; 95% CI: 1.23–1.79), sexual (OR$_{adj}$ 1.28; 95% CI: 1.02–1.61) and physical and/or sexual (OR$_{adj}$ 1.51; 95% CI: 1.25–1.84) violence by their partners. No significant association was observed between women's experience of IPV and their children's wasting or being underweight.

Study II

Participants' general characteristics

The study included 1371 mother-child dyads living in Los Cuatro Santos area, rural Nicaragua. The women were mainly in their mid- and late-20s with a mean age of 28 years. The majority of them were housewives (90%) and lived with their husband or partners (87%) and more than 35% had less than 5 years of education. The women's mean score for autonomy and social

support was 69.3 (SD 9.5, range 34–85) and 39.2 (SD 7.5, range 19–72), respectively.

The children were 0–35 months of age with a mean age of 18 months. Only 34% of children younger than 6 months were exclusively breastfed and among children 6–35 months of age the rate of MAD was relatively low (40%). Around 20% of the children were stunted, 4% wasted and 6% underweight, while 9% were overweight.

Association between women's autonomy and infant and young child feeding and nutritional status

Better BF practices were observed among the women with the lower levels of autonomy. Compared to the women in the highest autonomy tertile, women in the lower tertiles had significantly lower odds of *not* exclusively breastfeeding (OR_{adj} 0.24; 95% CI: 0.08–0.71), and *not* continued breastfeeding (OR_{adj} 0.24; 95% CI: 0.07–0.81).

With regard to complementary feeding, women in the middle tertile of autonomy had generally better complementary feeding practices, that is to say, the odds for *not* meeting minimum meal frequency (OR_{adj} 0.68; 95% CI: 0.50–0.94), dietary diversity (OR_{adj} 0.69; 95% CI: 0.48–0.98) and acceptable diet (OR_{adj} 0.63; 95% CI: 0.46–0.85) were lower among the children of women in this group as compared to the women in the highest tertile. However, children of these women were also more likely to consume HP snacks and/or SSB (OR_{adj}1.45; 95% CI: 1.02–2.06).

After adjusting for potential confounders, no significant association between women's level of autonomy and their children's nutritional status was observed.

Association between women's social support and infant and young child feeding and nutritional status

No significant associations were found between women's level of social support and the WHO infant and young child feeding indicators. However, children of women with lowest social support were more likely to consume HP snacks and/or SSB (OR_{adj} 1.56; 95% CI: 1.10–2.23).

Better nutritional status was observed among the children aged 6–35 months of women with lowest level of social support. They had significantly higher HAZ (ß=0.26; 95% CI: 0.05–0.48) and lower odds of stunting (OR_{adj}0.63; 95% CI: 0.42–0.93) as compared with the children of women in highest tertile of social support.

Study III and Study IV

Participants' general characteristics

Studies III and IV were embedded into the MINIMat trial. Study III included 3504 pregnant women and Study IV included the follow-up of enrolled women with singleton live-born infants (*n*=2795). The general characteristics of the participants were similar in both studies. Women were mainly in their mid-20s with a mean age of 26. One-third of the women had no formal education and around 22% were underweight at enrollment with BMI< 18.5 kg/m^2.

In both studies, 57% of the women reported lifetime experience of DV. Around 21% experience physical, 23% experienced sexual, 28% experienced emotional DV and 37% reported experience of controlling behavior during their lifetime. Thirty-one percent of the women were exposed to more than one form of DV and more than 35% experienced emotional distress at week 30 of pregnancy. In Study III, women's mean level of cortisol was 9.91±3.56 and, among women who provided salivary samples (*n*=1212), around 23% experienced physical, 23% experienced sexual, 30% experienced emotional DV and 37% reported experience of controlling behavior during their lifetime and 39% experienced emotional distress. In Study IV, the median duration of EBF was 105 days among the study sample and women in the BFC group breastfed considerably longer than the women in the UHM group (135 days vs 60 days, respectively).

Association between women's exposure to lifetime DV and their emotional distress and cortisol level

We found significant association between any lifetime experience of DV and women's emotional distress (OR$_{adj}$3.18; 95% CI: 2.72–3.70). All forms of DV (physical, sexual, emotional DV and controlling behavior) were significantly associated with emotional distress and women who experienced emotional DV and controlling behavior had the highest odds of being emotionally distressed. There was a dose-response relationship between the number of forms of violence that the women experienced and their emotional distress and women who experienced all forms were considerably more likely to be distressed.

No significant association was observed between experience of any or specific forms of DV and women's level of morning salivary cortisol among the study sample. Similarly, we did not find any association between the number of forms of violence and women's level of salivary cortisol.

Association between women's exposure to lifetime DV and their breastfeeding practices

Experience of DV was significantly associated with lower duration of EBF among women who had not received BF counseling. In UHM groups, women were more likely to cease EBF if they had been exposed to any lifetime violence (HR_{adj}1.13; 95% CI: 1.01–1.26) or sexual DV (HR_{adj}1.15; 95% CI: 1.01–1.31). Further, the duration of EBF tended to be shorter among women who experienced lifetime controlling behavior (HR_{adj}1.10; 95% CI: 0.99–1.23). Among women in the BF counseling group, however, no significant association was found between experience of DV and duration of EBF.

Discussion

The research presented in this thesis showed women's status to be generally associated with their feeding practices and child nutritional status in two low income settings with different cultural and contextual characteristics: Bangladesh and Nicaragua. This report also highlights that different dimensions of women's status may associate differently with their feeding practices and child nutritional status and that the strength and direction of these associations may vary by child age, setting and other contextual factors.

Specifically, the results of the investigations revealed that, in Bangladesh, women who experienced lifetime DV/IPV were more likely to report emotional distress during pregnancy, cease EBF before 6 months and have stunted children. In Nicaragua, women's level of autonomy was associated differently with their feeding practices, that is to say, while women with lower autonomy had better BF practices, women with the middle level of autonomy had more appropriate complementary feeding practices. Further, women with a lower level of social support were less likely to have stunted children.

Discussion on the findings

Women's exposure to lifetime IPV and child nutritional status

We found women's lifetime exposure to physical, sexual or physical and/or sexual IPV to be significantly associated with higher odds of having a stunted child. In line with our findings, in a pooled analysis of demographic and health surveys of 29 countries, stunting in children was found to be positively associated with maternal lifetime experience of IPV (127). Similarly, lower height development and higher odds of stunting was also observed among children of women with lifetime experience of DV/IPV in research from Matlab, Bangladesh (128), and Kenya (129), respectively. Further, higher odds of stunting was reported among the children of women with last-year experience of multiple family violence in India (130) and sexual domestic violence in Liberia (131).

There are several potential mechanisms through which DV/IPV can affect a child's health and growth. DV/IPV may increase the risk of child abuse and maltreatment within the household (132, 133). Furthermore, witnessing violence between parents may increase a child's stress level and alter his/her biomarkers of stress which, in turn, can negatively affect a child's metabolic and immune function and ultimately impair his/her growth (64, 65). In a more indirect pathway, DV/IPV may negatively affect a child's growth through a "spillover" effect by compromising maternal mental and physical health and caretaking capacities (62, 134).

