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Intimate Partner Violence and Breastfeeding Practices
in Six African Countries

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Intimate Partner Violence and Breastfeeding Practices in Six African Countries

By

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Bachelor of Arts
Colgate University
2006

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An abstract of
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Rollins School of Public Health of Emory University
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Abstract

Intimate Partner Violence and Breastfeeding Practices
in Six African Countries
By Emily S. Misch

Background: Optimal breastfeeding practices impart health benefits to mothers and infants. Intimate partner violence (IPV) may adversely affect optimal breastfeeding, but research is limited and inconclusive. This study examined the effect of different forms of IPV on early initiation and exclusive breastfeeding in six African countries.

Methods: We used national Demographic and Health Surveys for Ghana, Kenya, Liberia, Nigeria, Zambia, and Zimbabwe to study mothers (15-49 years) with a child less than 6 months old. Logistic regression was used to estimate the unadjusted and adjusted associations of physical, emotional, sexual, and pregnancy IPV with: early (within 1 hour of birth) and exclusive breastfeeding.

Results: Across countries, IPV was typically negatively associated with optimal breastfeeding practices. More severe physical IPV in Kenya (aOR: 0.38, p=0.004), less severe physical IPV (aOR: 0.62, p=0.028) and sexual IPV (aOR: 0.40, p=0.005) in Zambia were negatively associated with early initiation. Sexual IPV in Liberia (aOR: 0.08, p=0.032) and Kenya (aOR: 0.27, p=0.007), as well as emotional IPV in Kenya (aOR: 0.40, p=0.010) were negatively associated with exclusive breastfeeding. Many other associations were marginally significant and in similar directions ($p<0.10$). Among Zimbabwean women, pregnancy IPV (aOR: 6.51, p=0.013) and emotional IPV (aOR: 2.72, p=0.013) were unexpectedly positively associated with early initiation and exclusive breastfeeding, respectively.

Conclusions: IPV may adversely affect breastfeeding practices, and longitudinal research of these relationships is warranted. IPV screening and breastfeeding counseling for exposed women should be a routine part of prenatal care to mitigate the potential intergenerational effects of IPV.

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Table of Contents

List of Tables and Figures

Thesis:

Manuscript:

1 Introduction

Violence against women has been identified as an important human rights and public health concern (1, 2); the World Health Organization (WHO) has cited the prevention of violence against women as a high priority (3). Intimate partner violence (IPV), defined by the Centers for Disease Control and Prevention (CDC) as physical, sexual, psychological harm, or the threat of physical or sexual harm by a current or former partner or spouse (4), is the most common form of violence against women (5). Indeed, women are six times more likely to be victims of IPV than men (6). As such, in the context of this thesis, the term "IPV" will be used to specifically reference violence against women.

Globally, estimates of IPV prevalence vary substantially, with studies reporting anywhere from 10% to 71% of women experiencing physical IPV, 4% to 32% experiencing sexual IPV, and 20% to 75% experiencing emotional IPV (3, 7). Women of reproductive age are at a greater risk for experiencing IPV than women of any other age (6). Estimates of IPV prevalence around pregnancy, like global estimates, differ, as studies report 0.9% to 30% of pregnant women experiencing physical and/or sexual IPV and 5.1% to 43.2% experiencing emotional IPV (5, 8, 9). In Africa specifically, a systematic review found prevalence estimates ranging from 22.5%-40% for physical IPV, 2.7%-26.5% for sexual IPV, and 24.8%-49% for emotional IPV (10).

As evidenced by these results, substantial amount of pregnant women and women of reproductive age are affected by IPV. It is therefore important to determine the effects that IPV has on pre-, intra-, and postpartum health outcomes, and indeed, many have been previously studied. Maternal health outcomes known to be associated with IPV include sexually transmitted diseases (10), substance abuse (11, 12), and depression (13, 14). IPV

during pregnancy has also been noted to be associated with an increased risk of preterm births and low birth weight infants (15-18). One health outcome for which its association with IPV is not fully understood, however, and thus merits further examination, is a woman's breastfeeding practices.

The health benefits of breastfeeding, to both mother and child, have been widely documented. Current international recommendations identify early initiation (within one hour of birth) and exclusive breastfeeding until six months of age as important components of optimal breastfeeding practices (19, 20). Early initiation provides the infant access to maternal colostrum, nutrient-dense breast milk produced during the first few days after delivery that is particularly important to the development of the infant's mucosal immune system (21), and has been associated with reduced infection-related neonatal mortality (22, 23). Exclusive breastfeeding until six months of age also imparts many health benefits, including reductions in gastrointestinal and lower respiratory tract infections (24, 25). Breastfeeding has also been shown to decrease a child's risk of ear infections, vomiting and SIDS in infancy, and eczema, asthma, obesity, type 1 and 2 diabetes, and leukemia later in life (26). A breastfeeding mother benefits from a decreased risk of breast cancer, ovarian cancer, and type 2 diabetes (26). Perhaps most impressive, it has been estimated that the deaths of over 1.4 million infants in low-income countries could be averted by practicing optimal breastfeeding (25, 27). Despite the many advantages imparted by breastfeeding, levels of early initiation and exclusive breastfeeding remain disappointingly low in many countries, including those in Sub-Saharan Africa (28).

Considering the additional stressors IPV places on a woman, it is logical to suggest that mothers experiencing IPV may be even less likely to meet breastfeeding

recommendations as mothers unaffected by IPV. As optimal breastfeeding has the potential to save so many lives, especially in the developing world, identifying any risk factor that may decrease its likelihood is a vitally important task. Only by first identifying these factors can healthcare providers and other public health professionals begin to address them directly in the hope of mitigating their negative effects.

The link between maternal experience of IPV and breastfeeding has been examined previously in six research studies (to be discussed in Section 2), yielding conflicting results. Beyond the disagreeing results, variations in the type of IPV studied and the measurements used to determine IPV and breastfeeding status make it difficult to arrive at a definitive answer regarding the link between IPV and breastfeeding by simply analyzing the current research. Additionally, low-income countries, particularly in Africa, have been overlooked by past research, as a majority of these studies take place in a high-income country context. It is possible that cultural differences surrounding both IPV and breastfeeding practices will determine the presence (or absence) of an association. Thus, there is substantial need to expand the research on IPV and breastfeeding into new, unexplored cultural contexts.

As such, this thesis sought to contribute to the existing literature by examining the relationship between the maternal experience of IPV and breastfeeding practices in the previously unstudied continent of Africa by utilizing population-level Demographic Health Surveys. Conducted by the National Population Commission (NPC), these surveys provide nationally representative data on IPV (physical, sexual, emotional, and during pregnancy) and breastfeeding practices. Specifically, we focused on the countries of Ghana, Kenya, Liberia, Nigeria, Zambia, and Zimbabwe. These countries were selected based upon the suitability of the data in their DHS surveys (adequate sample of women completing

domestic violence (DV) module with infants less than six months of age), but also served to provide evidence from a wide variety of Sub-Saharan African countries.

2 Literature Review

2.1 Introduction

This review has two objectives. First, it will provide a critical summary of the few known research studies examining the effect of IPV on breastfeeding. To find these articles, searches of the Medline, Web of Science, and PsycInfo databases were conducted using a combination of the search terms: "breastfeeding (and truncations of)," with "intimate partner violence," "domestic violence," "violence," "IPV" or "abuse." Of the 347 articles collected in total, only six were found to be original research articles examining IPV and breastfeeding practices. One of the six articles was written in Portuguese; an online translation tool was utilized to obtain an English version of the manuscript.

Secondly, as the existing literature is conflicting and inconclusive, a subsequent review of the literature was conducted to provide rationale for the current study. A conceptual framework is proposed as support for the hypothesized relationship between IPV and breastfeeding and examples from the literature review are provided as justification for the framework's intermediary links and suggested mechanisms.

2.2 Studies Examining the Effect of IPV on Breastfeeding Practices in the United States

In total, six studies were identified as original research examining intimate partner violence and breastfeeding practices. A summary can be seen in Table 1. Of these, three were undertaken in the United States. We begin with a chronological study of these three studies.

The first article to suggest a link between IPV and breastfeeding came upon the connection quite serendipitously (29). A retrospective chart review of 800 pregnancies in

a U.S. family practice, in which the original intention was to examine the type of delivery and breastfeeding outcomes, observed a striking variation in prevalence of reported physical IPV among those women breastfeeding at 6 weeks follow-up and those not. Of the 611 breastfeeding women, only one reported physical partner abuse (0.2%), while among the non-breastfeeding women, five of the 113 women did (4.4%) ($p<0.001$). No further analysis was undertaken, so it is difficult to predict how controlling for socioeconomic demographics or other factors may have affected the results. While certainly not providing conclusive evidence, this paper importantly brought the possible association to light.

The second article studied the relationship between physical and/or sexual IPV and breastfeeding using a case-control design (30). Women from two Midwestern U.S. WIC clinics were interviewed (n=212) and split into two groups based on report of IPV within the past year (IPV, n=21; no IPV, n=129). The women were followed for 10 months; the type of vouchers collected by the women (food vs. formula vouchers) was used to determine breastfeeding status. Bullock et al. found no association between report of IPV and a woman's likelihood to initiate breastfeeding, as measured by the type of voucher obtained the first month after delivery ($p=0.98$), or the duration of her breastfeeding, based on the number of months food vouchers were obtained ($p<0.65$). One limitation of this study was its recruitment of participants from WIC clinics, where women are predominately of lower socioeconomical status, making it difficult to extrapolate the results more broadly. Additionally, the use of vouchers as a proxy for breastfeeding is problematic. Partially breastfeeding women may have obtained either voucher based on what they deemed to be more important or costly, thus, the limiting the validity of this measure. Perhaps the greatest limitation to this study was that its questionnaire did not

differentiate between physical/sexual IPV and physical/sexual violence by others. The questions, taken from the Abuse Assessment Screen (AAS), asked "Within the last year, have you been hit, slapped, kicked, or otherwise physically hurt by *someone*?," "Since you have been pregnant, have you been hit, slapped, kicked, or otherwise physically hurt by *someone*?," and "Within the last year, has *anyone* forced you to have sexual activities?" [author's emphasis]. Without specifically limiting the violence to that of a specific person (ie, the partner), it is difficult to apply the results (as Bullock et al. do) to IPV.

A third article by Silverman, Decker, Reed, and Raj (31) used data from the Pregnancy Risk Assessment Monitoring System (PRAMS) to examine IPV and breastfeeding among 118,579 women. PRAMS is a CDC-led population-based surveillance system that monitors maternal behaviors around pregnancy among women delivering liveborn infants in 26 U.S. states. Birth certificates are utilized to identify mothers and questionnaires are mailed between two and six months post-delivery. Mothers of low birth weight infants and minority women are oversampled to ensure adequate inclusion. In the study, IPV was measured through two questions concerning physical violence from a partner in the year prior to pregnancy and during pregnancy. Unadjusted analyses indicated that women reporting physical IPV in either time period, or both, had significantly higher odds of never initiating breastfeeding (IPV year prior, OR: 1.45, 95% CI: 1.26-1.66; IPV pregnancy, OR: 1.35, 95% CI: 1.11-1.64; IPV both, OR: 1.52, 95% CI: 1.34-1.72). If women had begun breastfeeding, those reporting IPV also had higher odds of early breastfeeding cessation (defined as within 4 weeks of initiation) (IPV year prior, OR: 1.41, 95% CI: 1.15-1.74; IPV pregnancy, OR: 1.48, 95% CI: 1.11-1.97; IPV both, OR: 1.71, 95% CI: 1.41-2.06). Upon adjusting for race, age, education, marital status, and current smoking, however, the

associations between IPV and breastfeeding initiation (IPV year prior, aOR: 0.95, 95% CI: 0.81-1.10; IPV pregnancy, aOR: 0.86, 95% CI: 0.69-1.06; IPV both, aOR: 0.87, 95% CI: 0.76-1.01) and early cessation (IPV year prior, aOR: 0.94, 95% CI: 0.76-1.17; IPV pregnancy, aOR: 0.97, 95% CI: 0.72-1.30; IPV both, aOR: 1.05, 95% CI: 0.86-1.30) did not remain significant. Black race, having less than a high school education, and currently smoking remained significantly associated with breastfeeding initiation and black race, being less than 20 years old, not being married, and currently smoking remained associated with early breastfeeding cessation. This study benefits from a large sample representing 26 U.S. states, but is limited by its reliance on self-reported data, making underreporting of physical IPV a potential concern. Additionally, the severity and duration of physical IPV was not examined, nor were other forms of IPV.

