

Examining the Association between Spousal Violence and the Incidence of Acute Respiratory Infection among Children under Five: Random-Effect Modeling Using Data from Nigeria and Bangladesh

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Abstract Acute respiratory infection (ARI) is one of the major causes of mortality among children under five in many developing countries. This paper examines survey data reporting maternal recall of episodes of ARI in two contrasting settings: Bangladesh and Nigeria where about 11.1% and 3.3% of children under five, respectively, have had symptoms of ARI in the past two weeks. In these two countries, about 25.6% of married Bangladeshi women and 15.4% of married Nigerian women reported that they had experienced spousal violence in past year. To test the proposition that intimate partner violence (IPV) is associated with childhood adversity, we examine the relationship between spousal violence in past year and childhood ARI in past two weeks among children under five. This research uses data from nationally represented sample of mothers (aged 15-49 years) obtained from the 2007 Bangladesh Demographic and Health Survey and 2008 Nigeria Demographic and Health Survey. Random-effects multiple logistic regression models are estimated to assess the association of maternal exposure to IPV with the incidence of ARI in past two weeks among under-5 children after controlling for the potentially confounding effects of maternal social and demographic characteristics. Results from Nigeria suggest that the odds of ARI incidence among children of mothers who are IPV victims is double ARI among other children among Nigerian under-5 children. (OR=1.78; 95% CI: 1.45-2.19 p <0.001) and similarly, Bangladeshi children of IPV victims is elevated, one and half times (OR=1.61; 95% CI: 1.21-2.14 (p <0.001). Findings suggest that children under-5 suffer indirect health consequences from gender-based violence.

Introduction

International concern about intimate partner violence (IPV) has gained currency in recent years. This public health problem transpires when two individuals who are currently in an intimate relationship or have previously been in an intimate relationship engage in physical violence, sexual violence, intimidations of physical or sexual violence, and emotional abuse (Kernic, Wolf, & Holt, 2000; Rennison & Welchans, 2000). IPV frequently results in emotional distress that compounds physical harm. Although domestic violence and IPV are frequently used interchangeably, domestic violence refers to any act of abuse against older people, children, and intimate partner violence whereas IPV is limited to cases whereby the abuser is a current or past intimate partner of the victim (Cronholm, Fogarty, Ambuel, & Harrison, 2011).

IPV has been shown to affect not only maternal health outcomes, but also child health outcomes (Ackerson & Subramanian, 2009). According to a study conducted by the World Health Organization on the incidence of physical, sexual or combined IPV across different countries, the prevalence of women who had ever experience IPV ranged between 15 and 71% (Ellsberg et al., 2008). Several studies have documented the association IPV with childhood morbidity and mortality (Silverman, Gupta, Decker, Kapur, & Raj, 2007; Bogat, DeJonghe, Levendosky, Davidson, von Eye, 2006). Children under-five who witness such viciousness behavior are at greater risk of impaired intellectual development and social skills psychological factors that impinge upon the childhood survival (Adam, 2006). For example, a study conducted in northern India it found that the risk of child mortality during perinatal and neonatal period is more than two times higher in mother who experienced IPV during pregnancy compared to those who did not (Ahmed, Koenig & Stephenson, 2006).

IPV has been showed to have indirect effects on maternal health. IPV exposed women also lack social and financial autonomy which in turns impedes mobility and authority to seekhealth care for their children (Åsling-Monemi, Naved, & Persson, 2009). Maternal exposure to IPV has been linked to depression in women, traumatic brain injury, sexually transmitted diseases and other poor health outcomes (Campbell & Lewandowski, 1997; Åsling-Monemi et al., 2009).