While higher odds of wasting have also been reported in children of women with experience of DV/IPV (130, 135), the association was more evident for stunting in previous research. Considering the repeating pattern of violence (136) and the long-term residual negative consequences it has for both women (45, 137) and children (64), one could expect that the effects of maternal lifetime exposure to violence was more evident in children's stunting, as it is an indicator for long-term nutritional status and reflects the cumulative impact of negative experiences.

Women's autonomy and infant and young child feeding and nutritional status

The results of this study showed that children of women with the lowest level of autonomy were more likely to be exclusively breastfed and continue to be breastfed. In line with this finding, in a meta-analysis of demographic and health surveys of 36 countries, Smith et al found a negative association between women's autonomy and duration of BF in all three regions of SSA, SA and LA (36). They found this association to be independent of women's working status and concluded that women prefer not to BF when they gain higher autonomy. On the other hand, women with a low level of autonomy might have better BF practices because of their limited access to family financial resources and/or freedom of movement.

We found children of women in the middle tertile of autonomy to have the best complementary feeding in Los Cuatro Santos. One potential explanation for this finding might be that having a higher level of autonomy may not always represent a higher level of women's control over resources, but rather, that they have more responsibilities that they must fulfil. Further, promoting a higher level of women's autonomy in areas where traditional gender norms dictate women's dependency on their partner might result in DV/IPV (138, 139) and reduce women's caretaking capacities. Another possible explanation for this finding is that women in the middle tertile of autonomy may be making decisions jointly with their partners. This might reflect better power structures within the family and result in better child

complementary feeding practices. In line with this explanation, previous research in Nicaragua (140) and Bolivia (141) have reported a positive association between joint decision making among couples and their children's nutritional status.

No significant association between women's level of autonomy and child nutritional status was observed in our study. Consistent with this finding, a weaker influence of women's decision making power on child nutritional status in LA compared to SA and SSA has been reported previously (36, 142). Higher levels of women's autonomy in LA (36) and lower prevalence of child undernutrition in the region (143) might be possible explanations for these findings.

Association between women's social support and infant and young child nutritional status

We found that children of women with the lowest level of social support are less likely to be stunted. Similarly, a negative association between women's level of social support and their feeding practices (144) and child's nutritional status (145, 146) has been reported previously. While the maternal social network can be a valuable arena for providing knowledge and child care skills, social network obligations and responsibilities might detract from women's caretaking capacities and negatively affect their children's nutritional status. Further, it has been suggested that the characteristics of the social network might be more important for child health and nutrition, that is to say, in a network where members have limited knowledge and education, mothers might be exposed to "wrong" ideas and suggestions which can also negatively affect their caretaking practices (144, 147).

Association between women's exposure to lifetime DV and their emotional distress and cortisol level

The results from Study III revealed that women who experienced any DV in their life were more likely to report emotional distress. Further, all forms of DV (physical, sexual, emotional and controlling behavior) were significantly associated with higher levels of emotional distress among these women. The association between experience of DV/IPV and women's symptoms of emotional distress and common mental disorders has been reported previously (45, 148-150).

Notably, we found that women who experienced either emotional DV or controlling behavior were more likely to report emotional distress as compared to any physical and sexual DV. While research evaluating the effect of emotional DV and controlling behavior on women's mental and physical health is relatively limited, there is some evidence that experience of such

violence is more strongly associated with depression (151), PTSD (151, 152), emotional distress (153, 154) and physical health symptoms (154) as compared to physical and/or sexual DV. The detrimental effects of emotional DV and controlling behavior might be due to the more frequent and pervasive nature of these forms of DV in a relationship (155). Further, it has been suggested that such violence is a more direct attack on women's sense of self (156); can destroy their autonomy (1); cause them to have higher levels of guilt and shame (152, 157); and can make them feel helpless and hopeless (158).

Another important finding of this study was the dose-response association between the cumulative number of forms of DV and women's levels of emotional distress. Consistent with this finding, a dose-response relationship between the number of forms of DV/IPV experienced by women and their level of depression, anxiety, PTSD and suicidal ideation has been reported previously (159). One can expect that experience of multiple forms of DV might reflect a more severe and/or more frequent form of DV, which can have a more detrimental effect on women (157, 160).

We did not find any association between women's experience of DV and their level of morning cortisol. Lack of association between morning cortisol levels and maternal psychological measures of stress in late pregnancy has been reported previously (161-163). It can be possible that a higher level of cortisol during late pregnancy, especially in the mornings when the cortisol level is at its highest peak, does create a "ceiling effect" and may mask cortisol responses to stressors (164).

Association between women's exposure to lifetime DV and their breastfeeding practices

Results from Study IV showed shorter duration of EBF among women with lifetime experience of DV in the UHM group. Consistent with this finding is the negative association between experience of DV/IPV and women's BF practices that has been reported previously (165-167). Experience of DV/IPV might negatively affect women's physical and mental health and may compromise their ability to breastfeed (62). Further, abused women might face the additional challenge of having an un-supporting partner who does not approve of their BF practices (168, 169).

Among all forms of DV we found experience of sexual DV and controlling behavior to be particularly associated with shorter duration of EBF. Women with a history of sexual DV might attach BF with their experience of abuse and experience a sense of shame in a way that affects their BF abilities (170, 171). Further, controlling behavior might restrain women's access to social

42

support, health care services and information related to appropriate infant feeding practices, which can ultimately impair their BF practices.

No significant association between experience of DV and duration of EBF was found among women in the BFC group, indicating that the negative effects of DV on BF might be mitigated by one-on-one breastfeeding counseling. Experience of DV may cause women to feel powerless in controlling their life situations. Such feelings of hopelessness and helplessness may undermine their sense of self-efficacy and ultimately manifest in their performance of caretaking activities such as BF (172). Breastfeeding counseling might extend the duration of BF in these women by increasing their self-efficacy and providing them the knowledge and support that they need in order to maintain optimal BF practices (173, 174).

Methodological considerations

External validity

The findings of this thesis might be generalizable to other areas in Bangladesh and Nicaragua as well as other countries in the region with similar culture and settings. While the effects of DV/IPV on women and children might be slightly different based on individual patterns of exposure and life conditions, the general consensus is that DV/IPV is widespread and can bring negative consequences both for women and children's health and well-being, regardless of their demographic and cultural context.

All studies included in this thesis were population-based with relatively large sample sizes; further, the findings in general were consistent with previous research, which increases the external validity of our findings.

Internal validity and reliability

In all studies, standard procedures and methodologies were used to ensure validity and reliability. All fieldworkers were provided with careful training in relation to interview techniques and data collection methods. The precision and accuracy of the anthropometric measurements (Study II) were evaluated though standardization sessions. In all of the studies, standard questionnaires were used and the questionnaires were pilot tested and modified before use.

