Physical violence between intimate partners during pregnancy and postpartum: a prediction model for use in primary health care facilities

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Summary

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This article offers a simple predictive model of physical intimate partner violence (PIPV) to be used by primary health care (PHC) professionals. The sample comprised 811 mothers of children <5 months old attending PHC facilities in Rio de Janeiro, Brazil. A multinomial logit model was used. Measured by the Revised Conflict Tactics Scales, PIPV was classified in three levels (absence, at least one episode during pregnancy or postpartum, and presence in both periods). Socio-economic, demographic and life style variables were considered as potential predictors. Maternal age <20 years, an education of <8 years of schooling, raising >2 children under 5, tobacco smoking, alcohol misuse and illicit drug use by the mother and/or partner, and perception of baby's ill-health were identified as predictors of PIPV. The model-projected prevalence of PIPV for pregnancy and/or postpartum was just 10.1% in the absence of these characteristics, whereas this increased to 96.4% when all the seven characteristics were present. Child, maternal and family characteristics greatly increase the likelihood of PIPV and could be used together as screening indicators.

Keywords: *domestic violence, maternal age, maternal education, smoking, alcohol abuse, drug abuse.*

Introduction

Experts on physical intimate partner violence (PIPV) from around the world agree that the prevalence of PIPV is much higher than is generally believed by the public.[1] A similar pattern is present in Brazil. According to a nationwide survey conducted in 2002 and 2003, the prevalence of 'minor' and severe physical assaults between intimate partners, with either the woman or her partner as victim, was 21.5% and 12.9% respectively in the 12 months preceding the interview.[2]

The physical, emotional and social consequences make PIPV ever more relevant. They involve different dimensions, not only reflecting upon the physical spheres of the victims and perpetrators, but also in regard to emotional and social relationships at the family level and beyond.[1,3–8] Multiple abusive events over time and different types of violence appear to have lasting and cumulative effects, which remain even after their cessation.[9] The consequences may be devastating when violence occurs during pregnancy or the first postpartum months, entailing life-threatening situations for the mother and baby.[6–8,10–14]

The key role which could be played by primary health care (PHC) facilities in dealing with PIPV has recently been acknowledged. These services may serve

as warning and sentinel sites for detecting women experiencing intimate partner violence (IPV) as PHC services are often the main gateway to the health system.[15,16] The possibility of early detection of PIPV becomes even greater in certain periods of life where health care is expected to be provided on a regular basis, as is the case in pregnancy and in the first months of life of the child.[17–20] Yet, despite some efforts in raising awareness of health professionals to the problem, most episodes of IPV still go unnoticed by the health services. A hectic routine, lack of time and resources, restricted privacy, as well as insufficient training of professionals, may result in the persistent under-detection of cases, which in turn ultimately hinders any effective action to break the cycle of violence.[21–23]

Given the high prevalence and deleterious consequences of PIPV during gestation and the postpartum period for mothers and their families, it is important to promote effective and amicable approaches that may help to address the problem. Educating active primary care professionals about the different patterns or manifestations of violence found in domestic environments may be one of those measures. This study aims to provide health professionals who work directly with the public with the tools to anticipate such events. To address this aim, this paper presents a simplified model for predicting prevalence of PIPV occurring at the couple level which could be used as a first step towards its detection in primary care services. To this end, this model tested and used several socio-economic, demographic and life style characteristics related to women and their families, which were chosen not only for their solid theoretical background as risk factors and/or markers/predictors,[1,4,11,17,24–26] but also for their ease of application and use in PHC settings.

Methods

Setting and participants

The sample comprised randomly selected mothers of children under 5 months of age who were waiting in five large public PHC facilities of Rio de Janeiro, Brazil. Data collection took place from January to July 2007. Women were considered ineligible if they had experienced <1 month of intimate relationship with their partner during pregnancy or the postpartum period. In view of our other research purposes (e.g. to study the

association of PIPV and early weaning), we excluded women who were HIV-positive, those undergoing cancer treatment and/or using medication that contraindicated breast feeding, as well as those who gave birth to twins, and children with metabolic problems or anatomic malformations preventing breast feeding.