Studies have also reported very high rates of IPV in the south Asia including Bangladesh (Silverman et al., 2009). Bangladesh has a high infant mortality rate, with 50-60 deaths per 1,000 children dying before their first birthday (Åsling-Monemi et al., 2009). Although this represents an improvement over levels observed in the past, infant mortality remains high in comparison to levels observed in most other developing countries. Social equity contributes to risk. For example, while Silverman et al. (2009) reported a mortality rate of 77 per 1,000 live births among children 5 years old and under a similar study of uneducated Bangladeshi mothers reported a rate that was double this level for under-five female children of uneducated mothers (Åsling-Monemi et al., 2009).

The prevalence of currently married Bangladeshi women who have ever experienced IPV in the past 12 months is about 18% (BDHS, 2008). According to results from the multi-country study of the health of women and IPV, the lifetime prevalence of women who have ever experienced IPV was 69% out of 1,500 women in Bangladesh who were ever married (Ellsberg et al., 2008). In another study to determine maternal experiences of IPV and child morbidity in Bangladesh, Silverman and her colleagues (2009) found that 2 of 5, almost 43% of married women with at least one child that is 5 years old or younger, experienced IPV in the year before the survey (Silverman et al., 2009)

Women who experience IPV are also prevalent in Nigeria. Ezechi and colleagues (2004) in their studies on the prevalence of domestic violence against pregnant women found most of the violence was committed by intimate partners (78.7%). The prevalence of women who reported IPV experience in the past 12 months by currently married women in Nigeria is about 15% (NDHS, 2009). Other risk factors that are associated with IPV include women's young age, low social-economic status (SES), poor educational level, and personal or spousal alcohol, tobacco and other substance abuse (Adesina, Oyugbo, Oladokun, & Olubukola, 2011). Adesina and colleagues (2011) conducted a study to assess the prevalence of women who experience IPV among antenatal care (ANC) clinic clientele in Ibadan, Nigeria. Their investigation found a prevalence rate of 17% of pregnant ANC patients who reported that their husbands being the common perpetrators (Adesina et al., 2011). The authors found the highest rates for threats to abuse. Antai's (2011) study on controlling behaviors within intimate relationships found a lifetime prevalence of 63 percent of all married women who claimed that that their spouses controlled their behavior with threats of violence (Antai, 2011). It appears that marital control by husbands over their wives and threats are more common types of IPV reported in Nigeria. This high prevalence in controlling behavior may be as a result of the fact that the other kinds of abuse take place on the platform of control.

This study examines the association of the prevalence of IPV exposure in the year before a survey among married women in Nigeria and Bangladesh with the reported fortnightly incidence of ARI among their under five years children. To assess the robustness of this relationship, we compare findings from two counties located on different subcontinents.

Acute Respiratory Infections (ARI)

Definitions. Pneumonia and respiratory infection are the leading cause of morbidity globally with African countries being more affected (Gessner, 2011). Lower respiratory tract infections are more common cause of death in children under the age of 5. Pneumonia, the most common lower respiratory tract infection accounts for 19% of death in this population with 70% of these deaths occurring in Sub-Saharan Africa

and South-East Asia. Evidence from Bangladesh and Nigeria has consistently shown that children in both countries experience high ARI risks.

Many clinical and socioeconomic causes have been reported as contributing to the deaths of children; especially children living in developing countries (Ackerson 2011), more studies are now examining the social determinants of child mortality and morbidity. Some of the social predictors that have been mentioned so far include IPV, and these studies have established an association between maternal abuse and poor child health outcomes. For example Ackerson and colleagues (Ackerson et al., 2011) found that maternal physical abuse was associated with infant death in Bangladesh. Risk factors associated with ARI in these countries include lack of access to basic amenities like adequate housing, electricity and clean running water (Jamison 2006), lack of exclusive breastfeeding, under-nutrition, indoor air pollution, low birth weight and lack of measles immunization (Rudan et al., 2004). The incidence of ARI in developing countries have been estimated to be 150.7 million new cases every year (Jamison). About 6 million each are reported for Nigeria and Bangladesh (Rudan et al., 2004).