Selection bias

In Study I, only one eligible woman or man per household was selected to answer the IPV questionnaire. However, the demographic characteristics of

selected women were not different from the total sample, indicating that the selected women were representative of the entire population of women of reproductive age in the 2007 BDHS (105). In order to provide a representative sample, all children under the age of 3 in Study II and all pregnant women in Studies III and IV were invited to participate. The rate of refusal was relatively low in all four studies (<4%).

In Studies III and IV, where we had more missing data, the main reason for participants being lost to follow-up was fetal losses. Given that exposure to DV/IPV is associated with pregnancy complications and fetal loss (175, 176), we might have missed some of the most vulnerable women in these studies. Further, in Study IV, women who had missing data or were lost to follow-up, generally had lower SES and infants with lower birth weight and therefore they might represent a population with different BF practices. However, considering the relatively small proportion of women who were lost to follow-up in both studies (<12%), it seems unlikely that selection bias would have influenced the reported outcomes to a large extent.

Information bias

a) Under-reporting of DV/IPV

Reporting of lifetime experience of DV/IPV could have been affected by reporting or recall bias and therefore women might have over-reported the violence events. However, due to the fear of social stigma and threat, under-reporting of DV/IPV is more common among abused women (177). In order to reduce under-reporting and increase the validity of such reporting, in all of the studies, in-person interviews were conducted. Interviewers were provided with rigorous training to collect data in a secure, confidential and ethical manner. Women were asked behaviorally-specific questions regarding their experience of violence and were given several opportunities to disclose their experience of DV/IPV within the time of interview. However, women had to answer several questionnaires (Study I) or undergo other procedures, such as blood sampling and ultrasound, at the same time (Studies III and IV), which might have increased the risk of under-reporting among them due to response fatigue and/or physical tiredness. If under-reporting is the case, however, it tends to dilute the associations between DV/IPV and the study outcomes, and this would indicate that the associations between women's experience of DV/IPV and their emotional distress, BF practices and child's nutritional status might be stronger than reported.

b) Reporting of feeding practices

In Study II we used the 24-hour FFQ to assess infant and young child feeding practices. The instrument is considered to be a valid tool for evaluating

dietary consumption in epidemiological studies (178) and has been recommended by the WHO to record infant dietary information (123). However, it may be subject to measurement error due to recall bias and does not include the amount of food that has been given to the child. Further, because the questionnaire measures the foods that have been given to the child during the last 24 hours, it might not accurately reflect usual maternal feeding practices. Despite these limitations the instrument has been shown to provide an acceptable estimate of child dietary intake during the first years of life (179).

In Study IV, women were asked about their BF habits during the last month. Due to recall and/or social desirability, it is possible that bias was introduced when women may have over-reported their BF practices, especially in the BFC group. In order to limit this possibility, the data on maternal BF practices were collected approximately 1–3 days before BF counseling sessions and mothers were asked several questions about their feeding practices. Further, in a subset of the study population, the accuracy of reported BF practices was confirmed by biological measurements (180).

c) Reporting of emotional distress

In Study III, the questions regarding emotional distress were asked prior to asking women about their experience of DV, therefore it is unlikely that women's reporting of symptoms of emotional distress has been influenced by their disclosure of violence. While it is possible that women who were emotionally distressed might have exaggerated their experience of DV, as we discussed earlier, under-reporting of DV/IPV is more common.

Confounding

In this thesis we tried to include well-known confounding factors that have been detected by previous studies. However, the possibility of residual confounders cannot be excluded.

Causality

Due to the cross-sectional/observational nature of the studies, causal inference cannot be established. Regarding Studies I, II and IV, there are several mechanisms and theoretical reasoning suggesting that reported outcomes are results of abuse rather than the precursor. The consistency of our finding with other studies, as well as evidence of temporal direction for some of the outcomes (such as emotional distress), indicates that the possibility of reverse causality is unlikely in these studies.

Conclusions and recommendations

The findings of this thesis support the role of women's status as being of importance in determining their feeding practices and child nutritional status in two different cultural settings; Bangladesh and Nicaragua.

The implication of the results from the studies in Bangladesh is that DV/IPV not only has negative impacts on women's mental health and well-being, but it also compromises their caretaking activities, such as feeding practices, and brings negative consequences to their children's nutritional status. Our findings also suggested that BF counseling might reduce the negative association between DV and maternal duration of EBF. Given the overall high prevalence of DV/IPV and its negative impacts, both on women and their children, a greater focus on primary prevention of all forms of DV/IPV and providing support to the victims in the current maternal and child health programs is warranted.

In Nicaragua, lower levels of maternal autonomy and social support were associated with more favorable feeding and nutrition outcomes, such as better BF practices and having children with better HAZ. However, these results might be the reflection of other underlying issues related to child feeding practices and nutritional status, such as cultural and contextual factors rather than casual outcomes. Considering the potential negative association between women's autonomy and their BF practices, efforts to improve women's autonomy should be accompanied by efforts to support and promote BF practices in order to ensure optimal results.

In general, while increasing women's status by itself is an important goal, the findings from this thesis suggest that it might also have an important public health impact on improving child health and nutritional status. Therefore, programs and policies aiming to improve child health and nutrition need to consider the importance of women's status along with other nutritional interventions in improving child health and growth.

Acknowledgements

First and foremost, I would like to show my appreciation to all of the women and children in Matlab who participated in this study, as well as all members of ICDDR, B, who made this great trial possible with their dedication and hard work.

I am indebted to my main supervisor, Professor Eve Charlotte Ekstrom, for this educational opportunity. Lotta, I am really grateful for all your support, encouragement, and understanding during all these years. Not only have you been an incredible supervisor, but also you were a great mentor and supportive friend. Thank you so much for all those thought-provoking discussions, concept maps and figures that you created on the back of used paper. They were precious to me, I have kept them all! Thank you for your trust in me and for giving me the space to be independent while always being there to support and lead me. I never could have reached here without your wonderful supervision.

I am very grateful to my co-author, Associate Professor Amy L. Frith, for all of her great contributions to my papers. Amy, you are such a wonderful person to work with! I enjoyed every moment that I have spent with you last winter. Not only you are a great researcher, but also you are one of the most generous and kindest persons that I have ever met! I really appreciate the opportunity of knowing you, Diyah and Alex. The winter was not dark while you were here!