2.3 Studies Examining the Effect of IPV on Breastfeeding Practices Outside the United States

Three additional studies were conducted in countries outside of the U.S.—one in China and two in Brazil. In the first article, Lau and Chan (32) investigated the influence of IPV and early postpartum depression on breastfeeding among Chinese women in Hong Kong. Two scales were used to measure IPV, the AAS scale previously described (though with questions specifically targeted at partner abuse) and the Revised Conflict Tactics Scale (CTS-2), a 39 item questionnaire which measures psychological aggression, physical assault, sexual coercion, and injury through an 8-point Likert scale. Women with a CTS-2 score greater than zero were said to have experienced that type of IPV. Among the cross-sectional cohort of 1200 women, 134 (11.2%) reported physical, sexual, or emotional IPV. Chi-square analyses indicated that women reporting IPV were significantly more likely to

use artificial feeding methods (47.8%) than to breastfeed (28.4%) or use mixed methods (23.9%) ($p<0.05$). Looking at the types of IPV individually, psychological aggression ($p<0.05$) and physical assault ($p=0.032$) were significantly associated with greater levels of artificial feeding, but sexual coercion ($p=0.069$) and injury ($p=0.111$) were not. Upon controlling for demographic, socioeconomic, and obstetric variables, the relationship between IPV and breastfeeding remained, as women who did not experience IPV during pregnancy were significantly more likely to breastfeed than women who experienced IPV (aOR: 1.84, 95% CI: 1.16-2.91). The cross-cultural setting of this study is particularly interesting. On one hand, it may lend support to the idea that the relationship and IPV and breastfeeding is universal; on the other hand, breastfeeding practices and demographics of breastfeeding women differ greatly among countries, thus, specific Chinese cultural factors may have influenced the results.

A small qualitative study by Lourenco and Deslandes (33) recruited 11 women who experienced IPV during pregnancy from a hospital in Rio de Janeiro. Most women were single, unemployed, and had low levels of schooling. Physical IPV was experienced by all, though one woman also reported sexual violence. Each woman completed an in-depth interview that used a life history approach to gain a sense of the women's experience with motherhood, complemented by a semi-structured guide that focused on breastfeeding. Predominately, the women reported enjoying motherhood, though a sense of guilt and need to protect and shelter their children from the violence also surfaced as a theme. Regarding breastfeeding, all women reported having a "good" experience with breastfeeding, though the challenges detailed in their accounts may indicate otherwise. Many women only breastfed for a short period, though the reasons given for weaning were

varied. Some cited the need to work outside the home, others discussed their concerns with their medication use and its effect on their milk, and some associated the weaning with their experience of IPV. In general, the small, qualitative nature of this study makes it difficult to interpret. "Some" women blamed IPV for their breastfeeding cessation, but we do not know what proportion. If anything, this article continues to suggest that there may be a connection between IPV and breastfeeding and that it may span cultures, but it does not contribute to the arrival at a definitive answer.

Finally, an additional study from Rio de Janeiro, Brazil randomly selected mothers of infants less than five months of age from five large public primary healthcare facilities to examine the link between severe physical IPV during pregnancy and exclusive breastfeeding cessation (34). The CTS-2 was used to determine if women experienced at least one act of severe physical IPV, as a victim or a perpetrator and maternal recall of infant feeding during the last week was used to determine exclusive breastfeeding. Of the 811 women selected, 153 (18.9%) reported severe physical violence during pregnancy and 437 (53.9%) had ceased breastfeeding. They found that severe physical IPV was significantly associated with early cessation of exclusive breastfeeding, even when socioeconomic status, age, and maternal alcohol consumption (HR: 1.30, 95% CI: 1.01-1.65, p=0.043). When the mother's perception of her baby's health, type of maternity clinic, timing of first prenatal visit, and maternal self esteem were added to the model, however, severe physical IPV lost significant (HR: 1.17, 95% CI: 0.89-1.53, p=0.260). This study is important because it adds to the evidence to suggest that there is a link between IPV and breastfeeding, but it also suggests that that link may be mediated, or superseded, by other factors such as quality and timing of prenatal care and self-esteem. Additionally, only

severe physical IPV was examined, so the effect of less severe, emotional, or sexual IPV is left unknown. Finally, the authors posit that their measure for exclusive breastfeeding—maternal recall of the past week's feeding, is superior to cross-sectional measures because the additional time span allows for a more accurate portrayal of normal feeding practices, but it is also possible that difficulties in remembering a week prior affected the validity of the self reports.

Among the six studies examining IPV and breastfeeding, two report a significant association (30, 32); two others report significant association that is lost upon the inclusion of control variables (or additional control variables, in the case of Moraes et al.) (31, 34); one reports no association (30); and the other is a qualitative study from which definitive results cannot be derived (33). Variations in IPV and breastfeeding measures, as well as differences among subjects and cultures, may contribute to the lack of agreement among studies. Further research will help us arrive at a definitive answer.

Logically, however, there is reason to suspect that a relationship will ultimately present itself in this research. Whereas the (previously discussed) literature to suggest a direct link between IPV and breastfeed is inconclusive, the literature to suggest intermediary links between the two is vast. The remainder of this literature review offers a conceptual framework (Figure 1) to illuminate the links between IPV and breastfeeding that are suggestive of a greater relationship and justify our analysis.

Table 1. Summary of studies examining relationship between IPV and breastfeeding

Study	Location	Study Design	Sample Size	Response Rate	Type of IPV	Breastfeeding Outcome	Measurement tools	Strength of Association
Acheson, 1995	U.S. family practice	Cross sectional	724	N/A, 724/800 eligible	Physical IPV	Early breastfeeding cessation (6 weeks)	**IPV:** Medical chart review, noted haphazardly **Breastfeeding:** Medical chart review, noted at 6 week postpartum visit	Physical IPV significantly associated with early breastfeeding cessation (p<0.001)
Bullock, Libbus, & Sable, 2001	Two Midwestern U.S. WIC clinics	Case Control	212	NS	Physical & sexual IPV	Breastfeeding initiation; breastfeeding duration	**IPV:** AAS **Breastfeeding:** Type of voucher obtained (food vs. formula)	No association between IPV and breastfeeding initiation (p=0.98) or breastfeeding duration (p<0.65)
Silverman, Decker, Reed, & Raj, 2006	26 U.S. states	Cross sectional	118,579	70-80%	Physical IPV year prior to pregnancy; Physical IPV during pregnancy	Breastfeeding initiation; early breastfeeding cessation (4 weeks)	**IPV**: Two questions in PRAMS survey **Breastfeeding:** Two questions in PRAMS survey	Significant unadjusted associations between physical IPV and breastfeeding initiation and early cessation; No significant adjusted associations
Lau & Chan, 2007	Hong Kong, China	Cross sectional	1200	1200/1265	Physical, sexual, & emotional IPV	Use of artificial feeding	**IPV:** AAS, CTS-2 **Breastfeeding:** Self report questionnaire	Women not experiencing IPV significantly more likely to breastfeed (aOR: 1.84, 95% CI: 1.16-2.91)
Lourenco & Deslandes, 2008	Rio de Janeiro hospital	Qualitative cross sectional	11	NS	Physical & sexual IPV	Feelings on experience of breastfeeding; reasons for cessation	**IPV:** Self report **Breastfeeding:** Self report	Qualitative study; did not quantify results
Moraes, de Oliveira, Reichenheim, & Lobato, 2011	Five Rio de Janeiro public primary healthcare facilities	Cross sectional	811	811/853	Severe physical IPV	Cessation of exclusive breastfeeding	**IPV:** CTS-2 **Breastfeeding:** 7 day maternal recall	Significant association in Model I (HR: 1.30, p=0.043); Significance lost in Model II (HR: 1/17, p=0.260)

2.4 Conceptual Framework & Rationale for Link Between IPV and Breastfeeding

Six main mediators linking IPV with breastfeeding practices have been identified from the literature: maternal depression, maternal substance abuse, antenatal healthcare, preterm births/low birth weights, breastfeeding self-efficacy (a woman's confidence in her ability to breastfeed), partner/social support for breastfeeding (Figure 1). Many of these factors are interrelated among themselves, and the complexities of these connections will be expounded upon as well.

Maternal depression

Mental health issues are commonly observed among women who experience IPV. Indeed, depression is one of the two most common health outcomes associated with IPV, with PTSD being the second (35). A meta-analysis of 18 studies conducted by Golding (36) found a weighted mean prevalence of depression of 47.6% among abused women, far greater than the lifetime depression prevalence of 10 to 25% in the general population. Women with a history of depression or who experience depression during their pregnancy are more likely to develop postpartum depression (37), as are women who experienced physical IPV at any point in adulthood (38), or within two years of pregnancy (14, 39). Postpartum depression has repeatedly been found to be associated with women's breastfeeding practices, with depression reducing the likelihood of breastfeeding initiation and length of breastfeeding duration (40-42).

Depression also may exacerbate the effects of the other hypothesized factors linking IPV with breastfeeding. A Swedish cohort study observed a 56% increase in odds of preterm birth among depressed pregnant women (43). A meta-analysis of 29 studies found that depression increased the risk of low birth weight infants, and this effect was

more pronounced in developing countries (developing RR: 2.2; developed RR: 1.1) (44). Additionally, Leahy-Warren, McCarthy, and Corcoran (45) observed a significant association between postpartum depression and maternal self-efficacy. Both of these observations may be partially explained through biochemical pathways: depression has been shown to dysregulate the levels of both cortisol and oxytocin in the body (46, 47). High levels of cortisol have been implicated in preterm and low weight births (48) and both cortisol and oxytocin are necessary components of normal lactation (49, 50). Depressed women with high cortisol and/or low oxytocin levels may have difficulties initiating lactogenesis, thereby decreasing their self-efficacy surrounding breastfeeding (51). Depression and other mental health issues are increasingly recognized as important health concerns in the developing world (52), lending weight to this factor in the context of Sub-Saharan Africa.

Substance abuse

Women experiencing IPV are more likely to be abusing substances than their non-IPV exposed counterparts. Lemon, Verhoek-Oftedahl, & Donnelly (53) found that women experiencing physical IPV were more likely to smoke and those experiencing physical or psychological IPV were more likely to have high levels of alcohol use. The relationship between IPV and substance abuse also extends into pregnancy: Martin, Beaumont and Kupper (12) found that women exposed to physical IPV during pregnancy had 7.8 times higher odds of drinking alcohol during their pregnancy than non exposed women; sexual IPV during pregnancy resulted in 4.6 times higher odds. Physical IPV during pregnancy was associated with increased odds of illicit drug use during the pregnancy (12). Amaro,

Fried, Cambral, and Zuckerman (11) also observed an increased use of alcohol, marijuana, and cocaine during pregnancy among women experiencing IPV.