Out of the 835 eligible women invited to take part in the study, 811 (97.1%) were interviewed by female postgraduate students, using a structured questionnaire in a private location with only the interviewee present. The option for closed-form face-to-face interviews rather than self-response schedules was due to the relatively low level of literacy of the study population. Interviews lasted approximately 30 min.

Variables and measurement tools

The present paper focuses on PIPV occurring at the couple level and was evaluated through the *Revised Conflict Tactics Scale* (CTS2),[27] which has been formally adapted for use in Brazil.[28–30] For descriptive purposes, a positive PIPV comprised the reporting of at least one item on the 12-item physical assault subscale perpetrated by the respondent herself and/or her partner during the months of pregnancy and postpartum. In the main analysis, the variable comprised three levels, namely, PIPV absent, an isolated occurrence of one or more items in one of the two periods considered (pregnancy or postpartum), or the occurrence of at least one positive PIPV item in both periods.

A range of variables commonly used in the fields of maternal and child health and family violence were tested in constructing scenarios for predicting the three categories of PIPV outlined above. The following groups and descriptors were scrutinised: (a) characteristics of the children – age, sex, gestational age and birthweight, maternal perception of infant health status; (b) characteristics of women – age, education, self-reported colour/race, occupation and marital status; (c) reproductive history – number of children under 5 years old, parity, number of living children, number of prenatal consultations, intention to become pregnant; (d) life style – tobacco, alcohol and illicit drug use/abuse by the couple; and (e) socio-economic status of the family – amount of household goods, level of education of the household's main income earner, possession of selected appliances and durable assets, and whether there was a domestic servant.

Great care was taken in characterising scenarios according to a gradient from 'less favourable' to 'more

favourable' conditions for the occurrence of PIPV (profiles designated in the results with the letter A for the less favourable through to J for the more favourable condition for PIPV).

Most variables used in the Results section are self-evident, but a few require further explanation. Maternal perception of the child's health was evaluated using an adaptation of the World Health Organization question about adults' self-perception of health.[31] Maternal schooling was classified in three groups according to the Brazilian system: 1–7 years corresponds to incomplete basic education; 8–11 years corresponds to completed basic education, but not having completed high school; and 12 years and over corresponds to completed middle-level education or higher. Current alcohol misuse was evaluated by means of two screening tools. The TWEAK (*Tolerance; Worried; Eye-opener; Amnesia; K/Cut-down*)[32] assessed the habit in the study participants (women/mothers), whereas the CAGE (*Cut-down; Annoyed; Guilty; Eye-opener*)[33] answered by the respondents but reported their respective partners' alcohol intake. Both instruments have been adapted for use in Brazil.[34,35] A Portuguese (Brazilian) version of the Non-Student Drugs Use Questionnaire (NSDUQ) was used to identify present illicit drug use by the participants and their partners.[36] The use of one or more illicit substances among those listed (solvents, marijuana, cocaine or 'others') was defined as a positive drug use situation. As with alcohol misuse, women answered for themselves and for their partners by proxy. The Brazilian Criterion of Economic Classification (BCEC) was used for economic stratification of the families. The BCEC encompasses information on the level of education of the household's main income earner, on the possession of selected appliances and durable assets, and whether a domestic servant was employed. The scale classifies families into five decreasing levels in terms of purchasing power (A to E).[37]

Data analysis

Probabilities of PIPV were obtained using a special STATA® routine, *prvalue*.[38] A multinomial logit model was used as the variable (PIPV) has three non-ordered levels as outlined in the first paragraph of the previous subsection. According to this model, estimates of projected probabilities for each category of the variable are a function of the level-specific regression coefficients pertaining to the descriptors ('independent' covariates)

Table 1. Sociodemographic, reproductive and life style characteristics of the study sample