References

1. Stark E. Coercive Control. Oxford: Oxford University Press; 2007.
2. Tolman RM. The development of a measure of psychological maltreatment of women by their male partners. Violence Victims. 1989 Fall;4(3):159-77.
3. Goldberg DP, Huxley P. Common Mental Disorders: A Bio-Social Model. London Routledge; 1992.
4. Maxwell S, Smith M, editors. Household Food Security: a conceptual review, in S. Maxwell and T. Frankenberger, Household Food Security: Concepts, Indicators, and Measurements. A Technical Review. New York and Rome: UNICEF and IFAD; 1992.
5. de Onis M, Wijnhoven TM, Onyango AW. Worldwide practices in child growth monitoring. J Pediatr. 2004 Apr;144(4):461-5.
6. WHO, UNICEF. Low birthweight : country, regional and global estimates. Geneva: World Health Organization; 2004.
7. Popkin BM. The nutrition transition and obesity in the developing world. J Nutr. 2001 Mar;131(3):871S-3S.
8. WHO. WHO Multicentre Growth Reference Study Group.WHO Child Growth Standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: methods and development. Geneva: World Health Organization; 2006.
9. Straus MA. Measuring intrafamily conflict and violence. The conflict tactic scales. In Physical violence in American families: Risk factors and adaptations to violence in 8145 families, ed. Straus MA, Gelles RJ, editors. New Brunswick, New Jersey: Transaction Publishers; 1990.
10. WHO. WHO Global Database on Child Growth and Malnutrition. Geneva: World Health Organization; 1997.
11. Liu L, Johnson HL, Cousens S, Perin J, Scott S, Lawn JE, et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet. 2012 Jun 9;379(9832):2151-61.
12. UNICEF, WHO, World Bank . UNICEF-WHO-World Bank Joint Child Malnutrition Estimates: UNICEF, New York; WHO, Geneva; The World Bank,Washington, DC; 2012.
13. Olofin I, McDonald CM, Ezzati M, Flaxman S, Black RE, Fawzi WW, et al. Associations of suboptimal growth with all-cause and cause-specific mortality in children under five years: a pooled analysis of ten prospective studies. PLoS One. 2013;8(5):e64636.
14. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, et al. Maternal and child undernutrition: consequences for adult health and human capital. Lancet. 2008 Jan 26;371(9609):340-57.

15. UNICEF. Strategy for improved nutrition of children and women in developing countries: a UNICEF policy review. New York: United Nations Children's Fund; 1990.
16. ICN (International Conference on Nutrition). Plan of action for nutrition. Rom; 1992.
17. Engle PL, Menon P, Haddad L. Care and nutrition: Concepts and measurement. World Dev. 1999 Aug;27(8):1309-37.
18. Engle PL, Bentley M, Pelto G. The role of care in nutrition programmes: current research and a research agenda. P Nutr Soc. 2000 Feb;59(1):25-35.
19. WHO. Guiding Principles for Feeding Non-Breastfed Children 6-24 Months of Age. Geneva: World Health Organization; 2005.
20. Leroy JL, Ruel M, Habicht JP, Frongillo EA. Linear growth deficit continues to accumulate beyond the first 1000 days in low- and middle-income countries: global evidence from 51 national surveys. J Nutr. 2014 Sep;144(9):1460-6.
21. Victora CG, de Onis M, Hallal PC, Blossner M, Shrimpton R. Worldwide timing of growth faltering: revisiting implications for interventions. Pediatrics. 2010 Mar;125(3):e473-80.
22. WHO. Global Strategy for Infant and Young Child Feeding. Geneva: World Health Organization; 2003.
23. Victora CG, Bahl R, Barros AJD, Franca GVA, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. Lancet. 2016 Jan 30;387(10017):475-90.
24. Horta BL, Bahl R, Martinés JC, Victora CG, World Health Organization. Evidence on the long-term effects of breastfeeding : systematic review and meta-analyses. Geneva: World Health Organization; 2007.
25. Sankar MJ, Sinha B, Chowdhury R, Bhandari N, Taneja S, Martines J, et al. Optimal breastfeeding practices and infant and child mortality: a systematic review and meta-analysis. Acta Paediatr. 2015 Dec;104:3-13.
26. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. Cochrane Database Syst Rev. 2012(8):CD003517.
27. Chapman DJ, Morel K, Anderson AK, Damio G, Perez-Escamilla R. Breastfeeding Peer Counseling: From Efficacy Through Scale-Up. Journal of Human Lactation. 2010 Aug;26(3):314-26.
28. Haroon S, Das JK, Salam RA, Imdad A, Bhutta ZA. Breastfeeding promotion interventions and breastfeeding practices: a systematic review. Bmc Public Health. 2013 Sep 17;13.
29. Imdad A, Yakoob MY, Bhutta ZA. Impact of maternal education about complementary feeding and provision of complementary foods on child growth in developing countries. Bmc Public Health. 2011 Apr 13;11.
30. PAHO. Guiding principles for complementary feeding of the breastfed child. Washington, DC: Pan American Health Organization; 2003.
31. Dewey KG, Huffman SL. Maternal, infant, and young child nutrition: combining efforts to maximize impacts on child growth and micronutrient status. Food Nutr Bull. 2009 Jun;30(2 Suppl):S187-9.
32. WHO. Complementary feeding. [cited 2016 June 09]; Available from: http://www.who.int/nutrition/topics/complementary_feeding/en/.

33. Dewey KG, Adu-Afarwuah S. Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. Matern Child Nutr. 2008 Apr;4:24-85.

34. Martorell R, Khan LK, Schroeder DG. Reversibility of stunting: epidemiological findings in children from developing countries. Eur J Clin Nutr. 1994 Feb;48 Suppl 1:S45-57.

35. Ramalingaswami V, Jonsson U, Rohde J, Unicef. The Asian enigma. New York: UNICEF; 1996.

36. Smith LC, Ramakrishnan U, Ndiaye A, Haddad L, Martorell R. The Importance of Women's Status for Child Nutrition in Developing Countries.Research Report No. 133. Washington, DC: International Food Policy Research Institute; 2003.

37. Brunson EK, Shell-Duncan B, Steele M. Women's autonomy and its relationship to children's nutrition among the Rendille of northern Kenya. Am J Hum Biol. 2009 Jan-Feb;21(1):55-64.

38. Richards E, Theobald S, George A, Kim JC, Rudert C, Jehan K, et al. Going beyond the surface: Gendered intra-household bargaining as a social determinant of child health and nutrition in low and middle income countries. Soc Sci Med. 2013 Oct;95:24-33.

39. Furuta M, Salway S. Women's position within the household as a determinant of maternal health care use in Nepal. Int Fam Plan Perspec. 2006 Mar;32(1):17-27.

40. Kermode M, Herrman H, Arole R, White J, Premkumar R, Patel V. Empowerment of women and mental health promotion: a qualitative study in rural Maharashtra, India. Bmc Public Health. 2007 Aug 31;7.

41. Flury M, Nyberg E, Riecher-Rossler A. Domestic violence against women: definitions, epidemiology, risk factors and consequences. Swiss Med Wkly. 2010 Nov 13;140:23-7.

42. WHO. Global and regional estimates of violence against women : prevalence and health effects of intimate partner violence and non-partner sexual violence. (in IRIS). Geneva: World Health Organization; 2013.

43. Coker AL, Smith PH, Bethea L, King MR, McKeown RE. Physical health consequences of physical and psychological intimate partner violence. Arch Fam Med. 2000 May;9(5):451-7.