The association between IPV and ARI has not been substantially studied, particularly in countries where both problems are rampant. As far as we know, only one study has examined this association in Bangladesh and none has been conducted in Nigeria. In Bangladesh, the study by Silverman et al. (2009) assessed women's exposure to IPV from self-reports from their husbands who were also the perpetrators. This may not have yielded accurate results because perpetrators of IPV may under-report it or victims may conceal the practice. Our study utilizes reports from women's self-reported experience of IPV. The authors found an increased risk for ARI, pneumonia and diarrhea among children whose mothers have experienced IPV.

Posited pathway for the effect of IPV on the health of under-five children:

Our framework adapts the general process model of Repetti et al. 2002 to articulate the possible direct and indirect pathways by which IPV against mothers may affect a child's growth, morbidity and survival (Figure 1). The social determinants of health are well known and consistently demonstrated in social epidemiological research (pathways A in Figure 1) A mother's experience of IPV may initiate behavioral risks as well as psychological (anxiety, depression), physical (injury, disability, fatigue), and nutritional (anemia, poor weight gain) symptoms which may prevent her from taking care of a under-five child's health and health seeking behavior, leading to the effects posited by pathways B in Figure 1. Since exogenous factors are intercorrelated (pathways labeled C) and covary with pathways A, multivariate models must adjust for multiple indicators of relative household poverty and parental educational attainment,

<<Figure 1 about here>>

Data and methodology:

The data for this research were extracted from the 2008 Nigeria Demographic and Health Survey (NDHS, 2008) and the 2007 Bangladesh Demographic Health Survey (BDHS, 2007). All DHS surveys aim to provide up-to-date information on fertility levels; nuptiality; sexual activity; fertility preferences; awareness and use of family planning methods; breastfeeding practices; nutritional status of mothers and young children; early childhood mortality and maternal mortality; maternal and child health; and awareness and behavior regarding, HIV/AIDS and other sexually transmitted infections. The Bangladesh and Nigeria surveys contained identical modules for assessing domestic violence.

The BDHS was a nationally representative survey of 10,996 women age 15-49 and 3,771 men age 15-54 covering 361 clusters throughout Bangladesh, of which 134 were located in urban areas and 227 in rural areas. The survey was conducted under the authority of the National Institute for Population Research and Training (NIPORT) in the Ministry of Health and Family Medicine and used a multi stage cluster sample based the 2001 Bangladesh Census. Data collection occurred over a period of 5 months from March through August, 2007. A total of 10,819 households were selected for the survey out of which 10,461 were found to be occupied and interviews were successfully completed in 10,400 households (99.4%). All ever-married women 15-49 and all ever-married men 15-59 who slept in the selected households the night before the survey were eligible for the survey. About 11,178 eligible women identified in these households and 10,996 were successfully interviewed, producing a response rate of 98.4%. Eligible male participants were selected in every second household (for every two households sampled for women); out of 4,074 males identified, 3,771 were successfully interviewed leading to a response rate of 92.6%. Details of data collection and sampling method are described elsewhere (BDHS, 2007).

The 2008 Nigeria DHS data was implemented by the National Population Commission over the June to October 2008 period. It was a nationally representative sample of over 36,298 households selected of which 34,644 were occupied and 34,596 women were identified to be eligible for individual interview and 97% were successfully interviewed. Details of data collection and sampling methods are documented elsewhere (Nigeria DHS, 2008).

For both countries, a woman was randomly selected from each household to be asked additional questions about domestic violence. A total of 19,165 (Nigeria) and 2,455 (Bangladesh) women were asked questions about domestic violence and data from women were matched with the data from their husbands and husband-wife dyads were created.