Characteristics	n (%)
Sex of the baby	
Male	436 (53.7)
Female	375 (46.2)
Age of the baby (days)	
0–30	264 (32.6)
31–90	333 (41.1)
91–150	214 (26.4)
Perception of the child's health[a]	
Excellent	407 (50.3)
Very good	156 (19.3)
Good	215 (26.5)
Fair or bad	31 (3.8)
Maternal age (years)	
<20	184 (22.7)
20–35	554 (68.3)
>35	73 (9.0)
Race/colour (self-rated by mother)	
Brown/*mulatto*	418 (51.5)
White	229 (28.2)
Black	154 (19.0)
Other (Asian/Indian)	10 (1.2)
Maternal schooling (years)	
1–7	336 (41.4)
8–11	247 (30.5)
≥12	228 (28.1)
Marital status	
With the same partner during pregnancy and postpartum	702 (86.6)
With partner now, not during pregnancy	7 (0.86)
Without partner	102 (12.6)
Number of consultations during prenatal care	
0–2	20 (2.6)
3–5	112 (14.5)
≥6	642 (83.0)
Intention to get pregnant	
Yes, regarding latest pregnancy	251 (31.0)
Yes, but not regarding latest pregnancy	227 (28.0)
No	333 (41.1)
Number of offspring under 5 years of age	
One	602 (74.2)
Two	173 (21.3)
Three or more	36 (4.4)
Tobacco usage during pregnancy or postpartum by mother	
No	651 (80.3)
Yes	160 (19.7)
Current alcohol misuse	
Neither mother nor partner	422 (52.0)
Either mother or partner	319 (39.3)
Both	70 (8.6)
Current illicit drug use	
Neither mother nor partner	657 (81.0)
Either mother or partner	127 (15.7)
Both	27 (3.3)
Socio-economic class	
A and B (highest)	96 (11.8)
C	370 (45.6)
D and E (lowest)	345 (42.5)

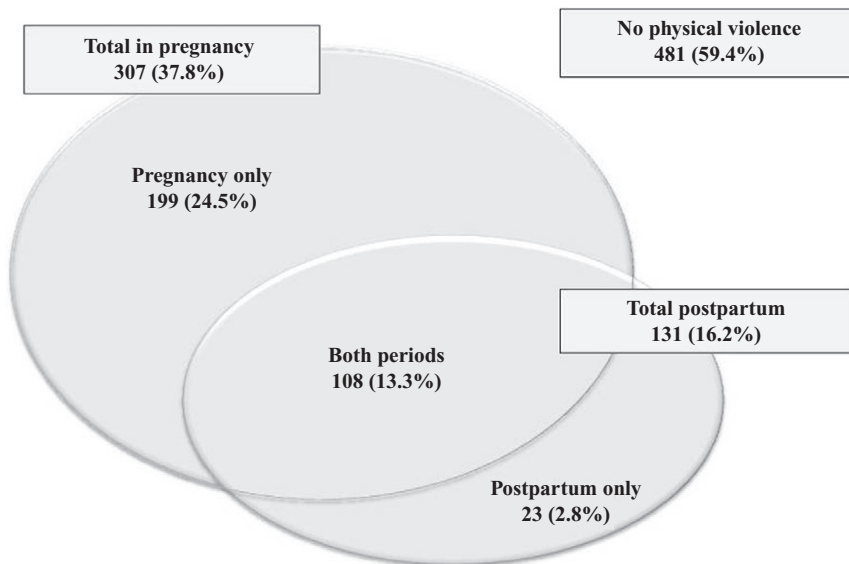[a]*n* = 810; one woman was not able/declined to evaluate the baby.

Figure 1. Prevalence of physical intimate partner violence during gestation and postpartum among attendees of primary health care facilities of Rio de Janeiro, Brazil.

comprising the scenarios and their respective values regarding individuals in the sample. Confidence intervals (95%) were obtained by non-parametric bootstrap[39] implemented in an *ad-hoc* routine developed in STATA[40] and based on the command *prvalue*.

Univariate analyses were first carried out to identify a parsimonious set of descriptors. Variables showing statistical significance at the 5% level were subsequently considered in the multivariate procedure. However, some variables lost significance when added to the more complex models, possibly because of information redundancy *vis-à-vis* one or more variables already contemplated. Competing variables were then tested sequentially in order to arrive at the best discriminant model, wherein all variables were significant at $P < 0.05$. The variable *child age* was forced into the model in order for all predictions/projections to be set at the mean age of the studied children (59 days; SD = 41.7).

In order to evaluate performance, the fit of the model was scrutinised in regard to the observed data set (*development model*), and a subset generated from 200 (B) bootstrap samples (*internal validation*). To this end, the prediction model identified from the data was fitted to the original sample and each of B samples.[41] Overall model fit was carried out through the Brier Score, which assesses the accuracy of the predictions. The Brier Score is given by the mean squared differences of the predicted and the observed outcomes of all subjects. The score may range from 0 (concordant prediction) to 1 (discordant prediction).