Substance abuse presents a unique challenge to breastfeeding, as women with substance abuse problems may be advised against the practice altogether, due to the potential transfer of the drugs to the infant through breast milk. In alcohol and drug abuse, it has been determined that the risks to the infants are great and outweigh the positive effects of breastfeeding, though in smokers and moderate users of alcohol, breastfeeding is still considered to be worthwhile (54). If they do choose to initiate breastfeeding, women with substance abuse issues may stop earlier than other mother—Moraes et al. found an increased likelihood to cease exclusive breastfeeding among women with inappropriate alcohol consumption (34).

Substance abuse also connects to the previously discussed mediator of maternal depression. Depressed women are more likely than non-depressed women to have substance abuse disorders (55), which may further exacerbate the effect of IPV on breastfeeding.

Antenatal healthcare

The experience a woman has in her antenatal healthcare may influence her decision to breastfeed. Quality prenatal care will include discussion of proper breastfeeding practices and techniques. As women exposed to IPV are less likely to seek timely prenatal care (56, 57), their lack of exposure to breastfeeding instructions and information may negatively affect their future breastfeeding practices. The length of a woman's post-delivery care is also important; indeed, any hospital stay outside of the normal length, be it shorter or longer, is associated with reduced likelihood of breastfeeding (58). This has the

potential to be relevant for women experiencing IPV, as the controlling, abusive partners of IPV victims may be reluctant to allow their partners to remain in the hospital any longer than is absolutely necessary (59). By cutting one's postpartum hospital stay short, a woman is denied valuable support from the healthcare workers in her breastfeeding activities. As will be further discussed below, social support from a variety of sources, including professional support, is positively associated with a woman's likelihood of breastfeeding initiation and continuation (60).

On the opposite end of the hospital stay spectrum, victims of IPV (or their children) may also spend extended periods of time at the hospital. Also expounded upon below is evidence to show that IPV is associated with preterm births and low birth weights. These infants are known to require longer hospital stays (61) and may require admission into a neonatal intensive care unit (NICU); infants admitted to the NICU and those with longer than average hospital stays are less likely to be breastfed than their healthier counterparts (58, 62).

Moraes et al. (34) found that the quality of healthcare facility used (based on accreditation by the Baby-Friendly Hospital Initiative in Brazil) significantly affected a woman's likelihood to cease exclusive breastfeeding. This may be particularly relevant in developing countries where women may give birth in low quality hospitals, or not in a hospital at all.

Preterm births/low birth weights

It has been consistently reported that IPV during pregnancy results in an increased risk of preterm births or infants of low birth weight. A study of 3149 pregnant women in Alabama found that those women reporting IPV injuries within the past year had a 60%

increase in odds of preterm birth and an 80% increase in odds of low birth weight when adjusted for covariates (17). Coker, Sanderson, and Dong (16) also observed significant associations between physical IPV during pregnancy and preterm and term low birth weight infants, with abused women having an approximately doubled risk of the negative outcomes. They noted that the greater the reported IPV frequency, the greater the risks of preterm and low birth weight infants. In agreement with these findings, meta-analyses have revealed increased odds of low birth weight infants among pregnant women experiencing IPV compared to women with no IPV (15, 18). With women in developing countries already at a greater risk of low birth weight infants (63), the experience of IPV may further compound this risk.

The effect of IPV on preterm and low weight births may be further exacerbated by the substance abuse commonly displayed among IPV victims discussed previously. A meta-analysis of 58 studies by Savitz and Murnane (64) found that even among low frequency smokers (1-10 cigarettes per day) there is an increased risk of preterm birth, with risk increasing with frequency of smoking. Among the 25 studies focused on alcohol, a link between alcohol and preterm birth was rarely found; only when comparisons were made between women drinking 1-6 drinks per week with women drinking 7 or more drinks was a moderate increase in risk observed. The study also identified associations between preterm birth and marijuana use, cocaine use, opiates, and mixed drug use. Furthermore, McFarlane, Parker, and Soeken (65) found that the triad of IPV, smoking, and substance abuse was significantly related to low birth weight in their cohort of 1,203 women.

The associations between these adverse pregnancy outcomes and IPV have implications for breastfeeding, as discussed previously, in their relationship to length of

hospital stay and NICU admission. Additionally, Moraes et al. (34) found that likelihood of early exclusive breastfeeding cessation increased as a mother's perception of her child's health decreased. Thus, mothers may be less likely to breastfeed a sick child under the incorrect assumption that their sick child requires supplemental food beyond breast milk during their illness.

Breastfeeding self-efficacy

Self-efficacy is defined as an individual's confidence in his or her ability to perform a specific task (66). Thus, breastfeeding self-efficacy refers to a woman's confidence in her ability to breastfeed. High breastfeeding self-efficacy has been found to be associated with breastfeeding duration. Forster, McLachlan, and Lumley (67) found self-reported breastfeeding confidence levels to be associated with likelihood of breastfeeding at six months. Similarly, Blythe, Creedy, Dennis, Moyle, Pratt, and De Vries (68) observed breastfeeding self-efficacy scores to be significantly correlated with breastfeeding both one week and four months after birth. Those with high self-efficacy scores were more likely to be breastfeeding exclusively at both time points. Among women who had stopped breastfeeding, insufficient breast milk amount was reported as the primary reason for cessation. This link between self-efficacy and the perception of insufficient breast milk is echoed by research conducted by McCarter-Spaulding and Kearney (69). Here, self-efficacy scores were significantly negatively correlated with reports of insufficient milk.

We have already linked self-efficacy to IPV through the discussion of the relationship between depression, cortisol, oxytocin, lactogenesis, and self-efficacy—depression-induced dysregulation of cortisol and oxytocin levels may negatively affect lactogenesis, and thereby, negatively affect self-efficacy. It is likely, however, that self-

efficacy is directly linked with IPV as well. The sense of self-worthlessness that manifests from IPV presumably has a substantial holistic effect on a woman's level of self-confidence, including her self-confidence surrounding breastfeeding abilities. As Moraes et al. (34) noted, low levels of maternal self-esteem significantly increased a mother's likelihood of exclusive breastfeeding cessation.

Support of partner and social support

Support from both professional sources and social sources have positive effects on breastfeeding. A meta-analysis by Britton, McCormic, Renfrew, Wade, and King (70) determined that professional support had a positive impact on exclusive breastfeeding in the first six weeks. As previously mentioned, women experiencing IPV who cut their hospital stays short due to pressure from their abusive partners are apt to miss out on this vital support from their medical caretakers. It is difficult to determine the effects of women giving birth outside of healthcare facilities, as is the case in many developing countries. If she is assisted by a trained midwife or skilled birth attendant, she may receive ample personal support for her breastfeeding; on the other hand, she may not use trained help and thereby receive very little additional care at all. This issue requires further expounding.

The support from a woman's social network also plays an important role in her decision to breastfeed. Her mother's opinion is highly influential, as is her partner's (60). Scott, Shaker, and Reid (71) reported high correlation between a woman's attitude towards breastfeeding and her partner's views. Additionally, Scott, Landers, Hughes, and Binns (72) found that women who believed their partner preferred bottle feeding or were unsure of their partner's opinions were less likely to be breastfeeding than women who believed their partner approved of breastfeeding. Among women experiencing IPV, this spousal

support is likely insufficient or absent. Abusive men may be unlikely to support "sharing" their partners with their child or encourage the strengthening of a bond between mother and child (59).

A woman's breastfeeding self-efficacy may also be negatively affected by a lack of partner/social support. If others do not support her and have confidence in her breastfeeding abilities, she too may lose self-assurance. Clearly, the dysfunctional relationship experienced by a victim of IPV may affect her breastfeeding in multiple ways.

2.5 Conclusion

While the research to suggest a direct association between IPV and breastfeeding is inconclusive and limited, there is ample research to support the presence of intermediary links between the two. Maternal depression, substance abuse, preterm and low weight births, antenatal healthcare, self-efficacy, and social support have all been shown to relate to both IPV and breastfeeding. These links are not necessarily always suggestive of a negative association with breastfeeding, however. As mentioned above, there are instances, such as a preterm birth and the resulting extended hospital stay leading to greater access to social support from hospital staff, in which the six intermediary links may affect each other in ways that are beneficial to breastfeeding practices. Depressed women may seek out the comfort and intimacy that breastfeeding her child may provide. Indeed, depressive symptoms have been shown to improve in breastfeeding mothers (26).

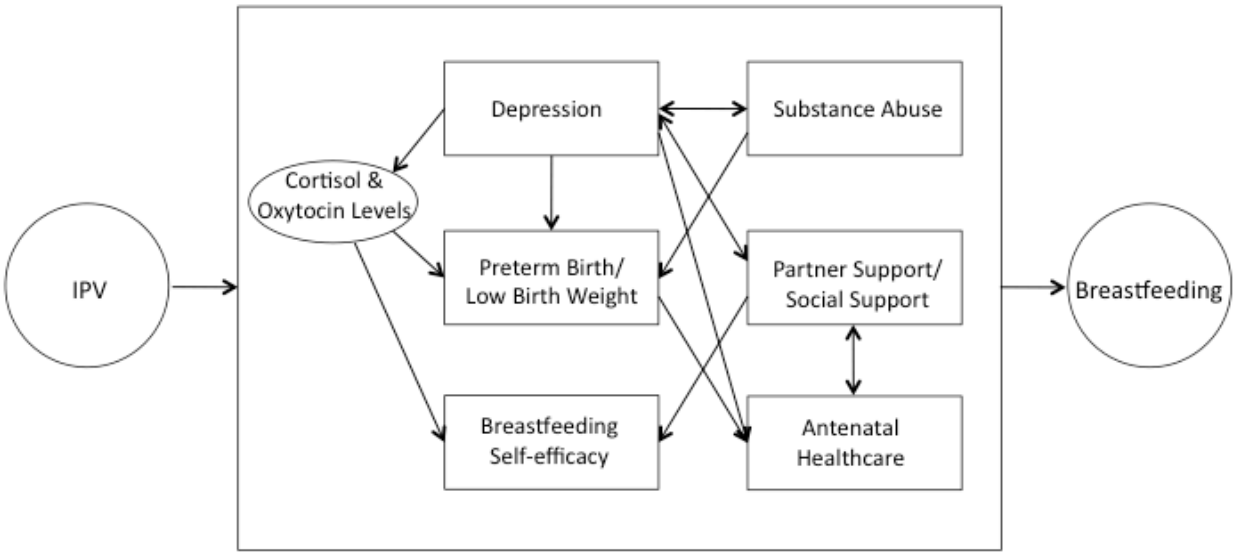
Additionally, it is possible that cultural differences may affect all of the associations discussed here. A majority of the literature focused on breastfeeding and intimate partner violence, and indeed most of the articles cited in this literature review, is conducted in developed countries. The relationships expounded upon here may persist in other areas of

the world, but that assumption cannot be appropriately made without additional, culturally specific research, which this thesis attempts to initiate.

Perhaps most importantly, it must be noted that despite the evidence to suggest a relationship between IPV and breastfeeding, it simply may not exist. It is entirely possible that the six common associations we highlighted are not predictive of a greater relationship. Direction of causality is impossible to determine from cross-sectional studies, as the majority of those cited here are, so the association among IPV, depression (and all other central links), and breastfeeding, need not be a linear progression. Unmentioned and unknown factors may affect the direction of effect within the framework. Nonetheless, the mere presence of so many possible mediating factors justifies the need for future elucidation between the potential relationship.

As the literature search produced only six original research articles examining IPV and breastfeeding with conflicting results, additional research is critical to arrive at more definitive answers regarding the link between IPV and breastfeeding. Given the vast benefits of breastfeeding, for both mother and child, it is important that clinicians are equipped to address the unique barriers that women exposed to IPV may face in initiating and continuing breastfeeding. It is only through a better understanding of the relationship between IPV and breastfeeding that these improvements to breastfeeding counseling among IPV victims can be made.

