Is Domestic Violence Related to Early Child Mortality? Evidence from North India

Introduction

Studies have showed that domestic violence does not stop during pregnancy(Norton et al. 1995), and may be even aggravated or initiated(Webster, Sweett and Stolz 1994). The adverse consequences of violence during pregnancy on birth outcomes have been well documented(Newberger et al. 1992; Petersen et al. 1997). These studies, however, predominately examined the effect of domestic violence on low birth weight(LBW) (Bullock and McFarlane 1989; Lipsky et al. 2003; McFarlane, Parker and Soeken 1996; Murphy et al. 2001; Valladares et al. 2002), preterm labor (Berenson et al. 1994; Cokkinides et al. 1999; Huth-Bocks, Levendosky and Bogat 2002; Lipsky et al. 2003; Rachana et al. 2002), and miscarriage(Huth-Bocks et al. 2002). Very limited information is available on the effect of violence on perinatal and neonatal deaths(Curry, Perrin and Wall 1998; Janssen et al. 2003; Lipsky et al. 2003), and its long-term effect on child survival.

Assessing the effect of violence during pregnancy on birth outcomes is not straightforward. A large number studies found no association of violence with LBW(Cokkinides et al. 1999; Covington et al. 2001; Webster, Chandler and Battistutta 1996), preterm labor and deliveries (Cokkinides et al. 1999; Janssen et al. 2003; Schei, Samuelsen and Bakketeig 1991) or, fetal deaths(Berenson et al. 1994). Several of these studies are based on small samples of women who seek treatment at clinic facilities, and are not generalizable to larger populations(Gazmararian et al. 1995). Campbell(1999) suggested that the observed relationship between violence and adverse birth outcome is

due to confounding effect of other risk factors. Empirical evidence suggests that low educated, high parity women of low socioeconomic status are more likely to experience domestic violence (Peedicayil et al. 2004), and these women are also more likely to have adverse birth outcomes and poor child survival. Selectivity bias thus may affect the spurious inference about the relationship between violence and birth outcomes.

This study examined the effects of domestic violence around pregnancy period on immediate birth outcomes, such as pregnancy loss, fetal deaths and neonatal mortality, as well as long-term effects on child survival in Uttar Pradesh, India, a setting characterized by very low women's autonomy and high levels of violence within marriage (Jejeebhoy 1998; Martin et al. 1999). The study is unique from several perspectives This study is based on representative samples of general population, rather than the samples from clinic facilities, the settings of the majority studies on the relationship between violence and pregnancy outcomes. The earlier studies gathered information on domestic violence from women's responses or from clinical examination records or police reports. This study used the responses on wife beating and abuses from the husbands, the principal aggressor. Considering potential selectivity bias, we have used statistical adjustments with propensity scores for balancing on the differentials in the known covariates for bias reduction (Rosenbaum and Rubin 1984).

Data and Method

This study is based on matched husband-wife data from two surveys in Uttar Pradesh, India: the Male Reproductive Health Survey (MRHS) and the 1995-96 PERFORM

System of Indicators Survey (PSIS) of women. The PSIS survey employed a stratified multistage cluster sample design for households and the details of the sampling strategies are described earlier(Stephenson and Tsui 2002, 2003). The sampling frame for the MRHS was all husbands in households identified in the first stage sample in five of the original twenty-eight sampled districts, representing all five regions of Uttar Pradesh. Eligibility criteria for men included being currently married, between 15-59 years of age, and currently residing with their wife. The enumeration led to the identification of 8296 eligible men through the household listing. Of these, 6,727 men (83.2%) were successfully contacted and interviewed during the period November, 1995 to April, 1996. Exclusion of an additional 121 married men who had not yet actually begun formal residing with their wife resulted in an overall available sample size of 6606 husbands. The questionnaire was administered by trained male interviewers, outside the home or in a private area, and was roughly 20 minutes in duration. The survey covered a wide range of issues pertaining to household socioeconomic and demographic status, contraceptive knowledge, use, and intentions, health expenditures, pre- and extra-marital sexual contact, and sexually transmitted infections. The survey also included a series of detailed questions on husbands' exposure to, and perpetration of physical violence and sexual violence, the basis for the present study. Husbands were asked whether they had ever physically hit, slapped, kicked, or tried to hurt their wife, the initial and most recent timing of such incidents, and the total number of times such violence had occurred. Husbands were also asked whether they ever had sex with their wife when she was unwilling, and if so, whether they ever physically forced their wife to have sexual relations, as well as the timing of the most recent occurrence of forced sex.