The agreement between observed and predicted probabilities was appraised by the Calibration Slope (CS) and the Hosmer–Lemeshow (HL) goodness of fit test. The former concerns the regression slope of the linear predictor, whereas the latter compares observed and predicted outcomes in grouped subjects. A model is considered calibrated as CS tends to 1 and when the *P*-value of the HL test is above 0.05.[41]

Ethical considerations

The study was approved by the Research Ethics Committee of the Rio de Janeiro Municipal Health Department in conformity with the Declaration of Helsinki. All participants gave their written informed consent after anonymity and confidentiality of information were guaranteed. All women also received information about public facilities that help families affected by violence in Rio de Janeiro. They were encouraged to contact them if they felt it was necessary.

Results

As shown in Table 1, approximately 40% of the children were between 30 and 90 days of life. About half the mothers classified their children's health as excellent. The average maternal age was 25.3 (SD = 6.6) years, but approximately one in four of the women were teenagers. Around half considered themselves as brown/*mulatto* and above 70% had less than 11

years of formal schooling. The majority of respondents reported having had the same partner during pregnancy and postpartum. Overall, this is a low-to-medium income population, as 88% of households qualified as belonging to the C, D or E socio-economic strata.

According to Figure 1, the prevalence of PIPV during pregnancy was 37.8%, while 16.2% occurred in the first five postpartum months. Among women who reported PIPV during pregnancy ($n = 307$), 108 (35.2%) also reported violence during the postpartum period. Yet, among those who did not report any physical assault during pregnancy ($n = 504$), only 23 (4.6%) experienced the situation after birth. Thus, the prevalence of PIPV in the postpartum period is approximately eight times higher in families that had also experienced violence during pregnancy as compared with those who had not ($P < 0.001$).

As some variables lost significance in the multivariate analysis, the final model comprised only seven variables, namely: maternal perception of the baby's health, maternal age, maternal education, number of children under 5 years, tobacco use by mothers, alcohol misuse, and any drug use by the couple. The adjustment indices of the final model are shown in Table 2.

Table 3 presents the profile of PIPV according to different scenarios often found among primary care service users. As scenarios were changed to incorporate more of the characteristics commonly associated with PIPV, so did the estimated prevalences. Comparison of the two extremes – scenarios A and J – illustrates these changes. In scenario A ('lowest risk'), the prevalence of PIPV occurring either during pregnancy or the postpartum period is 7.5%, and drops to 2.6% for PIPV occurring in both periods. At the other extreme (scenario J), these figures increase markedly, reaching 59.4% and 37.0%, respectively.

Table 2. Adjustment indices of the fitted model for physical partner violence during pregnancy and postpartum among attendees of five primary health care facilities of Rio de Janeiro, Brazil

Indices	Development model	Internal validation	Reference values/trends
Brier Score	0.162	0.178	→0
Calibration Slope	0.71	0.635	→1
Hosmer–Lemeshow	0.055	0.067	$P > 0.05$

Discussion

The study sample predominantly comprised mothers of children over 30 days of life and in good health. Most of the mothers self-rated themselves as brown/*mullatto*, had little schooling, had a steady partner, regularly attended for prenatal care and belonged to middle-income families or lower. This profile clearly is not unlike that of many attending public health (PH) services of Rio de Janeiro, and perhaps many other urban centres in Latin America.[42]

On average, the prevalence of PIPV was high both during pregnancy and after childbirth, which reinforces the relevance of PIPV as a PH issue that needs to be addressed in primary care facilities. The study places the prevalence of PIPV during pregnancy above the upper international limit, which ranges from 0.9% to 31.7%.[1,8,20,26] The same applies when comparing the results with other Brazilian studies where prevalences of 2.1%,[43] 7.4%[44] and 33.8%[17] are reported.