Variables

The dependent variable:

The dependent or outcome variable for this study is the incidence of ARI among children 5 years and under in last two weeks before the survey. ARI incidence was assessed by asking mothers whether their children under the age of five had been ill in the two weeks preceding the survey with a cough accompanied by short, rapid breathing or difficulty breathing which the mother considered to be chest-related. These symptoms are considered to be a proxy for pneumonia. A “yes” to any of these questions indicated the presence of ARI. For ARI, women indicating that their child/children had suffered cough in last two weeks, short, rapid breaths and/or had fever in last two weeks got a score of 1, otherwise, they got a score of “0” for the absence of ARI

The independent variables:

The independent variable of interest is wife’s report of violence (IPV) perpetrated by her husband/partner in the year before the survey. IPV was assessed using a shortened (modified) version of the Conflicts Tactics Scale (CTS) containing the following 8 questions: (Does/did) your (last) husband ever do any of the following things to you: a) Push you, shake you, or throw something at you? b) Slap you? c) Twist your arm or pull your hair? d) Punch you with his fist or with something that could hurt you? e) Kick you, drag you, or beat you up? f) Try to choke you or burn you on purpose? g) Threaten or attack you with a knife, gun, or any other weapon? h) Physically force you to have sexual intercourse with him even when you did not want to? The first seven questions (a-g) were used to estimate the prevalence of physical violence while the last question (h) assessed sexual violence. Women currently married were asked to respond to the questions with respect to their current partners while formerly but not currently married women were asked to respond with reference to their most recent husbands. A “yes” on any of the first 7 questions represented physical violence and a “yes” to the last question, sexual violence. For each “yes” response, currently married women were asked about the frequency of such acts in the past 12 months preceding the survey. Women that were formerly but not currently married were not asked about life time experience of violence, not past 12 months experience.

Geographic region, child’s age, women’s employment status, partner’s educational attainment, women’s educational attainment, duration of marriage, religion affiliation and socioeconomic status (SES) were used among others, as control variables. Geographic region was treated as a categorical variable. Six dummy variables were created which included: north-central (reference category), north-west, north-east, south-east, south-west and south-south for Nigeria and *Chittagong* (reference category), *Barisal*, *Dhaka*, *Khulna*, *rajshahi* and *sylhet* for Bangladesh. Dummy variables for child’s age were created and were categorized as follows: 1-12 months, 12-23 months, 24-35 months 36-47 months and

48-59 months being the reference category. Women's employment status was treated as dichotomous variable 1 meaning "working" and 0 meaning "not employed". Three dummy variables for partner's education were created: "No education", "primary education and "above primary education". Dummy variables for women's educational attainment were created: "no education", "primary education" and above secondary education". For duration of marriage, three dummy variables were generated: 1-10years, 10-19 years and married for 20 years and above. Socio-economic status (SES) was determined and three dummy variables (high, medium and low) were created using the wealth index (quintiles) category generated during the survey.

Statistical Analysis

Unadjusted and adjusted random-effect logistic regression models were estimated for predicting the relationship between women's experience of violence from her spouse or partner in past 12 months and her under-five child's incidence of ARI in past two weeks. Domestic violence was coded as a dichotomous variable corresponding to 1 a respondent answered "yes" to at least one of the abuse questions and 0 otherwise. By estimating models with random intercepts, we assumed random heterogeneity in women's propensity or underlying risk of having spousal/partner violence that persists that across primary sampling unit.

Results:

Table 1 provides the demographic information for participants in Bangladesh and Nigeria. About 26% and 15% of women ever experienced IPV in Bangladesh and Nigeria respectively. IPV prevalence was found to be considerably higher in Bangladesh than in Nigeria. Women in Bangladesh were equally distributed across the three groups for level of education (no education, primary, above primary) while nearly half of the women in our Nigerian sample reported having no education. Despite higher levels of illiteracy among the Nigerian respondents a higher percentage of the women reported that they were employed in the past 12 months compared to the Bangladesh women (Table 1).