Women who had delivered during the last 3 years were matched with their husbands, producing a sample of 2201 couples for this study. Estimates of child mortality are based on detailed pregnancy history of women during the last three years in the survey PSIS. The outcome status of each known pregnancy was recorded as live birth, still birth and early fetal loss. Those who responded still births were further clarified by asking whether the child had shown any movement or breathing. Age of death was recorded in days for children who died in the first month of life, in months for dying in the first year, and in years for dying later. This information was used to calculate neonatal, postneonatal, infant($_0q_1$)and child ($_1q_3$) mortality rates.

Methods

We examined the differentials in child survival probabilities by domestic violence with Kaplan-Meier life-table method. Multiple logistic regression and Cox proportional hazards models were used for multivariate analysis. Because covariance analysis adjustments may be not adequate to remove selectivity bias, we have used propensity score regression adjustments (D'Agostino 1998) by balancing on the differentials in the known covariates between women who experienced violence and those who did not.

Results

Fig. 1 shows the Kaplan-Meier survival curves of infants age 0-11 months by mother's domestic violence experience. Overall, the survival probabilities of infants were significantly higher for women who did not experience domestic violence (Log-rank chi-square: 4.38, $p<0.05$).

Table 1 shows child mortality rates by violence status. The most pronounced differentials in mortality rates are in the early period of life. Table 2 shows the multivariate regression model results showing the association of domestic violence to early childhood mortality, adjusted for the controlling covariates. Women who experienced domestic violence that continued through pregnancy period or initiated during the index pregnancy were significantly more likely to have higher perinatal (OR: 2.02: 95% CI: 1.07-3.82) and neonatal mortality risks (OR: 2.05: CI: 1.07-3.94). The differentials, however, attenuated during the postneonatal period. After the first year of life, essentially there is no difference in the risk of child mortality by mother's violence status.

Mechanisms which would account for the adverse effect of violence on birth outcomes include direct effects resulting from blunt trauma during gestation, as well as indirect effects associated with delays or deferrals in seeking prenatal care, pre-term delivery, and trauma related birth complications. We have also examined the association of domestic violence and maternal health care and pregnancy complication antepartum bleeding. Table 3 shows the logistic regression results. Women who experienced domestic violence were less likely to receive antenatal care, TT immunization and post-partum care. There was no difference in delivery care at health facilities by violence status. A larger proportion of women who experienced domestic violence reported bleeding during pregnancy ($p<0.10$).

To address the concern of selectivity bias, we have repeated the analyses with propensity score regression adjustments.(D'Agostino 1998) The analysis shows that propensity score adjustment had little effect on the inference about the relationship between violence and early child mortality. However, the propensity score adjustment shows that there is no difference in antenatal care and TT immunization by violence status (odds-ratio [OR] for antenatal care: 1.004; OR for TT: 1.014), in contrast to the standard analysis without propensity score adjustment which shows that there is an association. The difference in post-partum care by violence status, however, remained statistically significant (OR: 0.64; 95% CI: 0.41-0.999).

Conclusion

Studies suggested that a large proportion of women, as high as of 20%, are exposed to violence during pregnancy and are at an increased risk of adverse birth outcomes. Very few studies have examined the effect of intimate partner violence on infant and child mortality as long-term consequences on pregnancy outcomes. Using a case-reference method, a study in Nicaragua found that the risk of infant (0-11) and child (0-59) mortality was 7.8 and 6.3 time higher when mother experienced both physical and sexual partner violence (Asling-Monemi et al. 2003). A study in rural India reported that women who had experienced violence by their husband experienced more pregnancy loss and infant deaths(Jejeebhoy 1998). These studies, however, were based on life-time (ever) experience of violence.

This study examined the association of violence and early child mortality using the independent report of violence from the husband and linking with the wife's birth history. This study strongly suggests that violence is an important predictor of early child mortality.