The PIPV estimate after birth is at an intermediate level when compared with the international literature. The studies by Martin *et al.*[45] carried out in the US (women at an average of 3.6 months postpartum) and Saurel-Cubizolles *et al.*[46] in France (covering 12 months following delivery) found prevalences of 3.2% and 4.1%, respectively. Both figures are well below those found here in Rio de Janeiro. However, Harrykissoon *et al.*[25] reported 21% of mothers in the USA experiencing PIPV in the first 3 months postpartum and Hedin and Janson[19] in Sweden found that about one quarter of women studied for up to 8 weeks postpartum had been victims.

The majority of women who reported PIPV after childbirth had also reported having suffered violence during pregnancy, thus indicating that violence in the postpartum period is likely to be a continuance of violence occurring during pregnancy. This finding corroborates other authors who point to PIPV in pregnancy as a powerful marker for subsequent episodes of violence after childbirth.[26] Thus, it is worth prioritising screening those who had already reported PIPV during pregnancy for violence in the postnatal period.

Given the acceptable fit of the final statistical model, the present results show that the prevalence of PIPV varies according to different scenarios. They indicate that the variables considered may be appropriate predictors of abuse, and able to distinguish profiles of

Table 3. Projected percentages [95% confidence interval] of physical inter-partner violence (PIPV) during gestation and postpartum according to different scenarios

Characteristics	Scenarios									
	A	B	C	D	E	F	G	H	I	J
Perception of the child's health	Excellent	Less than excellent	↑	↑	↑	↑	↑	↑	↑	↑
Maternal age	Adult (≥20 years)	↑	Adolescent (<20 years)	↑	↑	↑	↑	↑	↑	↑
Maternal schooling (level)	Medium complete plus	↑	↑	Medium incomplete	↑	↑	↑	↑	↑	↑
Number of offspring under 5 years of age	one	↑	↑	↑	Two or more	↑	↑	↑	↑	↑
Tobacco use (mother)	Did not smoke in the last 12 months	↑	↑	↑	↑	Smoked in the last 12 months	↑	↑	↑	↑
Alcohol misuse (mother and/or partner)	Neither	↑	↑	↑	↑	↑	Mother or partner	Both	↑	↑
Illicit drug use (mother and partner)	Neither	↑	↑	↑	↑	↑	↑	↑	Mother or partner	Both
No PIPV[a]	89.9 [85.9, 93.9]	85.7 [80.0, 91.3]	79.7 [70.3, 89.0]	65.5 [55.1, 75.8]	57.3 [47.5, 67.1]	46.9 [34.1, 59.8]	30.8 [20.6, 41.0]	18.3 [9.9, 26.7]	8.4 [3.9, 12.9]	3.6 [0.86, 6.27]
PIPV during pregnancy or postpartum[a]	7.5 [4.1, 10.9]	10.6 [5.8, 15.5]	15.9 [7.6, 24.3]	23.0 [14.3, 31.8]	31.9 [22.8, 41.0]	39.1 [26.5, 51.6]	49.5 [37.6, 61.5]	56.7 [42.6, 70.9]	60.2 [46.1, 74.2]	59.4 [40.9, 77.9]
PIPV during pregnancy and postpartum[a]	2.6 [0.78, 4.5]	3.7 [1.0, 6.3]	4.4 [0.67, 8.1]	11.5 [5.0, 18.0]	10.8 [5.4, 16.2]	14.0 [5.8, 22.2]	19.7 [10.1, 29.2]	25.0 [11.8, 38.2]	31.5 [17.5, 45.5]	37.0 [18.4, 55.6]

[a]Percentages (%). In brackets: 95% confidence intervals calculated via Delta method.

Arrows indicate that there has been no variation of the characteristic between this and the previous scenario.

$n = 810$ women with complete information in all variables used in the analysis.

women at increased susceptibility to physical violence in pregnancy and the postpartum. Similar to a previous study estimating the prevalence of different forms of IPV (psychological and physical aggression during pregnancy) demographic and maternal psychosocial characteristics,[22] the consumption of illicit drugs and suspicion of alcohol misuse by the couple had the greatest impact on the prediction of PIPV. Although the consumption of alcohol and drugs is a sensitive subject and difficult to approach because of the high social disapproval of their use in general and during pregnancy in particular, efforts should be made to include these topics during prenatal and postpartum childcare consultations. The use of simplified structured questionnaires such as CAGE,[34,47] TWEAK[32,35] and NSDUQ[36,48] in the screening for suspicious situations may be feasible.

