PREGNANCY LOSS IN THE PHILIPPINES

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Abstract. In this cross-sectional study, 8,481 women aged 15-49 who had at least one pregnancy outcome were considered. This study aimed to examine the characteristics of Filipino women having had a pregnancy loss, and to test the association between domestic violence and pregnancy loss. To control for the confounding effect of the number of pregnancies, the sample was divided into seven groups classified by the number of pregnancies. The risk factors considered were demographic characters (age and partner's age, marital status, and place of residence), socioeconomic status (education and partner's education, having a paid helper at home, having a say in how income was spent), domestic violence (physical abuse and forced sex), sexual behavior of partner, whether the pregnancy was wanted, and disease history (tuberculosis, diabetes, hypertension, malaria, hepatitis, kidney disease, heart disease, anemia, goiter and other medical problems). The major risk factors were found to be physical abuse, region, faithfulness of partners, hypertension, hepatitis, kidney disease, anemia, and the other medical problems, respectively. The risk of pregnancy loss for the women suffering domestic violence was 1.59 (95%CI 1.28-1.97) times higher than for the women who did not. Women aged 15-19 years had a much higher risk of pregnancy loss than the other age groups (OR=1.49, 95%CI 1.22-1.82). There were similar risk for women aged 20-24 years (OR=1.08, 95%CI 0.94-1.25) and 35-39 years (OR=1.05, 95%CI 0.92-1.19). No association emerged with marital status, socioeconomic status, forced sex, the number of partners, unwanted pregnancy, tuberculosis, diabetes, malaria, heart disease, and goiter. Although women's age, partner's age, residence, women's education, partner's education, and paid helper at home were significantly associated with pregnancy loss, they were likely to be confounders rather than risk factors.

INTRODUCTION

Reproductive health has always occupied an important part of any discussion about women's health (Santow, 1995). Reproductive failure is represented by fetal loss (National Statistical Office, 2000). The risk of pregnancy loss has been justified as a useful health index in epidemiological studies of possible environmental hazards to man (Czeizel *et al*, 1984). Pregnancy loss occurs in 12 to 24% of pregnancies (Smith, 1988; Stirrat, 1990). Pregnancy loss adversely affects the mother's present health (Regan, 1991), grief response, subsequent pregnancy, psychological problems (Bowles *et al*, 2000), and social or economic condition (Ney *et al*, 1994).

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Previous pregnancy losses have downstream impacts on the mother's health. Pregnancy loss has an adverse affect on subsequent live births. Thom *et al* (1992) suggested that women with three or more prior pregnancy losses were at higher risk of preterm delivery, placenta previa, having membranes ruptured for more than 24 hours, breech presentation, and having an infant with a congenital malformation.

Domestic violence against women is a public health problem. At least one woman in three has been beaten, coerced into sex, or otherwise abused in her lifetime, and up to 2 million women worldwide are assaulted by their partners each year [United Nations Population Fund (UNFPA), 2000]. Approximately 40-60% of battered women are abused during pregnancy (Parker and McFarlane, 1991) and these women are four times more likely to have a pregnancy loss than non-battered women (Bullock, 1989). The proportion

of women having had more than one pregnancy loss increases with increased severity of abuse (Webster *et al*, 1996).

The aims of the study were to examine this characteristics of Filipino women from the Safe Motherhood Survey (SMS) [(National Statistic Office (NSO), Philippines, and Macro International Inv (MI), 1994] having had a pregnancy loss, and to test the association between domestic violence and pregnancy loss.

MATERIALS AND METHODS

A total sample of 8,481 Filipino women aged 15-49 who had ever had a pregnancy outcome from the Safe Motherhood Survey (SMS) was used in this study. The Safe Motherhood Survey was the first national survey of the Philippines carried out as part of the global Demographic and Health Surveys program. This survey was conducted between October and December 1993, to investigate a variety of women's reproductive health issues, including pregnancy history, maternal morbidity, pregnancy outcomes, use of services for health problems, socio-demographic characteristics, domestic violence and sexual behavior. Pregnancy outcomes included live births and pregnancy. A pregnancy loss is defined as any non-live birth after pregnancy, either by spontaneous abortion (miscarriage or fetal loss before full term), induced abortion or stillbirth (children born dead after a gestation of seven or more complete months). The outcome, pregnancy loss, was measured by the questions 'Have you had any pregnancies that did not result in live births?' and 'How many pregnancies did not result in a live birth?'

In our analysis, we took the unit of analysis as the woman, rather than the pregnancy, and we measured the fetal loss rate as the number of women having at least one pregnancy loss divided by their total number of pregnancies.