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Table 1: Childhood mortality rates by mother's exposure to domestic violence, Uttar Pradesh, India

	Not Exposed to Violence			Exposed to Violence		
	Mortality Rate/1000 Live Births	**95% Confidence Interval**	**N**	**Mortalty Rate/1000 Live Births**	**95% Confidence Interval**	**N**
Perinatal[1]	21.4	15.7-29.2	1818	39.4	15.7-63.5	392
Early neon	15.3	10.5-22.1	1797	23.9	12.7-44.6	386
Neonatal	20.4	14.8-28.1	1997	38.9	23.8-63.3	386
Postneonatal	21.1	15.2-29.3	1758	33.6	19.2-58.5	372
Infant ($_0q_1$)	42.6	34.1-53.2	1797	70.4	49.1-100.5	386
Child ($_1q_3$)	19.4	12.5-30.2	1327	12.6	3.2-49.4	277
Childhood ($_0q_3$)	62.0	50.7-75.6	1797	76.8	53.0-110.6	386

[1]per 1000 births (include stillbirths)

Table 2: Logistic Regression and Hazards Model Results Showing the Association of Domestic Violence to Early Child Mortality, Adjusted for Controlling Covariates

	Perinatal mortality (N=2200)		Neonatal mortality (N=2162)		Postneonatal mortality (N=2130)		Infant mortality ($_0q_1$) (N=2162)		Child mortality ($_1q_3$) (N=1584)	
	OR	95% CI	OR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Experienced Violence	2.02**	(1.07-3.82)	2.05**	(1.07-3.94)	1.61	(0.82-3.16)	1.79**	(1.13-2.84)	0.43	(0.10-1.92)
Age	0.74*	(0.55-1.01)	0.71**	(0.52-0.96)	0.60***	(0.44-0.81)	0.66***	(0.53-0.81)	0.81	(0.49-1.34)
Age-squared	1.00*	(1.00-1.01)	1.00*	(1.00-1.01)	1.01**	(1.00-1.01)	1.01**	(1.00-1.01)	1.00	(0.99-1.01)
Parity (>3)	1.57	(0.70-3.52)	1.75	(0.75-4.09)	2.86**	(1.20-6.80)	2.19**	(1.21-3.99)	0.96	(0.26-3.61)
Education										
None	1.0		1.0		1.0		1.0		1.0	
Primary	0.43	(0.12-1.48)	0.46	(0.13-1.57)	1.65	(0.69-3.94)	0.97	(0.48-1.94)	1.06	(0.22-5.08)
Secondary+	0.29**	(0.10-0.85)	0.45	(0.16-1.26)	0.46	(0.13-1.68)	0.49	(0.22-1.06)	1.46	(0.36-5.93)
Husband's education										
None	1.0		1.0		1.0		1.0		1.0	
Primary	1.00	(0.47-2.13)	1.15	(0.52-2.57)	1.99*	(0.92-4.30)	1.51*	(0.87-2.60)	0.88	(0.26-2.93)
Secondary+	0.56	(0.28-1.15)	0.87	(0.43-1.76)	1.22	(0.58-2.57)	1.02	(0.62-1.69)	0.56	(0.19-1.69)
Caste										
Scheduled	1.0		1.0		1.0		1.0		1.0	
Backward	0.68	(0.30-1.55)	0.53	(0.23-1.25)	0.98	(0.46-2.09)	0.77	(0.44-1.33)	0.77	(0.26-2.24)
General	1.51	(0.69-3.31)	1.73	(0.82-3.65)	1.10	(0.49-2.45)	1.36	(0.80-2.33)	0.65	(0.20-2.13)
Others Relgion	1.05	(0.44-2.48)	0.89	(0.35-2.24)	0.82	(0.32-2.12)	0.86	(0.45-1.66)	0.40	(0.08-2.00)
HH with electricity	1.11	(0.51-2.41)	1.28	(0.60-2.75)	1.44	(0.68-3.02)	1.36	(0.80-2.31)	0.39	(0.10-1.61)
Undesired child	0.35	(0.08-1.52)	0.40	(0.09-1.75)	0.58	(0.17-1.95)	0.50	(0.20-1.27)	-	
Asset index	0.97	(0.77-1.22)	0.84	(0.63-1.10)	0.77*	(0.57-1.02)	0.80**	(0.66-0.98)	0.72	(0.45-1.14)
Borrow	1.14	(0.63-2.03)	1.20	(0.67-2.15)	0.80	(0.43-1.49)	0.97	(0.64-1.47)	0.65	(0.25-1.72)
Antenatal care	1.21	(0.49-2.98)	1.63	(0.64-4.15)	0.89	(0.39-2.07)	1.15	(0.62-2.13)	2.85	(0.63-12.85)
Delivery care	3.21***	(1.39-7.43)	1.68	(0.64-4.39)	0.21	(0.03-1.67)	0.82	(0.36-1.85)	2.90	(0.78-10.81)
TT immunized	0.83	(0.35-1.98)	0.53	(0.21-1.33)	1.09	(0.49-2.41)	0.78	(0.43-1.42)	0.72	(0.16-3.23)
Post-partum care		-		-	1.92	(0.78-4.74)	1.85**	(1.03-3.34)	1.05	(0.28-3.95)