Similarly, the variation by maternal age suggests that special attention should be paid to pregnant and postpartum adolescents. The fact that the probability of PIPV is higher among families with more children under 5 years also reinforces the need of a comprehensive family health care approach that acknowledges and alerts direct care providers – including paediatricians – to the possibility of co-occurrence of IPV and violence against children, as highlighted in several studies worldwide,[1,49,50] including Brazil (Rio de Janeiro).[2] The mother's perception of her child's health, her educational level and smoking habits also seem to be important predictors of PIPV; inquiring about these factors may easily be built into routine screening.

In developing predictive models, pragmatic alternatives warrant consideration. In the present study, this occurred only once. Information about the 'number of live children' could have been used in practice instead of 'number of children under 5 years old', but was eventually dropped from the final model although the former variable was almost as predictive as the latter. Yet, statistical considerations were less imperative; the choice for including 'number of children under 5 years old' was ultimately based on practical motives, given that it is less sensitive and easier to acknowledge by respondents.

Generalisations must consider some methodological features that may have influenced the results. That the field team was comprised only of extensively trained interviewers who were sensitive to the topic is one positive aspect. The option to conduct individualised interviews in private and welcoming locations may

have also helped in obtaining information that would otherwise have been withheld. Specifically in relation to violence, another favourable feature was the use of instruments that had already been adapted for use in our socio-cultural *milieu*.

A downside, though, was that some characteristics of potential interest in this area were not collected. In line with the proposition that information should be easy to gather in busy PH settings, it would be worth further exploring characteristics such as the age differential between a pregnant woman and her partner, the gestational age at the beginning of prenatal care and the couple's region or country of origin. Furthermore, it would be of interest to explore prediction models for other forms of violence such as psychological and sexual abuse. In addition, research to evaluate the performance of our predictive model in other population domains would be helpful, as it would enable an assessment of its external validity.[41]

The findings of this study confirm that PIPV is a frequent event during pregnancy and early in the child's life, and deserves immediate attention, especially among professionals who are at the forefront of delivering care during these important cycles of life. Suspecting and screening for PIPV on every opportunity may increase early detection of couples who are experiencing intimate violence, and allow providing an inviting, integrated and inter-sectoral approach to assist in breaking the process. Given that tracing the problem in all of the women seen in PH services may be an overwhelming task, especially in services with limited resources, efforts should be directed to those women who possess characteristics such as those described in our model. Knowing the probability of occurrence of PIPV according to different subgroups may help to raise awareness and thereby bring about a more proactive course of action. Once PIPV is suspected, the health professional may launch a more thorough investigation, either directly by using a more specific diagnostic tool such as the CTS2,[27] or by calling on specialised services to carry out the process.

References

1 Krug EG, Dahlberg LL, Mercy JA, Zwi AB, Lozano R. *World Report on Violence and Health*. Geneva: World Health Organization, 2002.
2 Reichenheim ME, Moraes CL, Szklo A, Hasselmann MH, Souza ER, Lozana JA, *et al*. The magnitude of intimate

partner violence in Brazil: portraits from 15 capital cities and the Federal District. *Cadernos de Saúde Pública* 2006; **22**:109–121.

3 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**:1165–1172.

4 Garcia-Moreno C, Jansen HA, Ellsberg M, Heise L, Watts CH. Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. *Lancet* 2006; **368**:1260–1269.

5 O'Donnell L, Stueve A, Myint UA. Parenting and violence toward self, partners, and others among inner-city young adults. *American Journal of Public Health* 2009; **99**:2255–2260.

6 Yalçın SS, Örün E, Mutlu B, Madendağ Y, Sinici İ, Dursun A, *et al*. Why are they having infant colic? A nested case–control study. *Paediatric and Perinatal Epidemiology* 2010; **24**:584–596.

7 Hasselmann MH, Reichenheim ME. Parental violence and the occurrence of severe and acute malnutrition in childhood. *Paediatric and Perinatal Epidemiology* 2006; **20**:299–311.

8 Coker AL, Sanderson M, Dong B. Partner violence during pregnancy and risk of adverse pregnancy outcomes. *Paediatric and Perinatal Epidemiology* 2004; **18**:260–269.