44. Dutton MA, Green BL, Kaltman SI, Roesch DM, Zeffiro TA, Krause ED. Intimate partner violence, PTSD, and adverse health outcomes. J Interpers Violence. 2006 Jul;21(7):955-68.

45. Ellsberg M, Jansen HA, Heise L, Watts CH, Garcia-Moreno C. Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. Lancet. 2008 Apr 5;371(9619):1165-72.

46. WHO. Violence against women: Intimate partner and sexual violence against women World Health Organization; [updated November 2014; cited 2014 December]; Available from: http://www.who.int/mediacentre/factsheets/fs239/en/.

47. Campbell JC. Health consequences of intimate partner violence. Lancet. 2002 Apr 13;359(9314):1331-6.

48. Shah PS, Shah J. Maternal Exposure to Domestic Violence and Pregnancy and Birth Outcomes: A Systematic Review and Meta-Analyses. J Womens Health. 2010 Nov;19(11):2017-31.

49. Sarkar NN. The impact of intimate partner violence on women's reproductive health and pregnancy outcome. J Obstet Gynaecol. 2008 Apr;28(3):266-71.

50. Bailey BA, Daugherty RA. Intimate partner violence during pregnancy: incidence and associated health behaviors in a rural population. Matern Child Health J. 2007 Sep;11(5):495-503.

51. Koski AD, Stephenson R, Koenig MR. Physical Violence by Partner during Pregnancy and Use of Prenatal Care in Rural India. J Health Popul Nutr. 2011 Jun;29(3):245-54.

52. Moraes CL, Amorim AR, Reichenheim ME. Gestational weight gain differentials in the presence of intimate partner violence. Int J Gynaecol Obstet. 2006 Dec;95(3):254-60.

53. Coker AL. Does physical intimate partner violence affect sexual health? A systematic review. Trauma Violence Abuse. 2007 Apr;8(2):149-77.

54. Sharps PW, Laughon K, Giangrande SK. Intimate partner violence and the childbearing year: maternal and infant health consequences. Trauma Violence Abuse. 2007 Apr;8(2):105-16.

55. Silverman JG, Decker MR, Reed E, Raj A. Intimate partner violence victimization prior to and during pregnancy among women residing in 26 US states: Associations with maternal and neonatal health. Am J Obstet Gynecol. 2006 Jul;195(1):140-8.

56. Grimstad H, Backe B, Jacobsen G, Schei B. Abuse history and health risk behaviors in pregnancy. Acta Obstet Gyn Scan. 1998 Oct;77(9):893-7.

57. Christian P, Lee SE, Donahue Angel M, Adair LS, Arifeen SE, Ashorn P, et al. Risk of childhood undernutrition related to small-for-gestational age and preterm birth in low- and middle-income countries. Int J Epidemiol. 2013 Oct;42(5):1340-55.

58. Victora CG, Villar J, Barros FC, Ismail LC, Chumlea C, Papageorghiou AT, et al. Anthropometric Characterization of Impaired Fetal Growth: Risk Factors for and Prognosis of Newborns With Stunting or Wasting. Jama Pediatr. 2015 Jul;169(7):e151431.

59. Valladares E, Pena R, Ellsberg M, Persson LA, Hogberg U. Neuroendocrine response to violence during pregnancy--impact on duration of pregnancy and fetal growth. Acta Obstet Gyn Scan. 2009;88(7):818-23.

60. Wadhwa PD, Culhane JF, Rauh V, Barve SS. Stress and preterm birth: neuroendocrine, immune/inflammatory, and vascular mechanisms. Matern Child Health J. 2001 Jun;5(2):119-25.

61. Wadhwa PD, Entringer S, Buss C, Lu MC. The contribution of maternal stress to preterm birth: issues and considerations. Clin Perinatol. 2011 Sep;38(3):351-84.

62. Yount KM, DiGirolamo AM, Ramakrishnan U. Impacts of domestic violence on child growth and nutrition: a conceptual review of the pathways of influence. Soc Sci Med. 2011 May;72(9):1534-54.

63. Davies PT, Sturge-Apple ML, Cicchetti D. Interparental aggression and children's adrenocortical reactivity: testing an evolutionary model of allostatic load. Dev Psychopathol. 2011 Aug;23(3):801-14.
64. Moffitt TE. Childhood exposure to violence and lifelong health: clinical intervention science and stress-biology research join forces. Dev Psychopathol. 2013 Nov;25(4 Pt 2):1619-34.
65. Mead HK, Beauchaine TP, Shannon KE. Neurobiological adaptations to violence across development. Dev Psychopathol. 2010 Winter;22(1):1-22.
66. Hamby S, Finkelhor D, Turner H, Ormrod R. The overlap of witnessing partner violence with child maltreatment and other victimizations in a nationally representative survey of youth. Child Abuse Neglect. 2010 Oct;34(10):734-41.
67. Leeb R, Lewis T, Zolotor AJ. A review of physical and mental health consequences of child abuse and neglect and implications for practice. American Journal of Lifestyle Medicine. 2011;5:454-68.
68. Hill A, Pallitto C, McCleary-Sills J, Garcia-Moreno C. A systematic review and meta-analysis of intimate partner violence during pregnancy and selected birth outcomes. Int J Gynecol Obstet. 2016 Jun;133(3):269-76.
69. Murphy CC, Schei B, Myhr TL, Du Mont J. Abuse: a risk factor for low birth weight? A systematic review and meta-analysis. Cmaj. 2001 May 29;164(11):1567-72.
70. Pavey AR, Gorman GH, Kuehn D, Stokes TA, Hisle-Gorman E. Intimate partner violence increases adverse outcomes at birth and in early infancy. J Pediatr. 2014 Nov;165(5):1034-9.
71. Asling-Monemi K, Naved RT, Persson LA. Violence against women and increases in the risk of diarrheal disease and respiratory tract infections in infancy: a prospective cohort study in Bangladesh. Arch Pediatr Adolesc Med. 2009 Oct;163(10):931-6.
72. Ackerson LK, Subramanian SV. Intimate Partner Violence and Death Among Infants and Children in India. Pediatrics. 2009 Nov;124(5):E878-E89.
73. Asling-Monemi K, Pena R, Ellsberg MC, Persson LA. Violence against women increases the risk of infant and child mortality: a case-referent study in Nicaragua. Bull World Health Organ. 2003;81(1):10-6.
74. Dixon RB. Rural Women at work: Strategies for Development in South Asia. Baltimore: John Hopkins University Press; 1978.
75. Dyson T, Moore M. On Kinship Structure, Female Autonomy, and Demographic Behavior in India. Popul Dev Rev. 1983;9(1):35-60.
76. Jejeebhoy SJ, Sathar ZA. Women's autonomy in India and Pakistan: The influence of religion and region. Popul Dev Rev. 2001 Dec;27(4):687.
77. Schmeer KK. Married Women's Resource Position and Household Food Expenditures in Cebu, Philippines. Journal of Marriage and Family. 2005;67:399–409.
78. Carlson GJ, Kordas K, Murray-Kolb LE. Associations between women's autonomy and child nutritional status: a review of the literature. Matern Child Nutr. 2015 Oct;11(4):452-82.