Figure 1. Conceptual framework identifying mediating links between IPV and breastfeeding



3 MANUSCRIPT (SUBMISSION TO THE *INTERNATIONAL JOURNAL OF EPIDEMIOLOGY*)

TITLE PAGE

Intimate Partner Violence and Breastfeeding Practices in Six African Countries

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The development of the research question and appropriate analyses were conceived in collaboration between the two authors. Emily S. Misch is responsible for the data collection, data analysis, table development and initial writing of this manuscript. Kathryn M. Yount assisted in the writing and editing of the final manuscript.

ABSTRACT

Background: Optimal breastfeeding practices impart health benefits to mothers and infants. Intimate partner violence (IPV) may adversely affect optimal breastfeeding, but research is limited and inconclusive. This study examined the effect of different forms of IPV on early initiation and exclusive breastfeeding in six African countries.

Methods: We used national Demographic and Health Surveys for Ghana, Kenya, Liberia, Nigeria, Zambia, and Zimbabwe to study mothers (15-49 years) with a child less than 6 months old. Logistic regression was used to estimate the unadjusted and adjusted associations of physical, emotional, sexual, and pregnancy IPV with: early (within 1 hour of birth) and exclusive breastfeeding.

Results: Across countries, IPV was typically negatively associated with optimal breastfeeding practices. More severe physical IPV in Kenya (aOR: 0.38, p=0.004), less severe physical IPV (aOR: 0.62, p=0.028) and sexual IPV (aOR: 0.40, p=0.005) in Zambia were negatively associated with early initiation. Sexual IPV in Liberia (aOR: 0.08, p=0.032) and Kenya (aOR: 0.27, p=0.007), as well as emotional IPV in Kenya (aOR: 0.40, p=0.010) were negatively associated with exclusive breastfeeding. Many other associations were marginally significant and in similar directions ($p<0.10$). Among Zimbabwean women, pregnancy IPV (aOR: 6.51, p=0.013) and emotional IPV (aOR: 2.72, p=0.013) were unexpectedly positively associated with early initiation and exclusive breastfeeding, respectively.

Conclusions: IPV may adversely affect breastfeeding practices, and longitudinal research of these relationships is warranted. IPV screening and breastfeeding counseling for exposed women should be a routine part of prenatal care to mitigate the potential intergenerational effects of IPV.

Keywords: Intimate partner violence; domestic violence; breastfeeding; Africa; Sub-Saharan Africa; Demographic and Health Surveys

INTRODUCTION

The health benefits of breastfeeding to mother and infant have been widely documented. Current international recommendations identify early initiation (within one hour of birth) and exclusive breastfeeding until six months of age as important components of optimal breastfeeding practices (1, 2). Early initiation provides the infant access to maternal colostrum, nutrient-dense breast milk produced during the first few days after delivery that is particularly important to the development of the infant's mucosal immune system (3), and has been associated with reduced infection-related neonatal mortality (4, 5). Exclusive breastfeeding until six months of age also imparts many health benefits, including reductions in gastrointestinal and lower respiratory tract infections (6, 7). An estimated 1.4 million deaths to infants in low-income countries could be averted by practicing optimal breastfeeding (7). Despite this, levels of early initiation and exclusive breastfeeding remain disappointingly low in many countries, including those in Sub-Saharan Africa (8).

Biological, psychological, behavioral, and cultural factors influence the decision to initiate and continue breastfeeding. One such factor that is hypothesized to affect a woman's decision to breastfeed is maternal experience of intimate partner violence (IPV) (9). The Centers for Disease Control and Prevention (CDC) define IPV as physical, sexual, psychological harm, or the threat of physical or sexual harm by a current or former partner or spouse (10). Indeed, six studies have previously investigated the effect of maternal experience of IPV on breastfeeding practices, with conflicting results. Two of the studies found a significant negative relationship between IPV and breastfeeding initiation and early cessation (11, 12); two articles found negative associations that lost significance upon

the inclusion of possible confounding factors (13, 14); one found no association (15); and the final study was a qualitative study from which a definitive conclusion could not be derived, but was suggestive of the presence of a negative relationship (16). Physical IPV was overwhelmingly the most commonly examined type of IPV in these studies; very few examined the effect of sexual IPV, emotional IPV, or IPV during pregnancy.

There is clearly, then, a need for further research before a conclusion surrounding the relationship between the various forms of IPV and breastfeeding can be made. Of particular need is the exploration of the possible link in new cultural contexts. Most of the scant existing research has taken place in a high-income country context; little attention has been paid to the relationship between IPV and breastfeeding in low-income countries. Indeed, Sub-Saharan Africa has been completely overlooked in this research, despite the fact that prevalence estimates of exposure to IPV in Africa are among the highest worldwide (17-19) and breastfeeding practices remain suboptimal (8). As such, this article seeks to contribute to the existing literature by examining the impact of maternal exposure to IPV on early breastfeeding initiation and exclusive breastfeeding in the continent of Africa. Using population-level Demographic and Health Surveys (DHS), we investigate the relationship between physical IPV (less severe and more severe violence), emotional IPV, sexual IPV, and IPV during pregnancy and breastfeeding in six Sub-Saharan African countries: Ghana, Kenya, Liberia, Nigeria, Zambia, and Zimbabwe.

METHODS

Data source

This study conducted secondary analysis of data from Demographic and Health Surveys (DHS) in six countries: Ghana (2008), Kenya (2008-09), Liberia (2007), Nigeria

(2008), Zambia (2007), and Zimbabwe (2005-06). Primarily funded by the U.S. Agency for International Development (USAID), DHS surveys are conducted approximately every five years in a wide variety of low- and middle-income countries. Standardized methodologies and questionnaires are used to collect information on many topics, including household demographics, maternal and child health, reproductive health, fertility preferences, and IPV.

Of the 38 Sub-Saharan African countries with unrestricted DHS surveys, only these six countries had a sufficient number of women who had completed the domestic violence (DV) module and who had children less than six months of age to permit this analysis. These countries also provide a diverse Sub-Saharan African sample; the variations among the countries in a select set of characteristics can be seen in Table 1.

[TABLE 1]

Sampling

The DHS uses a multistage stratified probabilistic sampling design. Each country's sample was stratified by census enumeration regions and by urban or rural residence. Households were selected at random from the enumeration areas and all women aged 15-49 within the selected households were eligible to participate. A random subset of households was selected for the DV module, a set of questions based on the Revised Conflict Tactics Score (CTS-2) (20). In agreement with World Health Organization's (WHO) ethical and safety recommendations for IPV research, only one randomly selected woman per household was interviewed for the DV module (21). Detailed sampling strategies can be found in each survey's final report (22-27). Survey information for each country, such as eligible sample sizes and response rates are detailed in Table 2.

Study population

For the purpose of this analysis, the study population for each country was first restricted to women aged 15-49 years who completed the DV module. To examine breastfeeding practices, the samples were further restricted to women who had an infant less than six months of age. Observations with missing data on outcome or exposure variables were excluded (Ghana: n=5; Kenya: n=8; Liberia: n=21; Nigeria: n=179; Zambia: n=18; Zimbabwe: n=17). Table 2 lists the final sample sizes for each country.

[TABLE 2]

Measures

Outcome variables

The outcome measures in our analysis were early breastfeeding initiation (<1 hour) and exclusive breastfeeding. To determine the timing of breastfeeding initiation, women were asked how long after birth they put their child to the breast. A dichotomous breastfeeding initiation variable was coded as *0=initiation after 1 hour, 1= initiation within 1 hour*. To determine exclusive breastfeeding, women were asked about liquids or foods that their child had consumed in the past 24 hours. A binary exclusive breastfeeding variable was created and coded *0=not exclusively breastfeeding (answered "yes" to any supplementary liquid/food question), 1=exclusively breastfeeding (answered "no" to all supplementary liquid/food questions).*

Exposure variables

Our primary exposure variable, IPV, was stratified into three different types: physical, emotional, and sexual. Questions on *physical IPV* asked if the woman's partner had a) pushed, shaken, or thrown something at her, b) slapped her, c) punched her with a fist or something that could hurt her, d) kicked or dragged her, e) tried to strangle or burn

her on purpose, f) threatened her with a knife, gun, or any other weapon, g) attacked her with a knife, gun, or any other weapon. Physical IPV was further subdivided into "less severe" physical IPV (a-d) and "more severe" physical IPV (e-g). Questions on *emotional IPV* asked if the woman's partner had a) humiliated her in front of others, b) threatened to harm her or someone close to her, and c) insulted her or made her feel bad about herself. Questions on *sexual IPV* asked if the woman's partner had a) physically forced her to have unwanted sexual intercourse or b) forced her to perform unwanted sexual acts. Women could respond as "yes, but not in past year," "yes, sometimes in the past year," "yes, often in the past year," or "no." All "yes" responses were collapsed into a single positive response and dichotomous variables for each type of IPV were created and coded as: *0= no history of specific type of IPV, 1= history of specific type of IPV.* In all countries except Kenya and Liberia, women were also asked if they had experienced IPV during their pregnancy. Where collected, a pregnancy IPV variable was created and coded as: *0= no history of pregnancy IPV, 1=history of pregnancy IPV*. A composite variable of any type of IPV (including pregnancy IPV, when available) was created in a similar vein: *0= no history of any type of IPV, 1= ever history of any type of IPV*.

Control variables

The multivariate analysis adjusted for nine household-, maternal-, and child-level variables that may confound the relationships between exposure to IPV and breastfeeding practices. Household-level variables included: wealth quintile (1=poorest [reference], 2=poorer, 3=middle, 4=richer, 5=richest), as determined by an analysis of 33 different household possessions and characteristics (28); urban [reference] versus rural residence; region of residence (Northern [reference] vs. Southern); and partner's highest level of

education attended (none [reference], primary, secondary, or higher). Maternal-level variables included: her age (≤24 years [reference], 25-34 years, 35-39 years); highest level of education attended (none [reference], primary, secondary, or higher); total number of ever born children minus the index child; and age at first marriage in years. The age of the child in months was included as a continuous child-level variable.

Analysis

The Stata/SE 12.0 software (StataCorp, College Park Station, TX) was used in all statistical data analysis. Univariate analyses were conducted to explore the completeness and distributions of all variables. Simple logistic regression was used to estimate the unadjusted relationship of breastfeeding outcomes with the IPV exposure variables. The control variables then were added to the models to determine independence of the associations of primary interest. In all regression analyses, region-by-urban/rural residence population weights were used and standard errors were adjusted for the stratified, multistage, cluster sample design of the DHS surveys. Because the sample size for some countries is small ($n<500$), significant (at $\alpha<0.05$) and marginally significant (at $\alpha<0.10$) results are discussed.

RESULTS

Demographic characteristics

Mothers were predominately young; the percentage of women under 25 years of age ranged from 31.2% in Ghana to 50.7% in Zimbabwe. As such, they tended to marry young; Liberian women married youngest, at a mean age of 17.7 years (SD: 3.8); whereas, Ghanan women married the latest, at the age of 19.3 years (SD: 4.1). The index child was typically not the mothers' first child, as the mean number of additional births ranged from

1.8 (SD: 1.6) in Zimbabwe to 3.2 (SD: 2.4) in Liberia. The highest maternal level of education attended varied greatly across countries—55.0% of women in Zimbabwe reached secondary school, whereas 53.0% of Liberian women had no education. Partner level of education was equally diverse. Like the women, Zimbabwean partners were the most educated with 63.5% reaching secondary school; Nigerian men had the greatest percentage of men with no education (37.0%). Households from all countries tended to be from the two lowest wealth quintiles and to live in rural areas (Table 3).