Demographic factors, socioeconomic factors, maternal morbidity history, domestic violence, sexual behavior and unwanted pregnancy were the determinants of interest. The ages of the woman and her partner were their ages at interview. The Philippines is grouped geographically into three major islands: Luzon, Visayas, and Mindanao. Socioeconomic status was measured by the questions 'Do you have a paid helper at home?' and 'Do you have a say in how your household's overall income is spent?' Paid helpers were defined broadly as any nonrelatives who received cash for services in the home, regardless of whether or not they resided in the household. The maternal morbidity questions comprised 'Have you ever, at any time in your life, been told by a doctor or a nurse that you had (a) tuberculosis, (b) diabetes, (c) high blood pressure, (d) malaria, (e) hepatitis, (f) kidney disease, (g) heart disease, (h) anemia, (i) goiter, or (j) other medical problems?' The domestic violence items were 'Has anyone close to you, that is, family or friend, ever hit, slapped, kicked, or tried to hurt you physically?' and 'Have you ever been physically forced to have sex with someone?' The direct questions, 'Has your husband had sex with other women or with men?' and 'Does your husband ever pay other women to have sex with him?' explored the sexual behavior of their partner. Altogether, 'How many sexual partners have you had in your whole life?' is the question for evaluating the sexual behavior of the woman [National Statistic Office (NSO), Philippines, and Macro International Inv (MI), 1994].

The number of fetal losses per woman is expected to increase with the number of pregnancies. To remove this confounding effect, we separated the 8,481 women into the following seven groups: one pregnancy (n=945), two (n=1,333), three (n=1,441), four (n=1,258), five (n=1,007), six or seven (n=1,278), and eight or more pregnancies (n=1,219). The association can then be measured separately within each group, and an accurate estimate of the overall association is then obtained by comparing the resulting estimates.

All the determinants of interest were categorical. Pearson's chi-squared test and 95% confidence intervals for odds ratios were used to assess the associations between the outcome and the various determinants. For determinants with more than two categories, odds ratios were computed by comparing each category of the determinant with all other categories of that determinant combined (McNeil, 1996). Mantel-Haenszel adjusted odds ratios were used to examine the

associations between the outcome and the determinants after adjusting for the number of pregnancies, using a homogeneity test based on the chi-squared goodness of fit statistic (Breslow and Day, 1980).

RESULTS

In this section, results are given for three outcome measures, as follows: (a) the proportion of women who had a fetal loss, (b) the fetal loss rate per pregnancy, obtained by dividing the proportion (a) by the number of pregnancies, and (c) the odds ratios for the risk of ever having a fetal loss comparing two risk factors.

The mean age of the women was 34.5 years, with a standard deviation of 8.0 years. The average number of pregnancies was 4.4 and the maximum was 20. One in three women had at least one pregnancy loss in their lifetime.

Fig 1 shows the proportion of women who had a fetal loss classified by mother's age group for each number of pregnancies. As expected, this proportion increased with the number of pregnancies, but the rate of increase diminished with age.

The fetal loss rate per woman varied from 4.2% for women who had had one pregnancy, to 8.0% for women who had had six or seven pregnancies.

Demographic factors

Table 1 shows the fetal loss rate per pregnancy classified by pregnancy number for the demographic factors. As seen from the Table, the disparity of rates is most obvious when evaluated by the ages of the woman and her partner. In one pregnancy group, the fetal loss rates were highest among women aged 40 or more (12.9%) whose partners were aged 45 or more (8.6%). The fetal loss rates in the two-pregnancy group (overall 5.8%) were highest for women aged 35-39 years (8.2%) and for women with partners aged 17-29 years (6.8%). Among women who had had more than two pregnancies, the overall rates varied from 7.2% to 8.0%, and were highest among the younger women.

The women having had 1-4 pregnancies and living in de facto relationships had higher fetal loss rates than those who were married or widowed.

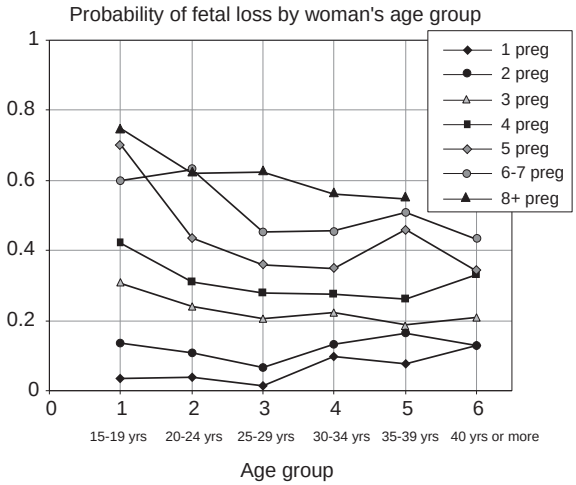

Fig 1–Proportion of women having a fetal loss by mother's age group.