***p<0.01;**p<0.05; *p<0.10

Table 3: Logistic Regression Results Showing the Association of Domestic Violence to Maternal Care Utilization and Pregnancy Complication, Adjusted for Controlling Covariates

	Antenatal Care			TT Immunized			Delivery Care at Health Facilities			Post-partum Care			Pregnancy Complication: Bleeding		
	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Experienced Violence	0.63***	0.48	0.82	0.80*	0.63	1.03	0.83	0.52	1.31	0.62**	0.40	0.97	1.35*	0.97	1.89
Age	1.00	0.89	1.12	1.02	0.91	1.15	1.12	0.91	1.38	1.16	0.95	1.42	1.20*	1.00	1.45
Age-squared	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00**	0.99	1.00
Parity (>3)	0.96	0.72	1.27	1.13	0.86	1.48	0.53***	0.33	0.86	1.09	0.72	1.65	0.99	0.68	1.45
Education															
None	1.0			1.0			1.0			1.0			1.0		
Primary	1.60***	1.15	2.23	1.92***	1.36	2.70	1.53*	0.93	2.53	1.15	0.71	1.86	0.92	0.57	1.48
Secondary+	2.71***	2.02	3.64	2.69***	1.98	3.66	4.03***	2.73	5.94	1.99***	1.36	2.91	0.55***	0.35	0.86
Husband's education															
None	1.0			1.0			1.0			1.0			1.0		
Primary	1.66***	1.23	2.25	1.54***	1.15	2.05	1.39	0.73	2.66	1.13	0.67	1.92	0.73	0.47	1.14
Secondary+	1.38**	1.07	1.78	1.20	0.95	1.53	1.88**	1.13	3.12	1.49*	0.98	2.25	0.99	0.71	1.40
Caste															
Scheduled	1.0			1.0			1.0			1.0			1.0		
Backward	0.74**	0.56	0.98	0.83	0.63	1.08	1.80**	1.01	3.20	0.52***	0.33	0.83	0.63**	0.42	0.93
General	1.08	0.81	1.42	1.40**	1.07	1.85	1.89***	1.12	3.20	1.05	0.71	1.55	1.06	0.73	1.56
Others Relgion	0.99	0.72	1.36	1.39**	1.02	1.90	2.40***	1.33	4.31	0.76	0.47	1.22	1.03	0.68	1.58
HH with electricity	2.02***	1.57	2.60	2.40***	1.87	3.08	2.78	1.76	4.38	1.50**	1.01	2.23	0.89	0.61	1.29
Undesired child	0.87	0.61	1.25	0.77	0.54	1.08	0.80	0.45	1.41	1.17	0.72	1.93	0.91	0.55	1.51
Asset index	1.32***	1.21	1.45	1.21***	1.10	1.33	1.51***	1.32	1.74	1.22***	1.07	1.39	1.16**	1.01	1.32
Borrow	1.18	0.96	1.46	1.29**	1.05	1.58	0.99	0.70	1.41	1.23	0.90	1.67	1.06	0.79	1.41

***p<0.01;**p<0.05; *p<0.10

Fig. 1: Survival probabilities of children by mothers' violence experience