<<Table 1 about here>>

In Nigeria, the rate of past year IPV experienced by the mother is significantly higher if she has a son who is under-five (Table 2). However, the rate of past year IPV experienced by the mother in Bangladesh is similar irrespective of gender of the child under-five. There is a significant ($p<0.001$) association between women's education and mother experienced IPV in past 12 months in Nigeria and in Bangladesh. There is a positive association between women's employment status and her experience of IPV in past 12 months

in Nigeria and in Bangladesh. The association is significant ($p<0.001$) in the case of Nigeria. The rate of IPV is higher (17.5 versus 11.6 in Nigeria and 26.0 versus 25.5 in Bangladesh) for a woman who is currently employed. SES also significantly ($p<0.001$) associated with women reported experienced IPV in past year.. In Bangladesh, 26.4% of Muslim women reported having experienced with past -year IPV whose religion is Islam whereas in Nigeria, only 9.0% of the Muslim women reported having experienced IPV within the past (Table 2).

<<Table 2 about here>>

Random-effect logistic regression results indicate that if a woman has experienced IPV in the past year, the odds of her child having ARI in past two weeks among children under five is about two times [OR=1.78; 95% CI:1.45-2.19, $p<0.001$] higher in Nigeria and one a half times [OR=1.63; 95% CI:1.22-2.16, $p<0.001$] higher in Bangladesh compared to the mothers who did not experience physical violence after controlling for the effect of other socio-demographic and economic indicators of the women (Table 3). Infants, (OR=2.47, $p<0.001$), young children aged 12-23 months (OR=2.04, $p<0.001$) and children aged 24-35 months (OR=1.82, $p<0.01$) had significantly higher odds of developing ARI compared to children between 48-59 months in Bangladesh while in Nigeria, only children younger than 12 months (OR=1.41, $p<0.05$) and between 12-23 months (OR=2.26, $p<0.001$) had significant higher odds of developing ARI compared to our reference category, children between 48-59 months. In our Nigerian sample, women whose spouses had no education were less likely to have children under 5 who had ARI (OR=0.69, $p<0.001$) compared to Bangladesh where women whose spouses had primary education were significantly more likely to have a child who has had ARI in the past two weeks (OR=1.75, $p<0.05$).

<<Table 3 about here>>

Discussion

The current study identifies an association between maternal exposure to IPV and past two weeks incidence of ARI among children under 5 years old. Given that IPV has a high prevalence in developing countries and ARI is one of the leading causes of death for children under 5, the association found between these variables suggests that IPV does not affect women alone but also younger children. Although many studies have reported mental health problems, school problems, emotional and adjustment problems, externalizing and internalizing behaviors as some adverse health outcomes of children exposed to violence in the home, ARI has not been readily included in this list (Moore, 1975; Levine, 1975; Gil-González, Vives-Cases, Ruiz, Carrasco-Portiño, & Álvarez-Dardet, 2007; Hungerford,

Ogle & Clements, 2010). In the current study, younger children (less than 12 months and between 12-23 months) were more likely to have experienced ARI in the past two weeks than older ones, suggesting that very young children may be much more vulnerable and impacted by IPV. This finding has serious implications especially for children younger than 12 months. Studies on the influence of IPV on child health outcome have often included older children (Carpenter & Stacks, 2009). This may partly be due to challenges in conducting accurate assessments on this population. It is however vital that these group be included, in order to intervene early.

Infant mortality has persistently posed a great public health problem globally, especially in developing countries. In countries like Nigeria and Bangladesh, ARI among children under the age of 5 is the leading cause of death. Our findings indicating an association between IPV and ARI suggests that violence in intimate relationships may be a contributor to the high infant mortality rates in both countries.

Results are similar to the findings of Silverman et al., (2009), although their odds of ARI incidence ($OR=1.37, p<0.05$) was slightly lower than what we have reported. This may be because reports of IPV against women were collected from their spouses and not from the women. Men may have under-reported the occurrence of IPV. Our study findings are also in line with the findings of Ackerson and colleagues. They reported an association between maternal physical abuse and child mortality, bearing in mind that ARI is a leading cause of death in the two countries included in this study.