79. Bloom SS, Wypij D, Das Gupta M. Dimensions of women's autonomy and the influence on maternal health care utilization in a north Indian city. Demography. 2001 Feb;38(1):67-78.

80. Shroff MR, Griffiths PL, Suchindran C, Nagalla B, Vazir S, Bentley ME. Does maternal autonomy influence feeding practices and infant growth in rural India? Soc Sci Med. 2011 Aug;73(3):447-55.

81. Hindin MJ. Women's power and anthropometric status in Zimbabwe. Soc Sci Med. 2000 Nov;51(10):1517-28.

82. Hindin MJ. Women's autonomy, women's status and fertility-related behavior in Zimbabwe. Popul Res Policy Rev. 2000 Jun;19(3):255-82.

83. Ahmed S, Creanga AA, Gillespie DG, Tsui AO. Economic Status, Education and Empowerment: Implications for Maternal Health Service Utilization in Developing Countries. PLoS One. 2010 Jun 23;5(6).

84. Mistry R, Galal O, Lu M. Women's autonomy and pregnancy care in rural India: a contextual analysis. Soc Sci Med. 2009 Sep;69(6):926-33.

85. Chakraborty P, Anderson AK. Maternal autonomy and low birth weight in India. J Womens Health. 2011 Sep;20(9):1373-82.

86. Antai D. Gender inequities, relationship power, and childhood immunization uptake in Nigeria: a population-based cross-sectional study. Int J Infect Dis. 2012 Feb;16(2):e136-45.

87. Mashal T, Takano T, Nakamura K, Kizuki M, Hemat S, Watanabe M, et al. Factors associated with the health and nutritional status of children under 5 years of age in Afghanistan: family behaviour related to women and past experience of war-related hardships. BMC Public Health. 2008;8:301.

88. Fantahun M, Berhane Y, Wall S, Byass P, Hogberg U. Women's involvement in household decision-making and strengthening social capital-crucial factors for child survival in Ethiopia. Acta Paediatr. 2007 Apr;96(4):582-9.

89. Hossain MB, Phillips JF, Pence B. The effect of women's status on infant and child mortality in four rural areas of Bangladesh. J Biosoc Sci. 2007 May;39(3):355-66.

90. Esterik PV. Factors influencing care: Care, caregiving, and caregivers. Food and Nutrition Bulletin. 1995;16(4):378-88.

91. Kawachi I. Social capital and community effects on population and individual health. Ann Ny Acad Sci. 1999;896:120-30.

92. Kawachi I, Berkman LF. Social ties and mental health. J Urban Health. 2001 Sep;78(3):458-67.

93. Martin KS, Rogers BL, Cook JT, Joseph HM. Social capital is associated with decreased risk of hunger. Soc Sci Med. 2004 Jun;58(12):2645-54.

94. Emmanuel E, St John W, Sun J. Relationship between Social Support and Quality of Life in Childbearing Women during the Perinatal Period. Jognn-J Obst Gyn Neo. 2012 Nov-Dec;41(6):E62-E70.

95. De Silva MJ, Huttly SR, Harpham T, Kenward MG. Social capital and mental health: A comparative analysis of four low income countries. Soc Sci Med. 2007 Jan;64(1):5-20.

96. Warren PL. First-time mothers: social support and confidence in infant care. J Adv Nurs. 2005 Jun;50(5):479-88.

97. Nkansah-Amankra S, Dhawain A, Hussey JR, Luchok KJ. Maternal social support and neighborhood income inequality as predictors of low birth weight and preterm birth outcome disparities: analysis of South Carolina Pregnancy Risk Assessment and Monitoring System survey, 2000-2003. Matern Child Health J. 2010 Sep;14(5):774-85.

98. Harpham T, De Silva MJ, Tuan T. Maternal social capital and child health in Vietnam. J Epidemiol Commun H. 2006 Oct;60(10):865-71.

99. Kana'Iaupuni SM, Donato KM, Thompson-Colon T, Stainback M. Counting on kin: Social networks, social support, and child health status. Soc Forces. 2005 Mar;83(3):1137-64.

100. Adams AM, Madhavan S, Simon D. Women's social networks and child survival in Mali. Soc Sci Med. 2002 Jan;54(2):165-78.

101. Bangladesh country profile [database on the Internet]. UN. Available from: http://www.un.org.bd/docs/Bangladesh%20Country%20Profile.pdf.

102. Bangladesh Bureau of Statistics (BBS). Bangladesh Population and Housing Census 2011, National Volume-3: Urban Area Report. Ministry of Planning. Dhaka, Bangladesh: Bureau of Statistics. Statistics and Informatics Division; 2014.

103. World Bank data: Bangladesh [database on the Internet]. World Bank. Available from: http://data.worldbank.org/country/bangladesh.

104. National Institute Of Population Research And Training (NIPORT) Mitra and Associates and ICF International. Bangladesh Demographic and Health Survey 2014. Dhaka, Bangladesh, and Rockville, Maryland, USA: NIPORT, Mitra and Associates, and ICF International; 2016.

105. National Institute of Population Research and Training, Mitra and Associates, Macro International. Bangladesh Demographic and Health Survey 2007. Dhaka, Bangladesh and Calverton, Maryland, USA: NIPORT, Mitra and Associates, and Macro International; 2009.

106. ICDDR B. Health and Demographic Surveillance System–Matlab, v. 38. 2005 Socio-economic Census. Dhaka: ICDDR,B; 2007.

107. World Food Programme. The Republic of Nicaragua.Current issues and what the World Food Programme is doing. [cited 2016 June, 16]; Available from: https://www.wfp.org/countries/nicaragua.

108. World Bank data: Nicaragua [database on the Internet] [cited December 8, 2014]. Available from: http://data.worldbank.org/country/nicaragua.

109. World Bank. Nicaragua overview. [updated April 10, 2014; cited 2014 December, 8]; Available from: http://www.worldbank.org/en/country/nicaragua/overview.

110. Perez W, Pena R, Persson LA, Kallestal C. Tracking progress towards equitable child survival in a Nicaraguan community: neonatal mortality challenges to meet the MDG 4. BMC Public Health. 2011;11:455.

111. DHS. Nicaragua Demographic and Health Survey 2011/12 - Preliminary Report Macro International, Calverton, MD; 2013.

112. UNICEF. Country Office Portal Annual Report 2011 for Nicaragua, TACRO; 2012.

113. WHO. Noncommunicable Diseases Country Profiles 2011: Nicaragua. Geneva: World Health Organization; 2011.

114. UNICEF. The state of the world's children 2007: Women and children the double dividend of gender equality. New York: UNICEF; 2006.