Outcome and exposure measures

Breastfeeding practices differed across the countries, with Nigeria consistently having the lowest percentage of women practicing early initiation (37.6%) and exclusive breastfeeding (14.3%). Zimbabwe had the highest levels of early initiation (69.5%) and Ghanan women were most likely to be exclusively breastfeeding (63.0%), with Zambian women a close second (58.4%) (Table 3).

Reported exposure to any IPV was universally high, but ranged from 29.2% in Nigeria to 47.8% in Zambia. Zambian women also reported the highest levels of physical IPV (42.7%), though Liberian women most often reported the most severe physical IPV (18.5%). Ghanan women reported the lowest levels of both physical IPV (16.2%) and more severe physical IPV (1.2%). Reported exposure to emotional IPV ranged from 18.1% of Zambian women to 34.5% of Liberian women. Conversely, sexual IPV and IPV during pregnancy were reported more often among Zambian women (sexual IPV: 15.2%; pregnancy IPV: 5.7%) and least often among Nigerian women (sexual IPV: 3.9%; pregnancy IPV: 3.6%) (Table 3).

[TABLE 3]

Early Breastfeeding Initiation and Maternal Exposure to IPV

Simple logistic regressions identified associations between IPV and the timing of breastfeeding initiation in four countries. In Zambia, sexual IPV was negatively associated with early initiation (OR: 0.44, p=0.017). More severe physical IPV was negatively associated with early initiation in Kenya (OR: 0.43, p=0.013) but positively associated in Nigeria (aOR: 1.64, p=0.022). IPV during pregnancy was positively associated with early breastfeeding initiation in Zimbabwe (OR: 5.60, p=0.033) (Table 4).

Upon adjustment for possible confounders, several new associations were noted. Physical IPV in Zambia (aOR: 0.64, p=0.032) was identified as an independent risk factor for delayed initiation, driven primarily by less severe physical violence (aOR: 0.62, p=0.028). In Kenya, more severe physical IPV remained associated with delayed initiation (aOR: 0.38, p=0.004), as did sexual IPV in Zambia (aOR: 0.40, p=0.005). Though pregnancy IPV remained positively associated with early breastfeeding in Zimbabwe (aOR: 6.51, p=0.013), marginally significant associations found opposing results between pregnancy IPV and timing of initiation in Ghana (aOR: 0.19, p=0.077) and Zambia (aOR: 0.47, p=0.097). Finally, a marginally significant association was noted in Kenya between emotional IPV and delayed initiation (aOR: 0.59, p=0.067) (Table 4).

[TABLE 4]

Exclusive Breastfeeding and Maternal Exposure to IPV

Simple logistic regressions identified an association between sexual IPV and decreased odds of exclusive breastfeeding in Ghana (OR: 0.14, p=0.029), Kenya (OR: 0.34, p=0.028), and Liberia (OR: 0.15, p=0.025). The experience of any IPV was associated with reduced odds of exclusive breastfeeding in Kenya (OR: 0.57, p=0.026) and Liberia (OR: 0.50,

p=0.047). Additionally in Kenya, less severe IPV (OR: 0.60, p=0.047) and emotional IPV (OR:0.46, p=0.015) were associated with decreased exclusive breastfeeding, with physical IPV exhibiting a marginally significant relationship (OR: 0.63, p=0.066) (Table 5).

In multivariate logistic regressions adjusting for confounders, sexual IPV remained associated with decreased likelihood of exclusive breastfeeding in Kenya (aOR: 0.27, p=0.007) and Liberia (aOR: 0.08, p=0.032). Sexual IPV in Ghana exhibited a marginally significant relationship with reduced exclusive breastfeeding (aOR: 0.17, p=0.061). As in the unadjusted regressions, any IPV remained associated with reduced odds of exclusive breastfeeding in Liberia (aOR: 0.49, p=0.044) and Kenya (aOR: 0.50, p=0.035). Emotional IPV was negatively associated with exclusive breastfeeding in Kenya (aOR: 0.40, p=0.010) and marginally negatively associated in Liberia (aOR: 0.56, p=0.096). Marginally negative associations were also noted with physical IPV (aOR: 0.55, p=0.071) and less severe physical IPV (aOR: 0.54, p=0.061) in Kenya. In contrast to all other countries, more severe physical IPV was associated with higher odds of exclusive breastfeeding in Zimbabwe (aOR: 2.72, p=0.013) (Table 5).

[TABLE 5]

DISCUSSION

In this study, the first to explore the link between IPV and breastfeeding in African women, we found significant, but not uniform, relationships between maternal exposure to IPV and suboptimal breastfeeding practices. The association appears to be strongest in Kenya, as more severe physical IPV was identified as an independent risk factor for delayed initiation and emotional, sexual, and any IPV were found to be significantly associated with lowered odds of exclusive breastfeeding, with other forms of IPV reaching marginal

significance. In contrast, no significant relationships were identified in Nigeria or Ghana once the models were adjusted for possible confounding factors, though several marginally significant associations remained. Among Zimbabwean women, two significant associations between IPV and *increased* odds of optimal breastfeeding practices were noted; these results are in direct opposition to all other countries' relationships.

Interpretation of our analysis is limited by several factors, and these limitations may provide rationale for some of these disparate results. First, baseline levels of breastfeeding practices and IPV prevalence varied dramatically across the countries. These, coupled with the small sizes of some of the country samples, may have affected the power of the analyses, particularly, for example, in Ghana, which had the highest levels of breastfeeding, lowest levels of IPV, and smallest sample size. Larger samples of mother-child dyads may help address this issue.

The cross-sectional nature of the DHS survey presents another important limitation. Because the data are cross-sectional, all relationships are interpreted as associational instead of causal. Furthermore, as all "yes" responses to IPV questions were collapsed into a single positive response and the question regarding IPV in pregnancy was not asked with specific reference to the index child, the temporality of all IPV is unknown. This is an important issue in our study, given that the sample was comprised of all recently pregnant women, and research examining the effect that pregnancy has on the magnitude and frequency of IPV is contentious (29, 30). While some studies have shown pregnancy to have a protective effect on the mother (31, 32), others have found that pregnancy is associated with an increased incidence of IPV (33-35). Knowing the timing of the IPV around the pregnancy would help us to determine which effect pregnancy is having on IPV

incidence and if the effect differs among countries. A disagreement may help to explain why some observed associations, like those in Zimbabwe, oppose the predominant negative trend. Another possibility for the Zimbabwe results is that the positive associations result from a compensatory effect of exposure to IPV. Mothers experiencing IPV have previously been found to compensate for the IPV by becoming more effective parents (36); it is possible that some mothers in our sample are compensating by becoming more effective breastfeeders. We also lack the ability to examine chronic IPV versus infrequent IPV with our data. It is quite likely that women habitually exposed to IPV may have different outcomes than those experiencing IPV infrequently. That being said, evidence of adjusted associations between IPV of any timing and duration and breastfeeding practices with the index child provides evidence of the long-term effects of prior IPV on mother-and-child interactions.

One final limitation to our work is the self-recall nature of our measures. When recalling the timing of breastfeeding initiation, mothers of infants close to six months of age may have difficulty recalling when they first breastfed their child. Additionally, a 24-hour recall was used to determine exclusive breastfeeding, but this measure is open to misclassification bias if the past 24 hours were atypical in feeding patterns. IPV is also particularly susceptible to underreporting due to issues with recall, misinterpretation of the questions, or the stigma surrounding IPV disclosure (37), though the IPV questions asked in the DHS have been shown to be better at generating IPV reporting than other formats (19, 38). Nonetheless, the levels of IPV noted in this study may remain an underestimate.

Despite these limitations, this study also has many strengths. By examining multiple countries, our results have the potential to be particularly affected by specific cultural factors, but we may also be able to identify trends among the countries that are indicative of an association that overrides these cultural factors. In our analysis, a significant relationship between sexual IPV and sub-optimal breastfeeding was most commonly identified; sexual IPV was an independent risk factor for delayed initiation in Zambia and for cessation of exclusive breastfeeding in Kenya, and Liberia, reaching near significance in both breastfeeding outcomes in Ghana. Given that breastfeeding involves the functioning of an, at times, sexualized organ, sexual IPV may result in a particularly acute aversion to breastfeeding. Indeed a history of childhood sexual abuse has been linked to diminished breastfeeding (39, 40); a similar relationship may exist with sexual IPV.

It follows, then, that an additional strength of this study is the ability of this analysis to distinguish among different types of IPV. Rather than combine all IPV types into one variable or look only at physical IPV, we are able to elucidate the effects of specific types of IPV. We found that even emotional IPV has the potential to have significant negative effects on a mother's breastfeeding practices in certain contexts.

Finally, among all identified significant relationships, the magnitude of the association was substantial. In Liberia for example, the experience of sexual IPV was associated with a 92% reduction in odds of exclusive breastfeeding. While many of the other associations were not as dramatic, nearly all resulted in at least a 50% reduction in odds of practicing recommended breastfeeding. The magnitude of these results, especially among population-based data, speaks to their importance. In Sub-Saharan Africa, IPV may substantially, and negatively, affect a mother's breastfeeding practices.

Future research should seek to further elucidate the relationship between maternal experience of IPV and breastfeeding practices in a few specific ways. First, replication of these results should be conducted in new areas. Prior research has examined the United States, Brazil, Hong Kong, and now Africa. Current, unpublished work suggests that the association may exist in India. Examination of the link between IPV and breastfeeding in new contexts will help speak to the universality of the association. Secondly, to avoid some of the limitations of cross sectional data, longitudinal studies with cohorts of pregnant women will be particularly important to understand causal pathway of the relationship. Also important in describing the causal pathway is the examination of possible mediators to the relationship. Important mediators to examine may include the quantity and quality of antenatal healthcare, birth outcomes and health of the infant at birth, and levels of maternal depression and substance abuse, as all have been associated with both maternal experience of IPV (41-48) and suboptimal breastfeeding (14, 49-52).

The cascading effects that IPV-related suboptimal breastfeeding practices may produce in Africa, and beyond, are dramatic. In addition to the effects on infant mortality and morbidity previously discussed (4-7), suboptimal breastfeeding practices (53), as well as maternal exposure to sexual IPV (54) also have been associated with undernutrition in under-five children in low-income settings, suggesting that the negative effects of IPV and suboptimal breastfeeding may persist well beyond infancy. Important future research should elaborate on the infant, as well as child, morbidity and mortality that is attributable to the reductions in optimal breastfeeding practices associated with maternal exposure to IPV.

This study has importantly demonstrated that maternal exposure to IPV has the potential to negatively affect optimal breastfeeding practices in a population-based, cross-cultural study. Given the substantial impact that optimal breastfeeding has on the health of a child, measures should be implemented in prenatal care visits to screen for maternal exposure to IPV. Women at risk for IPV should be counseled on the importance of breastfeeding and, if possible, assisted as they initiate, so as to mitigate the potential negative effects of IPV on their breastfeeding practices and their child's health.

REFERENCES

(1) United Nations Children's Fund/World Health Organization. Baby friendly hospital initiative: revised, updated, and expanded for integrated care. Geneva, Switzerland: United Nations Children's Fund/World Health Organization, 2005.

(2) United Nations Children's Fund/World Health Organization. Global strategy for infant and young child feeding. Geneva, Switzerland: United Nations Children's Fund/World Health Organization, 2003.

(3) Walker A. Breast milk as the gold standard for protective nutrients. *J Pediatr* 2010;156**(2 Suppl)**:S3-7.

(4) Edmond KM, Zandoh C, Quigley MA, Amenga-Etego S, Owusu-Agyei S, Kirkwood BR. Delayed breastfeeding initiation increases risk of neonatal mortality. *Pediatrics* 2006;117**(3):**e380-86.

(5) Edmond KM, Kirkwood BR, Amenga-Etego S, Owusu-Agyei S, Hurt LS. Effect of early infant feeding practices on infection-specific neonatal mortality: an investigation of the causal links with observational data from rural Ghana. *Am J Clin Nutr* 2007;86**(4):**1126-31.