The mechanism through which exposure to IPV may influence ARI risk may be through disruption of maternal schedule and her ability to provide appropriate care to her children. Women in abusive relationships may experience mental and physical health consequences that impact their care giving roles (Sharps, Campbell). In addition, societal and cultural norms around IPV may play a crucial role in understanding the prevalence of IPV and its subsequent association with ARI. In many developing countries like Bangladesh and Nigeria, men are the head of households and bread winners while women assume care giving roles. Many of the women in this study reported either having no education at all or having only primary school education. This limits their financial capability and makes them somewhat financially dependent on their male partners, hence increasing their vulnerability to IPV. Lack of education and employment has been reported as some of the risk factors for IPV (Adesina et al., 2011; Shamu, Abrahams, Temmerman, Musekiwa, Zarowsky, 2011). Previous studies have demonstrated that IPV is associated with low birth weight, reduced breastfeeding and premature birth, all of which are associated with increased odds of child mortality and morbidity including the incidence of ARI (Rudan et al., 2004).

The results of study should be interpreted cautiously, bearing the limitations of the study in mind. Firstly, we used secondary data information, although the DHS dataset is very well known and trusted for the quality of information that is collected. Secondly, the study is cross-sectional in nature which makes it

very difficult to infer causality. Owing to this, we cannot say that maternal IPV causes ARI in children under 5. Thirdly, given the survey nature of data collection, all information collected were self-reported which may be a potential source of bias. Contrary to Silvermann's (Silverman et al., 2009) study, this study used women's report of IPV which we considered may more accurately reflect the past year prevalence of IPV.

Conclusion:

This study has demonstrated a significant association between the odds of recent ARI among children and reported incidence of IPV among their mothers. This finding is consistent with the hypothesis that adversity associated with IPV extend to the children of the mothers who are affected. This result attests to the need for research that could identify feasible interventions for preventing and controlling IPV. The need for interventions is particularly pronounced in settings such as Nigeria and Bangladesh where both the incidence of ARI and IPV is high. While longitudinal studies may be needed to establish causality, intervention trials are also urgently needed. Qualitative studies and psychological research is warranted that could elucidate exact mechanisms that generate the association between IPV and ARI.

Table 1. Socio-demographic characteristics of the study sample, Bangladesh BDHS 2007 and Nigeria NDHS, 2008.

Variables	Bangladesh 2007		Nigeria 2008	
	n	%	n	%
Mother ever experienced spousal/partner violence				
Yes	627	25.6	2,893	15.4
No	1,823	74.4	15,889	84.6
Child having ARI in last two weeks				
Yes	272	11.1	623	3.3
No	2,178	88.9	18,159	96.7
Gender of the child under 5				
Female	1,214	49.6	9,290	49.5
Male	1,236	50.4	9,492	50.5
Age of child				
Less than 12 months	474	19.4	4,348	23.1
12-23 months	478	19.5	3,758	20.0
24-35 months	498	20.3	3,480	18.5
36-47 months	499	20.4	3,729	19.9
48-59 months	501	20.4	3,467	18.5
Mother's level of education				
No education	722	29.5	8,912	47.5
Primary	754	30.8	4,328	23.0
Above primary	974	39.7	5,542	29.5
Women's employment status				
Working in past 12 months	603	24.6	12,110	64.5
Not working in past 12 months	1847	75.4	6,672	35.5
Spouse/partner's level of education				
No education	1364	55.7	8,003	42.6
Primary	233	9.5	3,317	17.7
Above primary	853	34.8	7,462	39.7
Marital duration				
Less than 10 years	1,287	52.4	9,742	50.7
10 years or more	1,168	47.6	9,472	49.3
Wealth Index (quintile)				
Low	819	33.4	6,252	33.3
Medium	818	33.4	6,256	33.3
High	813	33.2	6,274	33.4
Region				
Bangladesh: Chittagong (Nigeria: North Central)	358	14.6	3,262	17.4
Bangladesh: Barisal (Nigeria: Northeast)	482	19.7	3,950	21.0
Bangladesh: Dhaka (Nigeria: Northwest)	539	22.0	5,037	26.8
Bangladesh: Khulna (Nigeria: Southeast)	282	11.5	1,688	9.0
Bangladesh: Rajshahi (Nigeria: Southwest)	382	15.6	2,285	12.2
Bangladesh: Sylhet (Nigeria: South South)	407	16.6	2,560	13.6
Religion				
Christian	-	-	8,070	43.0
Islam	2247	91.7	10,345	55.0
Other	203 ^a	8.3	367	2.0