115. Persson LA, Arifeen S, Ekstrom EC, Rasmussen KM, Frongillo EA, Yunus M, et al. Effects of Prenatal Micronutrient and Early Food Supplementation on Maternal Hemoglobin, Birth Weight, and Infant Mortality Among Children in Bangladesh The MINIMat Randomized Trial. Jama-J Am Med Assoc. 2012 May 16;307(19):2050-9.

116. Straus MA, Douglas EM. A short form of the Revised Conflict Tactics Scales, and typologies for severity and mutuality. Violence Victims. 2004 Oct;19(5):507-20.

117. DHS Model Questionnaire - Phase 5 (2003-2008) (English). Women's questionnaire [database on the Internet] 2008. Available from: http://dhsprogram.com/pubs/pdf/DHSQ5/DHS5-Woman%27s-QRE-22-Aug-2008.pdf.

118. Broadhead WE, Gehlbach SH, Degruy FV, Kaplan BH. The Duke-Unc Functional Social Support Questionnaire - Measurement of Social Support in Family Medicine Patients. Med Care. 1988 Jul;26(7):709-23.

119. WHO, UNICEF. Breastfeeding counselling : a training course. Geneva: World Health Organization; 1993.

120. de Onis M, Blossner M, Borghi E. Global prevalence and trends of overweight and obesity among preschool children. Am J Clin Nutr. 2010 Nov;92(5):1257-64.

121. Dewey K. Guiding principles for complementary feeding of the breastfed child. Washington, DC: Pan American Health Organisation/World Health Organisation; 2003.

122. WHO. Indicators for Assessing Infant and Young Child Feeding Practices: Conclusions of a Consensus Meeting Held 6-8 November 2007 in Washington D.C., USA, Part 1: Definitions. Geneva: World Health Organization 2008.

123. WHO. Indicators for assessing infant and young child feeding practices: Part II measurement. Geneva: World Health Organization; 2010.

124. Beusenberg M, Orley JH, World Health Organization. Division of Mental Health. A User's guide to the self reporting questionnaire (SRQ). Geneva: World Health Organization; 1994.

125. Khan NZ, Muslima H, Bhattacharya M, Parvin R, Begum N, Jahan M, et al. Stress in mothers of preterm infants in Bangladesh: associations with family, child and maternal factors and children's neuro-development. Child Care Hlth Dev. 2008 Sep;34(5):657-64.

126. van Veen NHJ, Hemo DA, Bowers RL, Pahan D, Negrini JF, Velema JP, et al. Evaluation of activity limitation and social participation, and the effects or reconstructive surgery in people with disability due to leprosy: a prospective cohort study. Disabil Rehabil. 2011;33(8):667-74.

127. Chai J, Fink G, Kaaya S, Danaei G, Fawzi W, Ezzati M, et al. Association between intimate partner violence and poor child growth: results from 42 demographic and health surveys. Bull World Health Organ. 2016 May;94(5):331-9.

128. Asling-Monemi K, Naved RT, Persson LA. Violence against women and the risk of fetal and early childhood growth impairment: a cohort study in rural Bangladesh. Arch Dis Child. 2009 Oct;94(10):775-9.

129. Rico E, Fenn B, Abramsky T, Watts C. Associations between maternal experiences of intimate partner violence and child nutrition and mortality: findings from Demographic and Health Surveys in Egypt, Honduras, Kenya, Malawi and Rwanda. J Epidemiol Commun H. 2011 Apr;65(4):360-7.

130. Ackerson LK, Subramanian SV. Domestic violence and chronic malnutrition among women and children in India. Am J Epidemiol. 2008 May 15;167(10):1188-96.

131. Sobkoviak RM, Yount KM, Halim N. Domestic violence and child nutrition in Liberia. Soc Sci Med. 2012 Jan;74(2):103-11.

132. Ko Ling C. Co-occurrence of intimate partner violence and child abuse in Hong Kong Chinese families. J Interpers Violence. 2011 May;26(7):1322-42.

133. Zolotor A J, Theodore AD, Coyne-Beasley T, Runyan DK. Intimate partner violence and child maltreatment: overlapping risk. Brief Treat Crisis Interv. 2007;7:305-21.

134. Troxel WM, Matthews KA. What are the costs of marital conflict and dissolution to children's physical health? Clin Child Fam Psychol Rev. 2004 Mar;7(1):29-57.

135. Hasselmann MH, Reichenheim ME. Parental violence and the occurrence of severe and acute malnutrition in childhood. Paediatr Perinat Ep. 2006 Jul;20(4):299-311.

136. Garcia-Moreno C, Jansen HA, Ellsberg M, Heise L, Watts CH. Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. Lancet. 2006 Oct 7;368(9543):1260-9.

137. Bonomi AE, Thompson RS, Anderson M, Reid RJ, Carrell D, Dimer JA, et al. Intimate partner violence and women's physical, mental, and social functioning. Am J Prev Med. 2006 Jun;30(6):458-66.

138. d'Oliveira AF, Schraiber LB, Franca-Junior I, Ludermir AB, Portella AP, Diniz CS, et al. Factors associated with intimate partner violence against Brazilian women. Rev Saude Publica. 2009 Apr;43(2):299-311.

139. Kishor S, Johnson K. Profiling domestic violence: a multi-country study. Calverton, MD: ORC MACRO; 2004.

140. Heaton TB, Forste R. Domestic Violence, Couple Interaction and Children's Health in Latin America. Journal of Family Violence. 2008;23:183-93.

141. Patel A, Leonard W, Reyes-Garcia V, McDade T, Huanca T, Tanner S, et al. Parental preference, bargaining power, and child nutritional status: Evidence from the Bolivian Amazon.Tsimane' Amazonian Panel Study Working Paper No. 31. Evanston, Ill., U.S.A.2007.

142. Kishor S. A focus on gender: Collected papers on gender using DHS data. Calverton, Maryland, USA: ORC Macro; 2005.

143. de Onis M, Blossner M, Borghi E, Frongillo EA, Morris R. Estimates of global prevalence of childhood underweight in 1990 and 2015. Jama. 2004 Jun 2;291(21):2600-6.

144. Na MZ, Jennings L, Talegawkar SA, Ahmed S. Association between women's empowerment and infant and child feeding practices in sub-Saharan Africa: an analysis of Demographic and Health Surveys. Public Health Nutr. 2015 Dec;18(17):3155-65.

145. De Silva MJ, Harpham T. Maternal social capital and child nutritional status in four developing countries. Health Place. 2007 Jun;13(2):341-55.

146. Harpham T, De Silva MJ, Tuan T. Maternal social capital and child health in Vietnam. J Epidemiol Commun H. 2006 Oct;60(10):865-71.

147. Moestue H, Huttly S, Sarella L, Galab S. 'The bigger the better' - mothers' social networks and child nutrition in Andhra Pradesh. Public Health Nutr. 2007 Nov;10(11):1274-82.