9 Schraiber LB, D'Oliveira AF, Franca-Junior I, Diniz S, Portella AP, Ludermir AB, *et al*. [Prevalence of intimate partner violence against women in regions of Brazil]. *Revista de Saúde Pública* 2007; **41**:797–807.

10 Silverman JG, Decker MR, McCauley HL, Gupta J, Miller E, Raj A, *et al*. Male perpetration of intimate partner violence and involvement in abortions and abortion-related conflict. *American Journal of Public Health* 2010; **100**:1415–1417.

11 Silverman JG, Gupta J, Decker MR, Kapur N, Raj A. Intimate partner violence and unwanted pregnancy, miscarriage, induced abortion, and stillbirth among a national sample of Bangladeshi women. *BJOG* 2007; **114**:1246–1252.

12 O'Reilly R. Domestic violence against women in their childbearing years: a review of the literature. *Contemporary Nurse* 2007; **25**:13–21.

13 Lau Y, Chan KS. Influence of intimate partner violence during pregnancy and early postpartum depressive symptoms on breastfeeding among Chinese women in Hong Kong. *Journal of Midwifery & Women's Health* 2007; **52**:e15–e20.

14 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**:344–353.

15 Zolotor AJ, Denham AC, Weil A. Intimate partner violence. *Primary Care* 2009; **36**:167–179, x.

16 Rutherford A, Zwi AB, Grove NJ, Butchart A. Violence: a priority for public health? (part 2). *Journal of Epidemiology and Community Health* 2007; **61**:764–770.

17 Moraes CL, Reichenheim ME. Domestic violence during pregnancy in Rio de Janeiro, Brazil. *International Journal of Gynaecology and Obstetrics* 2002; **79**:269–277.

18 Shoffner DH. We don't like to think about it: intimate partner violence during pregnancy and postpartum. *Journal of Perinatal & Neonatal Nursing* 2008; **22**:39–48.

19 Hedin LWJ, Olof P. Domestic violence during pregnancy: the prevalence of physical injuries, substance use, abortions and miscarriages. *Acta Obstetricia et Gynecologica Scandinavica* 2000; **79**:625–630.

20 Sharps PW, Laughon K, Giangrande SK. Intimate partner violence and the childbearing year: maternal and infant health consequences. *Trauma, Violence & Abuse* 2007; **8**:105–116.

21 Moura ATMS, Reichenheim ME. Estamos realmente detectando violência nas famílias de criança atendidas em nossos serviços de saúde? A experiência de um serviço público do Rio de Janeiro. *Cadernos de Saúde Pública* 2005; **21**:1124–1133.

22 Reichenheim ME, Patrício TF, Moraes CL. Detecting intimate partner violence during pregnancy: awareness-raising indicators for use by primary healthcare professionals. *Public Health* 2008; **122**:716–724.

23 Erickson MJ, Hill TD, Siegel RM. Barriers to domestic violence screening in the pediatric setting. *Pediatrics* 2001; **108**:98–102.

24 Garcia-Moreno C, Heise L, Jansen HA, Ellsberg M, Watts C. Public health. Violence against women. *Science* 2005; **310**:1282–1283.

25 Harrykissoon SD, Rickert VI, Wiemann CM. Prevalence and patterns of intimate partner violence among adolescent mothers during the postpartum period. *Archives of Pediatrics & Adolescent Medicine* 2002; **156**:325–330.

26 Jasinski JL. Pregnancy and domestic violence: a review of the literature. *Trauma, Violence & Abuse* 2004; **5**:47–64.

27 Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised Conflict Tactics Scales (CTS2): development and preliminary psychometric data. *Journal of Family Issues* 1996; **17**:283–316.

28 Moraes CL, Hasselmann MH, Reichenheim ME. Portuguese transcultural adaptation of the Revised Conflict Tactics Scales (CTS2), an instrument used to identify partner violence. *Cadernos de Saúde Pública* 2002; **18**:163–175.

29 Moraes CL, Reichenheim ME. Cross-cultural measurement equivalence of the Revised Conflict Tactics Scales (CTS2) Portuguese version used to identify violence within couples. *Cadernos de Saúde Pública* 2002; **18**:783–796.