Note: ^a Other religion in Bangladesh includes Christian, Hindu and Buddhist

Table 2. Sample demographics and past-year IPV among married Nigerian and Bangladeshi mothers of children aged five years and younger

Demographics	Nigeria 2008		Bangladesh 2007	
	% past year IPV (15.4)	p-value	% past year IPV (25.6)	p-value
Gender of the child under 5		0.019		0.949
Female	14.8		25.5	
Male	16.0		25.7	
Age of child		0.043		0.326
Less than 12 months	14.0		23.2	
12-23 months	16.4		28.0	
24-35 months	15.6		24.7	
36-47 months	15.7		27.7	
48-59 months	15.5		24.4	
Mother's level of education		<0.001		<0.001
No education	10.9		28.8	
Primary	21.7		28.7	
Above primary	17.8		20.8	
Women's employment status		<0.001		0.773
Working in past 12 months	17.5		26.0	
Not working in past 12 months	11.6		25.5	
Spouse/partner's level of education		<0.001		<0.001
No education	11.3		29.2	
Primary	19.1		26.2	
Above primary	18.1		19.7	
Marital duration		<0.001		0.005
Less than ten years	15.5		28.3	
1-19 years	16.1		22.3	
More than 19 years	12.8		23.9	
Wealth Index (quintile)		<0.001		<0.001
Low	13.2		31.9	
Medium	17.1		27.4	
High	15.9		17.5	
Region		<0.001		<0.001
Bangladesh: Chittagong (Nigeria: North Central)	19.7		27.0	
Bangladesh: Barisal (Nigeria: Northeast)	7.1		33.8	
Bangladesh: Dhaka (Nigeria: Northwest)	13.6		23.4	
Bangladesh: Khulna (Nigeria: Southeast)	20.4		29.4	
Bangladesh: Rajshahi (Nigeria: Southwest)	28.8		24.6	
Bangladesh: Sylhet (Nigeria: South South)	13.8		17.9	
Religion		<0.001		0.003
Islam	9.0		26.4	
Non-Islam ¹	23.2		16.8	

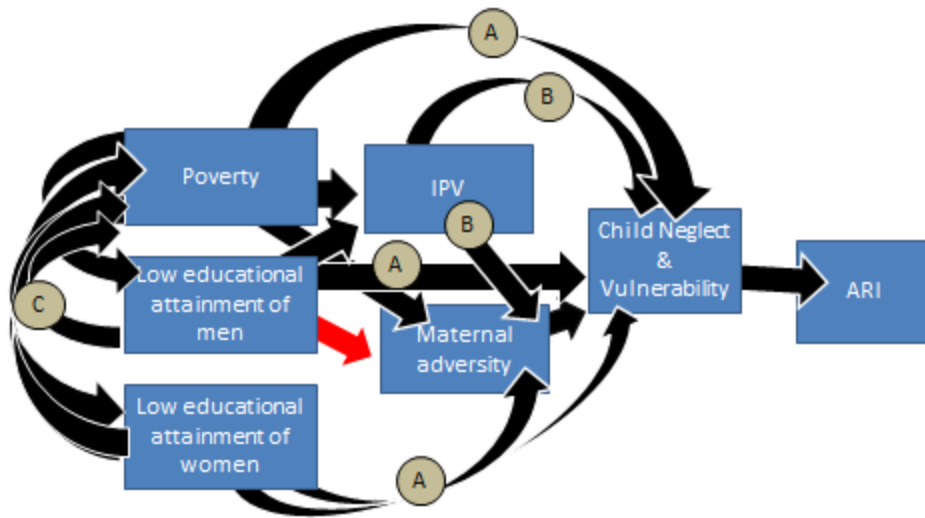
Sample size (currently married women)