(6) Kramer MS, Kakuma R. The optimal duration of exclusive breastfeeding: a systematic review. *Adv Exp Med Biol* 2004;554:63-77.

(7) Lauer JA, Betran AP, Barros AJD, de Onis M. Deaths and years of life lost due to suboptimal breast-feeding among children in the developing world: a global ecological risk assessment. *Public Health Nutr* 2006;9**(6):**673-85.

(8) Black RE, Allen, LH, Bhutta, ZA, et al. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet* 2008;371**(9608):**243-60.

(9) Setty V. Better breastfeeding, healthier lives. *Popul Rep L* 2006;**(14):**1, 3-23.

(10) Kendall-Tackett KA. Violence against women and the perinatal period: the impact of lifetime violence and abuse on pregnancy, postpartum, and breastfeeding. *Trauma Violence Abuse* 2007;8**(3):**344-53.

(11) Acheson L. Family violence and breast-feeding. *Arch Fam Med* 1995;4**(7):**650-52.

(12) 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;52**(2):**e15-20.

(13) Silverman JG, Decker MR, Reed E, Raj A. Intimate partner violence around the time of pregnancy: association with breastfeeding behavior. *J Womens Health* 2006;15**(8):**934-40.

(14) Moraes CL, de Oliveira AS, Reichenheim ME, Lobato G. Severe physical violence between intimate partners during pregnancy: a risk factor for early cessation of exclusive breast-feeding. *Public Health Nutr* 2011;14**(12):**2148-55.

(15) Bullock LFC, Libbus MK, Sable MR. Battering and breastfeeding in a WIC population. *Can J Nurs Res* 2001;32**(4):**43-56.

(16) Lourenco MA, Deslandes SF. Maternal care and breastfeeding experience of women suffering intimate partner violence. *Rev Saude Publica* 2008;42**(4):**615-21.

(17) World Health Organization. WHO Multi-country study on Women's Health and Domestic Violence against Women: initial results on prevalence, health outcomes and women's responses. Geneva, Switzerland: World Health Organization, 2005.

(18) Devries KM, Kishor S, Johnson H et al. Intimate partner violence during pregnancy: analysis of prevalence data from 19 countries. *Reprod Health Matters* 2010;18**(36):**158-70.

(19) Shamu S, Abrahams N, Temmerman M, Musekiwa A, Zarowsky C. A systematic review of African studies on intimate partner violence against pregnant women: prevalence and risk factors. *PLoS One* 2011;6**(3):**e17591.

(20) Strauss MA, Ed. Measuring intrafamily conflict and violence: The conflict tactics (CT) scales. New Brunswick: Transaction Publishers, 1990.

(21) World Health Organization (WHO) Department of Gender, Women and Health. Putting women first: ethical and safety recommendations for research on domestic violence against women. Geneva, Switzerland: WHO Department of Gender, Women and Health, 2001.

(22) Ghana Statistical Service (GSS), Ghana Health Service (GHS), ICF Macro. Ghana Demographic and Health Survey 2008. Accra, Ghana: GSS, GHS, ICF Macro, 2009.

(23) Kenya National Bureau of Statistics (KNBS), ICF Macro. Kenya Demographic and Health Survey 2008-09. Calverton, MD: KNBS, ICF Macro, 2010.

(24) Liberia Institute of Statistics and Geo-Information Services (LISGIS) [Liberia], Ministry of Health and Social Welfare [Liberia], National AIDS Control Program [Liberia], Macro International, Inc. Liberia Demographic and Health Survey 2007. Monrovia: Liberia: LISGIS, Macro International, Inc, 2008.

(25) National Population Commission (NPC) [Nigeria], ICF Macro. Nigeria Demographic and Health Survey 2008. Abuja, Nigeria: National Population Commission and ICF Macro, 2009.

(26) Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH), Tropical Diseases Research Centre (TDRC), University of Zambia, Macro International Inc. Zambia Demographic and Health Survey 2007. Calverton, MD: CSO, Macro International Inc, 2009.

(27) Central Statistical Office (CSO) [Zimbabwe], Macro International Inc. Zimbabwe Demographic and Health Survey 2005-06. Calverton, MD: CSO, Macro International Inc, 2007.

(28) Rutstein SO, Johnson K. The DHS Wealth Index. Calverton, MD: ORC Macro, 2004.

(29) Jasinski JL. Pregnancy and domestic violence: a review of the literature. *Trauma Violence Abuse* 2004;5**(1):**47-64.

(30) Taylor R, Nabors EL. Pink or blue…black and blue? Examining pregnancy as a predictor of intimate partner violence and femicide. *Violence Against Women* 2009;15**(11):**1273-93.

(31) Decker MR, Martin SL, Moracco KE. Homicide risk factors among pregnant women abused by their partners. *Violence Against Women* 2004;10**(5):**498-513.

(32) Jasinski JL. Pregnancy and violence against women: An analysis of longitudinal data. *Journal of Interpersonal Violence* 2001;16**(7):**713-34.

(33) Burch RL, Gallop, Jr GG. Pregnancy as a stimulus for domestic violence. *Journal of Family Violence* 2004;19:243-47.

(34) Martin SL, Harris-Britt A, Li Y, Moracco KE, Kupper LL, Campbell JC. Changes in intimate partner violence during pregnancy. *Journal of Family Violence* 2004;19:201-210.

(35) Richardson J, Coid J, Petruckevitch A, Chung WS, Moorey S, Feder G. Identifying domestic violence: cross sectional study in primary care. *BMJ* 2002;324**(7332):**274.

(36) Levendosky AA, Huth-Bocks AC, Shapiro DL, Semel MA. The impact of domestic violence on the maternal-child relationship and preschool-age children's functioning. *J Fam Psychol* 2003;17**(3):**275-87.

(37) 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;371:1165-72.

(38) Kishor S, Johnson K. Profiling domestic violence—A multi-country study. Calverton, MD: ORC Macro, 2004.

(39) Grant LJ. Effects of childhood sexual abuse: issues for obstetric caregivers. *Birth* 1992;19**(4):**220-21.

(40) Clarke L. Perinatal care for survivors of sexual abuse. *Nurs BC* 1998;30**(2):**16-19.

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

(42) Chambliss LR. Intimate partner violence and its implication for pregnancy. *Clin Obstet Gynecol* 2008;51**(2):**385-97.

(43) 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;164**(11):**1567-72.

(44) Shah PS, Shah J. Maternal exposure to domestic violence and pregnancy and birth outcomes: a systematic review and meta-analyses. *J Womens Health* 2010;19**(11):**2017-31.

(45) Campbell JC. Health consequences of intimate partner violence. *Lancet* 2002;359:1331-36.

(46) Golding JM. Intimate partner violence as a risk factor for mental disorders: a meta-analysis. *J Fam Violence* 1999;14**(2):**99-132.

(47) Amaro H, Fried LE, Cabral H, Zuckerman B. Violence during pregnancy and substance abuse. *Am J of Public Health* 1990;80**(5):**575-79.

(48) Martin SL, Beaumont JL, Kupper LL. Substance use before and during pregnancy: links to intimate partner violence. *American J Drug Alcohol Abuse* 2003;29**(3):**599-617.

(49) Heck KE, Schoendorf KC, Chavez GF, Braveman P. Does postpartum length of stay affect breastfeeding duration? A population-based study. *Birth* 2003;30**(3):**153-59.

(50) Maia C, Brandao R, Roncalli A, Maranhao H. Length of stay in a neonatal intensive care unit and its association with low rates of exclusive breastfeeding in very low birth weight infants. *J Matern Fetal Neonatal Med* 2011;24**(6):**774-77.

(51) Paulson JF, Dauber S, Leiferman JA. Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics* 2006;118**(2):**659-68.

(52) Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration. *Birth* 2003;30**(3)**:175-80.

(53) Kumar D, Goel NK, Mittal PC, Misra P. Influence of infant-feeding practices on nutritional status of under-five children. *Indian J Pediatr* 2006;73**(5):**417-21.

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

TABLES

Table 1. Selected characteristics of study countries

Country	GDP (PPP)[1] (in billions)	HDI[2] (out of 187)	Total Fertility Rate[3] (per woman)	Infant mortality[3] (per 1000)	Ever Use Contraception[3] (%)
Ghana	74.8	135	4.0	50	50.4
Kenya	70.9	143	4.6	52	57.7
Liberia	1.8	182	5.2	71	35.3
Nigeria	414.5	156	5.7	75	28.6
Zambia	21.9	164	6.2	70	63.1
Zimbabwe	5.9	173	3.8	50	67.0

[1]Source: CIA World Factbook

[2]HDI: Human Development Index; Source: Human Development Reports, UNDP

[3]Source: DHS surveys

Table 2. Survey and sample characteristics of study countries

Country	Year	Survey sample size	Eligible women response rate[1]	DV module sample size	DV module response rate	Mothers of infants <6 months	Final sample size
Ghana	2008	4916	96.5	2442	75.2	316	173
Kenya	2008-09	8444	96.3	6318	77.7	586	449
Liberia	2007	7092	95.2	4913	80.9	504	313
Nigeria	2008	33385	96.5	23752	81.6	2888	2036
Zambia	2007	7146	96.5	5236	81.1	621	454
Zimbabwe	2005-06	8907	90.2	6293	79.4	535	367

[1]Eligible women= women aged 15-49

Table 3. Distribution of outcome and exposure variables and characteristics of sample populations

	GHANA n=173		KENYA n=449		LIBERIA n=313		NIGERIA n=2036		ZAMBIA n=454		ZIMBABWE n=367	
	mean, %	SD	mean, %	SD	mean, %	SD	mean,%	SD	mean, %	SD	mean, %	SD
Breastfeeding												
Initiation within 1 hour of birth	56.7		59.9		64.2		37.6		56.0		69.5	
Exclusive breastfeeding	63.0		27.8		30.4		14.3		58.4		22.3	
IPV												
Physical IPV	16.2		36.5		33.6		16.4		42.7		26.7	
Less severe	16.2		35.4		32.3		16.1		42.3		26.2	
More severe	1.2		14.5		18.5		6.3		9.7		6.5	
Emotional IPV	28.3		22.1		34.5		22.4		18.1		28.9	
Sexual IPV	4.6		10.9		5.1		3.9		15.2		12.8	
Pregnancy IPV	4.1		N/A		N/A		3.6		5.7		5.2	
Any IPV	33.0		43.0		45.1		29.2		47.8		45.5	
Maternal Characteristics												
Age group												
<25	31.2		44.8		31.3		33.6		33.0		50.7	
25-34	43.4		42.1		48.6		48.9		51.8		40.9	
35-49	25.4		13.1		20.1		17.5		15.2		8.5	
Total number non-index births	2.5	2.0	2.5	2.1	3.2	2.4	2.9	2.5	3.2	2.2	1.8	1.6
Age at first marriage	19.3	4.1	18.5	3.4	17.7	3.8	17.7	4.5	17.8	3.0	18.4	3.5
Marital status[1]												
Married	82.7		86.4		55.6		97.2		93.4		95.1	
Living together	13.3		6.9		39.6		2.1		0.4		1.6	
Divorced/widowed	4.1		6.7		4.8		0.7		6.2		3.3	
Level of education												
None	28.3		25.2		53.0		45.8		14.5		2.5	
Primary	30.1		53.7		37.1		22.8		63.9		40.6	
Secondary	40.5		16.9		9.6		26.7		20.0		55.0	
Higher	1.2		4.2		0.3		4.7		1.5		1.9	
Partner's level of education[2]												
None	24.9		20.5		26.8		37.0		7.9		2.2	
Primary	9.8		48.3		27.5		20.4		49.6		29.4	
Secondary	53.2		24.9		41.2		31.1		35.5		63.5	
Higher	6.9		6.2		1.9		10.2		4.6		3.8	
Household Characteristics												
Age of youngest child												
<1 month	8.1		10.7		9.0		9.5		11.9		10.4	
1 month	16.8		20.5		18.5		17.6		17.8		16.9	
2 months	20.2		15.6		16.9		18.8		17.8		18.5	
3 months	17.3		18.0		21.1		17.1		15.6		18.5	
4 months	19.1		19.4		17.9		19.2		17.4		15.0	
5 months	18.5		15.8		16.6		17.8		19.4		20.7	
Household wealth quintile												
Poorest	24.9		31.6		28.4		27.6		24.5		27.3	
Poorer	20.8		18.5		28.8		22.1		24.2		24.3	
Middle	17.3		14.7		17.9		19.3		24.7		19.4	
Richer	20.2		15.4		17.9		16.5		17.2		18.3	
Richest	16.8		19.8		7.0		14.6		9.5		10.9	
Place of residence												
Urban	39.9		22.7		26.5		28.2		28.4		21.5	
Region									71.6			
Northern	45.1		54.1		33.9		65.2		62.1		51.0	