30 Reichenheim ME, Klein R, Moraes CL. Assessing the physical violence component of the Revised Conflict Tactics Scales when used in heterosexual couples: an item response theory analysis. *Cadernos de Saúde Pública* 2007; **23**:53–62.

31 De Bruin A, Picavet HS, Nossikov A. Health interview surveys. Towards international harmonization of methods and instruments. *WHO Regional Publications. European Series* 1996; **58**:1–161.

32 Russell M, Martier SS, Sokol RJ, Mudar P, Bottoms S, Jacobson S, *et al*. Screening for pregnancy risk-drinking. *Alcoholism, Clinical and Experimental Research* 1994; **18**:1156–1161.

33 Ewing JA. Detecting alcoholism: the CAGE questionnaire. *JAMA* 1984; **252**:1905–1907.

34 Masur J, Monteiro MG. Validation of the 'CAGE' alcoholism screening test in a Brazilian psychiatric inpatient hospital setting. *Brazilian Journal of Medical and Biological Research* 1983; **16**:215–218.

35 Moraes CL, Viellas EF, Reichenheim ME. Assessing alcohol misuse during pregnancy: evaluating psychometric properties of the CAGE, T-ACE, and TWEAK in a Brazilian setting. *Journal of Studies on Alcohol* 2005; **66**:165–173.

36 Smart RG, Arif A, Hughes P, Medina Mora ME, Navaratnam V, Varma VK, *et al. Drugs Use among Non-Student Youth*. Geneva: World Health Organization, 1981.

37 ABEP. Brazilian Criterion of Economic Classification. 2003. http://www.abep.org/novo/CMS/Utils/FileGenerate. ashx?id=13 [last accessed May 2011]

38 Long SJ, Freese J. *Regression Models for Categorical Dependent Variables Using Stata*. College Station, TX: Stata Press Publication, 2003.

39 Efron B, Tibshirani R. *An Introduction to the Bootstrap*. London: Chapman and Hall, 1993.

40 StataCorp. *Stata Statistical Software: Release 10*. College Station, TX: Stata Corporation, 2007.

41 Steyerberg EW, Harrell JFE, Borsboom GJ, Eijkemans MJ, Vergouwe Y, Habbema JD. Internal validation of predictive models: efficiency of some procedures for logistic regression analysis. *Journal of Clinical Epidemiology* 2001; **54**:774–781.

42 Castro IRB, Engstrom EM, Cardoso LO, Damião JJ, Rito RVFV, Gomes MASM. Tendência temporal da amamentação na cidade do Rio de Janeiro: 1996–2006. *Revista de Saúde Pública* 2009; **43**:1021–1029.

43 Durand JG, Schraiber LB. Violência na gestação entre usuárias de serviços públicos de saúde da Grande São Paulo: prevalência e fatores associados. *Revista Brasileira de Epidemiologia* 2007; **10**:310–322.

44 Menezes TC, Amorim MMR, Santos LC, Faúndes A. Violência física doméstica e gestação: resultados de um inquérito no puerpério. *Revista Brasileira de Ginecologia e Obstetrícia* 2003; **25**:309–316.

45 Martin SL, Mackie L, Kupper LL, Buescher PA, Moracco KE. Physical abuse of women before, during, and after pregnancy. *JAMA* 2001; **285**:1581–1584.

46 Saurel-Cubizolles MJ, Blondel B, Lelong N, Romito P. [Marital violence after birth]. *Contraception, Fertilité, Sexualité* 1997; **25**:159–164.

47 Mayfield D, McLeod G, Hall P. The CAGE questionnaire: validation of a new alcoholism screening instrument. *American Journal of Psychiatry* 1974; **131**:1121–1123.

48 Hasselmann MH, Lopes CS, Reichenheim ME. Confiabilidade das aferições de um estudo sobre violência familiar e desnutrição severa na infância. *Revista de Saúde Pública* 1998; **32**:437–446.

49 Hartley CC. The co-occurrence of child maltreatment and domestic violence: examining both neglect and child physical abuse. *Child Maltreatment* 2002; **7**:349–358.

50 Chambliss LR. Intimate partner violence and its implication for pregnancy. *Clinical Obstetrics and Gynecology* 2008; **51**:385–397.