Note: ¹ Hindus in Bangladesh; Catholic and other Christian in Nigeria

Table 3. Multilevel logistic regression odds ratios and 95% confidence intervals for the relationship between women's experience of spousal domestic violence and her under five children's incidence of ARI in past two-weeks, Bangladesh and Nigeria

Covariates	Bangladesh		Nigeria		
	OR	95% CI	OR	95% CI	
Bivariate model:					
Mother experienced spousal violence in past 12 months					
Yes	1.73***	1.31, 2.28	1.83***	1.49, 2.23	
No (RC)	1.00	-	1.00	-	
Random parameter	Intercept	Standard error	Intercept	Standard error	
	0.51*	0.131	0.99***	0.070	
Multivariate model:					
Mother experienced spousal violence in past 12 months					
Yes	1.61***	1.21, 2.14	1.78***	1.45, 2.19	
No (RC)	1.00	-	1.00	-	
Gender of the child under 5					
Female versus male	0.84	0.65, 1.09	0.97	0.82, 1.14	
Age of child					
Less than 12 months	2.47***	1.60, 3.82	1.41*	1.06, 1.87	
12-23 months	2.04**	1.31, 3.16	2.26***	1.72, 2.96	
24-35 months	1.82**	1.17, 2.83	1.32	0.98, 1.78	
36-47 months	1.15	0.72, 1.85	1.09	0.80, 1.48	
48-59 months (RC)	1.00	-	1.00	-	
Mother's level of education					
No education	1.21	0.80, 1.82	1.31	0.96, 1.80	
Primary	1.38	0.96, 1.98	1.13	0.86, 1.49	
Above primary (RC)	1.00	-	1.00	-	
Women's employment status					
Working in past 12 months	1.27	0.93, 1.74	1.10	0.91, 1.31	
Not working in past 12 months (RC)	1.00	-	1.00	-	
Spouse/partner's level of education					
No education	1.10	0.77, 1.57	0.69**	0.54, 0.89	
Primary	1.75*	1.11, 2.77	0.94	0.73, 1.22	
Above primary (RC)	1.00	-	1.00	-	
Marital duration					
Less than ten years	0.99	0.74, 1.31	1.10	0.92, 1.31	
More than ten years (RC)	1.00	-	1.00	-	
Wealth Index (quintile)					
Low	1.50*	1.01, 2.24	0.91	0.67, 1.24	
Medium	1.22	0.83, 1.77	1.08	0.84, 1.40	
High (RC)	1.00	-	1.00	-	
Religion					
Islam	1.30	0.77, 2.18	1.21	0.88, 1.66	
Non-Islam ¹ (RC)	1.00	-	1.00	-	
Nigerian Region	Bangladeshi Region:				
North Central	...Barisal	0.79	0.50, 1.26	2.25**	1.27, 3.96
Northwest	Chittagong	0.48***	0.30, 0.75	2.55***	2.04, 6.19
Northeast	Dhaka	0.97	0.64, 1.47	10.1***	5.84, 17.4
Southeast	Khulna	0.50*	0.29, 0.88	6.26***	3.59, 10.9
Southwest	Rajshahi	0.57*	0.35, 0.92	4.94***	2.87, 8.50
South-South (RC)	Sylhet (RC)	1.00	-	1.00	-
Random parameter:	Intercept	Standard error	Intercept	Standard error	
	0.31	0.194	0.81***	0.070	
Sample size (currently married women)	2,453		18,890		

Figure 1: A framework for the role of IPV as a determinant of ARI



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