148. Howard LM, Oram S, Galley H, Trevillion K, Feder G. Domestic violence and perinatal mental disorders: a systematic review and meta-analysis. PLoS Med. 2013;10(5):e1001452.

149. Lagdon S, Armour C, Stringer M. Adult experience of mental health outcomes as a result of intimate partner violence victimisation: a systematic review. Eur J Psychotraumatol. 2014;5.

150. Ribeiro WS, Andreoli SB, Ferri CP, Prince M, Mari JJ. Exposure to violence and mental health problems in low and middle-income countries: a literature review. Rev Bras Psiquiatr. 2009 Oct;31 Suppl 2:S49-57.

151. Dutton MA, Goodman LA, Bennett L. Court-involved battered women's responses to violence: the role of psychological, physical, and sexual abuse. Violence Victims. 1999 Spring;14(1):89-104.

152. Street AE, Arias I. Psychological abuse and posttraumatic stress disorder in battered women: examining the roles of shame and guilt. Violence Victims. 2001 Feb;16(1):65-78.

153. Ishida K, Stupp P, Melian M, Serbanescu F, Goodwin M. Exploring the associations between intimate partner violence and women's mental health: evidence from a population-based study in Paraguay. Soc Sci Med. 2010 Nov;71(9):1653-61.

154. Taft CT, O'Farrell TJ, Torres SE, Panuzio J, Monson CM, Murphy M, et al. Examining the correlates of psychological aggression among a community sample of couples. J Fam Psychol. 2006 Dec;20(4):581-8.

155. Arias I, Pape KT. Psychological abuse: implications for adjustment and commitment to leave violent partners. Violence Victims. 1999 Spring;14(1):55-67.

156. Follingstad DR, Rutledge LL, Berg BJ, Hause ES, Polek DS. The role of emotional abuse in physically abusive relationships. Journal of Family Violence. 1990;5:107-20.

157. Ansara DL, Hindin MJ. Psychosocial consequences of intimate partner violence for women and men in Canada. J Interpers Violence. 2011 May;26(8):1628-45.

158. Rogers MJ, Follingstad DR. Women's exposure to psychological abuse: Does that experience predict mental health outcomes? Journal of Family Violence. 2014;29:595-611.

159. Dillon G, Hussain R, Loxton D, Rahman S. Mental and Physical Health and Intimate Partner Violence against Women: A Review of the Literature. Int J Family Med. 2013;2013:313909.

160. Eberhard-Gran M, Schei B, Eskild A. Somatic symptoms and diseases are more common in women exposed to violence. J Gen Intern Med. 2007 Dec;22(12):1668-73.

161. Harville EW, Savitz DA, Dole N, Herring AH, Thorp JM. Stress questionnaires and stress biomarkers during pregnancy. J Womens Health. 2009 Sep;18(9):1425-33.

162. Obel C, Hedegaard M, Henriksen TB, Secher NJ, Olsen J, Levine S. Stress and salivary cortisol during pregnancy. Psychoneuroendocrinology. 2005 Aug;30(7):647-56.

163. Pluess M, Bolten M, Pirke KM, Hellhammer D. Maternal trait anxiety, emotional distress, and salivary cortisol in pregnancy. Biol Psychol. 2010 Mar;83(3):169-75.

164. Christian LM. Physiological reactivity to psychological stress in human pregnancy: current knowledge and future directions. Prog Neurobiol. 2012 Nov;99(2):106-16.

165. Lau Y, Chan KS. Influence of intimate partner violence during pregnancy and early postpartum depressive symptoms on breastfeeding among chinese women in Hong Kong. J Midwifery Womens Health. 2007 Mar-Apr;52(2):e15-20.

166. Misch ES, Yount KM. Intimate partner violence and breastfeeding in Africa. Matern Child Health J. 2014 Apr;18(3):688-97.

167. Zureick-Brown S, Lavilla K, Yount KM. Intimate partner violence and infant feeding practices in India: a cross-sectional study. Maternal & child nutrition. 2015 Oct;11(4):792-802.

168. Bar-Yam NB, Darby L. Fathers and breastfeeding: a review of the literature. J Hum Lact. 1997 Mar;13(1):45-50.

169. Campbell JC, Oliver C, Bullock L. Why battering during pregnancy? AWHONNS Clin Issues Perinat Womens Health Nurs. 1993;4(3):343-9.

170. Klingelhafer SK. Sexual abuse and breastfeeding. Journal of Human Lactation. 2007 May;23(2):194-7.

171. Wood K, Van Esterik P. Infant feeding experiences of women who were sexually abused in childhood. Can Fam Physician. 2010 Apr;56(4):E136-E41.

172. Kendall-Tackett K. Breastfeeding and the sexual abuse survivor. J Hum Lact. 1998 Jun;14(2):125-30; quiz 31-3.

173. Brand E, Kothari C, Stark MA. Factors related to breastfeeding discontinuation between hospital discharge and 2 weeks postpartum. J Perinat Educ. 2011 Winter;20(1):36-44.

174. Srinivas GL, Benson M, Worley S, Schulte E. A clinic-based breastfeeding peer counselor intervention in an urban, low-income population: interaction with breastfeeding attitude. J Hum Lact. 2015 Feb;31(1):120-8.

175. Alio AP, Nana PN, Salihu HM. Spousal violence and potentially preventable single and recurrent spontaneous fetal loss in an African setting: cross-sectional study. Lancet. 2009 Jan 24;373(9660):318-24.

176. Pallitto CC, Garcia-Moreno C, Jansen HA, Heise L, Ellsberg M, Watts C. Intimate partner violence, abortion, and unintended pregnancy: results from the WHO Multi-country Study on Women's Health and Domestic Violence. Int J Gynaecol Obstet. 2013 Jan;120(1):3-9.

177. Ellsberg M, Heise L, Pena R, Agurto S, Winkvist A. Researching domestic violence against women: methodological and ethical considerations. Stud Fam Plann. 2001 Mar;32(1):1-16.

178. Subar AF, Thompson FE, Kipnis V, Midthune D, Hurwitz P, McNutt S, et al. Comparative validation of the Block, Willett, and National Cancer Institute food frequency questionnaires : the Eating at America's Table Study. Am J Epidemiol. 2001 Dec 15;154(12):1089-99.

179. Mejia-Rodriguez F, Neufeld LM, Garcia-Guerra A, Quezada-Sanchez AD, Orjuela MA. Validation of a food frequency questionnaire for retrospective estimation of diet during the first 2 years of life. Matern Child Health J. 2014 Jan;18(1):268-85.

180. Moore SE, Prentice AM, Coward WA, Wright A, Frongillo EA, Fulford AJC, et al. Use of stable-isotope techniques to validate infant feeding practices reported by Bangladeshi women receiving breastfeeding counseling. Am J Clin Nutr. 2007 Apr;85(4):1075-82.

Acta Universitatis Upsaliensis

Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine 1252

ACTA
UNIVERSITATIS
UPSALIENSIS
UPPSALA
2016