[1]Missing values: Nigeria, n=1

[2]Missing values: Ghana, n=9; Liberia, n=8; Nigeria, n=26; Zambia, n=1; Zimbabwe, n=4

Table 4. Logistic regression estimates for unadjusted and adjusted associations of IPV with early breastfeeding initiation

	Ghana, n=173						**Kenya, n=449**					
	Unadjusted			Adjusted[1]			Unadjusted			Adjusted		
	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value
Physical	0.99	0.45	0.978	1.02	0.53	0.962	0.92	0.26	0.778	0.93	0.25	0.772
Less Severe	0.99	0.45	0.978	1.02	0.53	0.962	0.91	0.25	0.737	0.92	0.25	0.765
More Severe	[omitted]			[omitted]			0.43	0.15	**0.013**	0.38	0.13	**0.004**
Emotional	0.83	0.35	0.650	0.74	0.34	0.511	0.60	0.17	*0.077*	0.59	0.17	*0.067*
Sexual	0.57	0.50	0.521	0.46	0.42	0.399	0.71	0.35	0.486	0.56	0.24	0.181
Pregnancy IPV	0.32	0.29	0.208	0.19	0.18	*0.077*		N/A			N/A	
Any IPV	0.77	0.31	0.520	0.67	0.28	0.342	0.82	0.22	0.467	0.81	0.20	0.396
	Liberia, n=313						**Nigeria, n=2036**					
	Unadjusted			Adjusted[1]			Unadjusted			Adjusted[1]		
	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value
Physical	0.85	0.28	0.634	0.95	0.34	0.884	1.23	0.18	0.162	1.10	0.16	0.534
Less Severe	0.79	0.25	0.465	0.79	0.27	0.498	1.22	0.18	0.179	1.09	0.16	0.574
More Severe	0.72	0.26	0.374	0.60	0.26	0.232	1.64	0.36	**0.022**	1.44	0.32	0.101
Emotional	0.70	0.22	0.265	0.71	0.23	0.293	1.04	0.14	0.763	0.99	0.14	0.950
Sexual	1.36	0.84	0.616	1.23	0.86	0.765	1.22	0.34	0.470	1.05	0.29	0.867
Pregnancy IPV		N/A			N/A		1.35	0.37	0.273	1.26	0.35	0.408
Any IPV	0.84	0.25	0.552	0.94	0.29	0.848	1.04	0.13	0.738	0.98	0.13	0.861
	Zambia, n=454						**Zimbabwe, n=367**					
	Unadjusted			Adjusted			Unadjusted			Adjusted[1]		
	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value
Physical	0.73	0.15	0.133	0.64	0.13	**0.032**	0.77	0.21	0.337	0.80	0.23	0.450
Less Severe	0.72	0.15	0.126	0.62	0.13	**0.028**	0.81	0.22	0.441	0.85	0.25	0.570
More Severe	0.75	0.27	0.429	0.76	0.29	0.475	0.85	0.38	0.716	1.14	0.57	0.796
Emotional	0.85	0.25	0.589	0.84	0.25	0.550	0.82	0.23	0.459	0.86	0.25	0.602
Sexual	0.44	0.15	**0.017**	0.40	0.13	**0.005**	0.83	0.32	0.623	0.94	0.35	0.863
Pregnancy IPV	0.52	0.23	0.147	0.47	0.21	*0.097*	5.60	4.52	**0.033**	6.51	4.87	**0.013**
Any IPV	0.73	0.15	0.129	0.62	0.13	**0.027**	0.79	0.19	0.326	0.79	0.22	0.401

p<0.05; *p<0.10*

[1]Observations dropped from analysis: Ghana, n=2; Liberia, n=1; Nigeria, n=29; Zimbabwe, n=4

Table 5. Logistic regression estimates for unadjusted and adjusted associations of IPV with exclusive breastfeeding

	Ghana, n=173						**Kenya, n=449**					
	Unadjusted			Adjusted[1]			Unadjusted			Adjusted		
	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value
Physical	0.90	0.40	0.816	1.08	0.58	0.880	0.63	0.16	*0.066*	0.55	0.18	*0.071*
Less Severe	0.90	0.40	0.816	1.08	0.58	0.880	0.60	0.15	**0.047**	0.54	0.18	*0.061*
More Severe	0.46	0.66	0.592	0.73	0.97	0.812	0.69	0.23	0.270	0.77	0.31	0.513
Emotional	0.80	0.31	0.569	0.86	0.36	0.716	0.46	0.15	**0.015**	0.40	0.14	**0.010**
Sexual	0.14	0.12	**0.029**	0.17	0.16	*0.061*	0.34	0.17	**0.028**	0.27	0.13	**0.007**
Pregnancy IPV	1.47	1.30	0.659	1.60	1.49	0.614		N/A			N/A	
Any IPV	0.84	0.32	0.643	0.91	0.38	0.829	0.57	0.14	**0.026**	0.50	0.16	**0.035**
	Liberia, n=313						**Nigeria, n=2036**					
	Unadjusted			Adjusted[2]			Unadjusted[1]			Adjusted[1]		
	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value
Physical	0.79	0.30	0.526	0.97	0.33	0.932	1.09	0.22	0.651	0.87	0.18	0.507
Less Severe	0.78	0.30	0.529	0.95	0.33	0.873	1.10	0.22	0.636	0.87	0.18	0.511
More Severe	0.90	0.40	0.811	1.10	0.45	0.821	1.00	0.28	0.999	0.87	0.28	0.670
Emotional	0.55	0.19	*0.089*	0.56	0.19	*0.096*	0.82	0.15	0.279	0.97	0.20	0.874
Sexual	0.15	0.13	**0.025**	0.08	0.10	**0.032**	0.78	0.32	0.546	0.85	0.38	0.714
Pregnancy IPV		N/A			N/A		1.01	0.35	0.987	0.87	0.32	0.706
Any IPV	0.50	0.17	**0.047**	0.49	0.17	**0.044**	1.04	0.17	0.793	1.07	0.19	0.694
	Zambia, n=454						**Zimbabwe, n=367**					
	Unadjusted			Adjusted			Unadjusted			Adjusted[1]		
	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value	OR	SE	p-value
Physical	0.92	0.21	0.721	0.78	0.20	0.343	0.84	0.30	0.631	0.68	0.25	0.299
Less Severe	0.92	0.20	0.678	0.79	0.20	0.360	0.82	0.30	0.585	0.65	0.24	0.250
More Severe	0.67	0.23	0.251	0.60	0.22	0.162	2.33	1.23	0.110	2.72	1.09	**0.013**
Emotional	0.79	0.20	0.354	0.89	0.27	0.708	0.98	0.29	0.933	1.03	0.29	0.916
Sexual	1.51	0.46	0.176	1.76	0.62	0.111	1.06	0.50	0.907	0.93	0.44	0.875
Pregnancy IPV	0.52	0.23	0.148	0.37	0.22	*0.093*	2.32	1.39	0.159	1.69	0.97	0.360
Any IPV	0.93	0.20	0.742	0.79	0.20	0.362	0.81	0.23	0.449	0.67	0.20	0.180

p<0.05; *p<0.10*

[1]Observations dropped from analysis: Ghana, n=2; Liberia, n=6; Nigeria, n=29; Zimbabwe, n=4

4 CONCLUSIONS AND RECOMMENDATIONS

The implications of this work for public health are great. As previously mentioned, the lives of over 1.4 million children in low-income settings may be saved through the practice of optimal breastfeeding (25, 27). Optimal breastfeeding also positively affects the lives of surviving children by substantially reducing child morbidity (22-26). Our study identified IPV as a factor negatively associated with optimal breastfeeding practices—one that reduced the odds of optimal breastfeeding by up to 92%! A factor with an effect of such magnitude, especially in regards to a practice that has the potential to affect so many lives, cannot be ignored.

Our study was the first to examine maternal IPV exposure and breastfeeding practices within Africa. Work must now begin to study the relationship in additional parts of the world. Population-based studies, like ours, are an appropriate place to start, but in order to fully understand the causal pathway between IPV and breastfeeding, longitudinal studies are necessary. Thus, future research examining longitudinal cohorts of pregnant women will be an essential step towards reaching a full understanding of the relationship between IPV and breastfeeding. Additional studies examining the mediators proposed in this thesis's conceptual framework (Figure 1) will further elucidate the link.

While the relationship between maternal IPV exposure and breastfeeding requires further examination, our finding of a negative association in multiple African countries is sufficient evidence to recommend important interventions. IPV exposure during pregnancy is more common than other maternal health conditions, such as pre-eclampsia and gestational diabetes, which are customarily screened for during prenatal care (5). It is therefore recommended that screening for IPV become a routine component of basic

prenatal care. Additionally, health care providers should provide guidance and support for breastfeeding to all women, but particular attention should be paid to those women who screened positive for IPV exposure. While it is true that large-scale programs to screen for IPV and provide breastfeeding counseling will require commitment and resources from all involved, in comparison to other global interventions designed to prevent child deaths, such as efforts to improve hygiene, sanitation, and water, screening and breastfeeding counseling is less expensive and more easily implementable (25). We are therefore proposing a manageable solution to a substantial health concern. As optimal breastfeeding has the potential to save so many lives through the world, and as we have identified the substantial negative impact that maternal IPV exposure may have on breastfeeding practices, it is vitally important that steps be taken to mitigate the negative effect of IPV and to increase levels of optimal breastfeeding in African mothers, and beyond.

REFERENCES

(1) UN General Assembly. Declaration on the Elimination of Violence against Women. 1993.

(2) World Health Organization. Violence against women: WHO Consultation, Geneva, 5-7 February 1996. Geneva, Switzerland: World Health Organization, 1996

(3) World Health Organization. WHO multi-country study on women's health and domestic violence against women: summary report of initial results on prevalence, health outcomes and women's responses. Geneva, Switzerland: World Health Organization, 2005.

(4) Saltzman LE, Fanslow JL, McMahon PM, Shelley GA. Intimate partner violence surveillance: uniform definitions and recommended data elements, version 1.0. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 1999.

(5) Devries KM, Kishor S, Johnson H et al. Intimate partner violence during pregnancy: analysis of prevalence data from 19 countries. *Reprod Health Matters* 2010;18**(36):**158-70.

(6) Tjaden P, Thoennes N. Extent, nature, and consequence of intimate partner violence: findings from the National Violence Against Women Survey. Washington (DC): Department of Justice (US), 2000.

(7) Heiss L, Ellsberg M, Gottemoeller M. Ending violence against women. *Popul Rep L* 1999;**(11)**:1-43.

(8) Gazmararian JA, Lazorick S, Spitz AM, Ballard TJ, Saltzman LE, Marks JS. Prevalence of violence against pregnant women. *JAMA* 1996;275**(24):**1915-20.

(9) Taillieu T, Brownridge DA. Prevalence, patterns, and risk factors for experiencing intimate partner violence during pregnancy: a review of the literature and directions for future research. *Aggress Violent Behav* 2010;15**(1):**14-35.

(10) Shamu S, Abrahams N, Temmerman M, Musekiwa A, Zarowsky C. A systematic review of African studies on intimate partner violence against pregnant women: prevalence and risk factors. *PLos One* 2011;6**(3):**e17591.

(11) Amaro H, Fried LE, Cabral H, Zuckerman B. Violence during pregnancy and substance abuse. *Am J of Public Health* 1990;80**(5):**575-79.

(12) Martin SL, Beaumont JL, Kupper LL. Substance use before and during pregnancy: links to intimate partner violence. *American J Drug Alcohol Abuse* 2003;29**(3):**599-617.

(13) Martin SL, Kilgallen B, Dee DL, Dawson S, Campbell J. Women in a prenatal care/substance abuse treatment program: links between domestic violence and mental health. *Matern Child Health J* 1998;2**(2):**85-94.

(14) Beydoun HA, Al-Sahab B, Beydoun MA, Tamim H. Intimate partner violence as a risk factor for postpartum depression among Canadian women in the Maternity Experience Survey. *Ann Epidemiol* 2010;20:575-583.

(15) 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;164**(11):**1567-72.

(16) Coker AL, Sanderson M, Dong B. Partner violence during pregnancy and risk of adverse pregnancy outcomes. *Paediatr Perinat Epidemiol* 2004;18**(4):**260-69.

(17) Neggers Y, Goldenberg R, Cliver S, Hauth J. Effects of domestic violence on preterm birth and low birth weight. *Acta Obstet Gynecol Scand* 2004;83:455-60.

(18) Shah PS, Shah J. Maternal exposure to domestic violence and pregnancy and birth outcomes: a systematic review and meta-analyses. *J Womens Health* 2010;19**(11):**2017-31.

(19) United Nations Chidren's Fund/World Health Organization. Baby friendly hospital initiative: revised, updated and expanded for integrated care. Geneva, Switzerland: United Nations Children's Fund/World Health Organization, 2005.

(20) United Nations Children's Fund/World Health Organization. Global strategy for infant and young child feeding. Geneva, Switzerland: United Nations Children's Fund/World Health Organization, 2003.

(21) Walker A. Breast milk as the gold standard for protective nutrients. *J Pediatr* 2010;156**(2 Suppl)**:S3-7.

(22) Edmond KM, Zandoh C, Quigley MA, Amenga-Etego S, Owusu-Agyei S, Kirkwood BR. Delayed breastfeeding initiation increases risk of neonatal mortality. *Pediatrics* 2006;117**(3):**e380-86.

(23) Edmond KM, Kirkwood BR, Amenga-Etego S, Owusu-Agyei S, Hurt LS. Effect of early infant feeding practices on infection-specific neonatal mortality: an investigation of the causal links with observational data from rural Ghana. *Am J Clin Nutr* 2007;86**(4):**1126-31.

(24) Kramer MS, Kakuma R. The optimal duration of exclusive breastfeeding: a systematic review. *Adv Exp Med Biol* 2004;554:63-77.

(25) Lauer JA, Betran AP, Barros AJD, de Onis M. Deaths and years of life lost due to suboptimal breast-feeding among children in the developing world: a global ecological risk assessment. *Public Health Nutr* 2006;9**(6):**673-85.

(26) Meyers D. Breastfeeding and health outcomes. *Breastfeed Med* 2009;4**(Suppl 1):**S13-15.

(27) Black RE, Allen, LH, Bhutta, ZA, et al. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet* 2008;371**(9608):**243-60.

(28) Setty V. Better breastfeeding, healthier lives. *Popul Rep L* 2006;**(14):**1, 3-23.

(29) Acheson L. Family violence and breast-feeding. *Arch Fam Med* 1995;4**(7):**650-52.

(30) Bullock LFC, Libbus MK, Sable MR. Battering and breastfeeding in a WIC population. *Can J Nurs Res* 2001;32**(4):**43-56.

(31) Silverman JG, Decker MR, Reed E, Raj A. Intimate partner violence around the time of pregnancy: association with breastfeeding behavior. *J Womens Health* 2006;15**(8):**934-40.

(32) 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;52**(2):**e15-20.

(33) Lourenco MA, Deslandes SF. Maternal care and breastfeeding experience of women suffering intimate partner violence. *Rev Saude Publica* 2008;42**(4):**615-21.

(34) Moraes CL, de Oliveira AS, Reichenheim ME, Lobato G. Severe physical violence between intimate partners during pregnancy: a risk factor for early cessation of exclusive breast-feeding. *Public Health Nutr* 2011;14**(12):**2148-55.

(35) Campbell JC. Health consequences of intimate partner violence. *Lancet* 2002;359:1331-36.

(36) Golding JM. Intimate partner violence as a risk factor for mental disorders: a meta-analysis. *J Fam Violence* 1999;14**(2):**99-132.

(37) Miller LJ, LaRusso EM. Preventing postpartum depression. *Pyschiatr Clin North Am* 2011;34**(1):**53-65.

(38) Garabedian MJ, Lain KY, Hansen WF, Garcia LS, Williams CM, Crofford LJ. Violence against women and postpartum depression. *J Womens Health* 2011;20**(3):**447-53.

(39) Tiwari A, Chan KL, Fong D, et al. The impact of psychological abuse by an intimate partner on the mental health of pregnant women. *BJOG* 2008;115**(3):** 377–84.

(40) Paulson JF, Dauber S, Leiferman JA. Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics* 2006;118**(2):**659-68.

(41) Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration. *Birth* 2003;30**(3)**:175-80.

(42) Taveras E, Capra A, Braveman P, Jensvold N, Escobar G, Lieu T. Clinician support and psychosocial risk factors associated with breastfeeding discontinuation. *Pediatrics* 2003;112**(1 Pt 1)**:108-15.

(43) Fransson E, Ortenstrand A, Hjelmstedt A. Antenatal depressive symptoms and preterm birth: a prospective study of a Swedish national sample. *Birth* 2011;38**(1):**10-16.

(44) Grote NK, Bridge JA, Gavin AR, Melville JL, Iyengar S, Katon WJ. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. *Arch Gen Psychiatry* 2010;67**(10):**1012-24.

(45) Leahy-Warren P, McCarthy G, Corcoran P. First-time mothers: social support, maternal parental self-efficacy and postnatal depression. *J Clin Nurs* 2011;21**(3-4):**388-97.

(46) Burke HM, Davis MC, Otte C, Mohr DC. Depression and cortisol responses to psychological stress: a meta-analysis. *Psychoneuroendocrinology* 2005;30**(9):**846-56.

(47) Garcia FD, Coquerel Q, Klive E, Dechelotte P, Harro J, Fetissov SO. Autoantibodies reacting with vasopressin and oxytocin in relation to cortisol secretion in milk and moderate depression. *Prog Neuropsychopharmacol Biol Psychiatry* 2011;35**(1):**118-25.

(48) Field T, Hernandez-Reif M, Diego M, Figueiredo B, Schanberg S, Kuhn C. Prenatal cortisol, prematurity and low birthweight. *Infant Behav Dev* 2006;29**(2):**268-75.

(49) Chen DC, Nommsen-Rivers L, Dewey KG, Lonnerdal B. Stress during labor and delivery and early lactation performance. *A J Clin Nutr* 1998;68**(2):**335-44.

(50) Buhimschi CS. Endocrinology of lactation. *Obstet Gynecol Clin North Am* 2004;31**(4):**963-79.

(51) Kendall-Tackett K, Hale TW. The use of antidepressants in pregnant and breastfeeding women: a review of recent studies. *J Hum Lact* 2010;26**(2)**:187-95.

(52) World Health Organization. The world health report 2001—Mental health: new understanding, new hope. Geneva, Switzerland: World Health Organization, 2001.

(53) Lemon SC, Verhoek-Oftedahl W, Donnelly EF. (2002). Preventative healthcare use, smoking, and alcohol use among Rhode Island women experiencing intimate partner violence. *J Womens Health Gend Based Med* 2002;11**(6):**555-62.

(54) Howard CR, Lawrence RA. Breast-feeding and drug exposure. *Obstet Gynecol Clin North Am* 1998;25**(1):**195-217.

(55) Davis L, Uezato A, Newell JM, Frazier E. Major depression and comorbid substance use disorders. *Curr Opin Psychiatry* 2008;21**(1):**14-18.

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

(57) Chambliss LR. Intimate partner violence and its implication for pregnancy. *Clin Obstet Gynecol* 2008;51**(2):**385-97.

(58) Heck KE, Schoendorf KC, Chavez GF, Braveman P. Does postpartum length of stay affect breastfeeding duration? A population-based study. *Birth* 2003;30**(3):**153-59.

(59) Kendall-Tackett K. Violence against women and the perinatal period: the impact of lifetime violence and abuse on pregnancy, postpartum, and breastfeeding. *Trauma, Violence, & Abuse* 2007;8**(3):**344-53.

(60) Whalen B, Cramton R. Overcoming barriers to breastfeeding continuation and exclusivity. *Curr Opin Pediatr* 2010;22:655-63.

(61) Schmitt SK, Sneed L, Phibbs CS. Costs of newborn care in California: a population-based study. *Pediatrics* 2006;117**(1):**154-60.

(62) Maia C, Brandao R, Roncalli A, Maranhao H. Length of stay in a neonatal intensive care unit and its association with low rates of exclusive breastfeeding in very low birth weight infants. *J Matern Fetal Neonatal Med* 2011;24**(6):**774-77.

(63) Valero De Bernabe J, Soriano T, Albaladejo R, et al. Risk factors for low birth weight: a review. *Eur J Obstet Gynecol Reprod Biol* 2004;116**(1):**3-15.

(64) Savitz DA, Murnane P. (2010). Behavioral influences on preterm birth: a review. *Epidemiology* 2010;21**(3):**291-99.

(65) McFarlane J, Parker B, Soeken K. Physical abuse, smoking, and substance use during pregnancy: prevalence, interrelationships, and effects on birth weight. *J Obstet Gynecol Neonatal Nurs* 1996;25**(4):**313-20.

(66) Meedya S, Fahy K, Kable A. Factors that positively influence breastfeeding duration to 6 months: a literature review. *Women Birth* 2010;23:135-45.

(67) Forster DA, McLachlan HL, Lumley J. Factors associated with breastfeeding at six months postpartum in a group of Australian women. *Int Breastfeed J* 2006;1:18.

(68) Blythe R, Creedy DK, Dennis C-L, Moyle W, Ratt J, De Vries SM. Effect of maternal confidence on breastfeeding duration: an application of breastfeeding self-efficacy theory. *Birth* 2002;29**(4):**278-84.

(69) McCarter-Spaulding DE, Kearney MH. Parenting self-efficacy and perception of insufficient breast milk. *J Obstet, Gynecol Neonatal Nurs* 2001;30**(5)**:515-22.

(70) Britton C, McCormick FM, Renfrew MJ, Wade A, King SE. Support for breastfeeding mothers. *Cochrane Database Syst Rev* 2007;**(1):**CD001141.

(71) Scott J, Shaker M, Reid R. Parental attitudes toward breastfeeding: their association with feeding outcome at hospital discharge. *Birth* 2004;31**(2):**125-31.

(72) Scott J, Landers M, Hughes R, Binns C. Factors associated with breastfeeding at discharge and duration of breastfeeding. *J Paediatr Child Health* 2001;37**(3):**254-61