There were relatively small differences between those living in urban and rural areas, and between the three island groups.

Socioeconomic status, domestic violence, sexual behavior and unwanted pregnancy

Table 2 shows the fetal loss rate classified by pregnancy number, with respect to socioeconomic status, domestic violence, sexual behavior and unwanted pregnancy status.

The fetal loss rate for women with more than two pregnancies increased with educational level for the woman and for her partner. For women who had 2-7 pregnancies, the fetal loss rate of those who had a paid helper at home was higher than for others. Among women who had had 1 and 5 pregnancies, the fetal loss rate had a higher difference between those who had a say in income spent and those who had not.

For women who had up to three pregnancies, those suffering physical abuse had higher fetal loss rates (7.8% to 10.6%) than others. Also, the fetal loss rate of women having been forced to have sex was high among women with 1, 2 and 4 pregnancies.

For women with one pregnancy, no fetal losses at all were reported by those whose partners had sex with other women. However, the fetal loss rates were higher among women with three or more pregnancies if their partners were not

Table 1
Rate of fetal loss classified by number of pregnancies for the demographic factors.

Demographic factors	Number of pregnancies						
	1	2	3	4	5	6-7	8+
Total number of women	945	1,333	1,441	1,258	1,007	1,278	1,219
Fetal loss rate (%)	4.3	5.8	7.6	7.4	7.9	8.0	7.2
Age (years)							
15-19	3.4	6.7	10.3	10.6	14.1	10.0	-
20-24	3.8	5.4	8.0	7.8	8.7	10.5	9.4
25-29	1.3	3.4	6.8	6.9	7.2	7.6	7.8
30-34	9.6	6.6	7.4	6.9	7.0	7.6	7.8
35-39	7.8	8.2	6.3	6.5	9.2	8.5	7.0
≥40	12.9	6.5	7.0	8.3	6.8	7.2	6.9
Partner's age (years)							
17-29	3.9	6.8	9.7	10.2	9.5	9.1	6.3
30-34	3.8	4.9	7.0	7.7	8.8	8.8	8.6
35-39	7.1	5.7	7.1	6.2	7.0	7.5	7.2
40-44	8.3	5.8	5.4	6.6	8.4	8.4	7.3
≥45	8.6	6.1	7.8	7.5	7.4	7.5	7.1
Missing	1.3	2.0	8.0	6.0	6.7	7.8	7.3
Marital status							
Married	4.3	6.0	7.4	7.3	8.0	8.0	7.2
Living together	6.7	6.3	9.7	9.9	7.5	7.5	7.3
Widowed	1.7	1.5	8.7	6.3	6.7	7.9	7.3
Residence							
Urban	4.9	5.8	7.2	7.7	8.0	8.9	7.6
Rural	3.6	5.7	8.0	7.1	7.8	7.2	7.1
Region							
Luzon	4.8	6.3	7.8	8.2	8.2	8.0	7.8
Visayas	6.0	6.4	6.9	7.1	7.9	8.6	7.0
Mindanao	2.0	4.2	8.0	6.1	7.4	7.5	6.7

faithful. Women who had more than one partner, and those who had unwanted pregnancies, had similar fetal loss rates to other women.

Mother's health status

Table 3 shows the fetal loss rate classified by number of pregnancies for mother's health status. The major health problems of the women who had fetal loss were hepatitis, diabetes, tuberculosis and malaria. Among women who had suffered hepatitis, the fetal loss rate was high for those with one pregnancy (14.3%), four pregnancies (12.5%), 6-7 pregnancies (12.8%), and more than seven pregnancies (11.5%). For women with diabetes, the fetal loss rate varied from 10.0% to 13.3% for women with 2-5 pregnancies. Among women who had suffered tuberculosis, fetal losses were high for those with three pregnancies (11.1%). For women who had experienced malaria, the fetal loss rate was 10.0% among those who had 6-7 pregnancies.

Associations between determinants and fetal loss

The Mantel-Haenszel odds ratios, used to measure the association between fetal loss and the risk factors after adjusting for the number of pregnancies, are shown in Table 4. Except for marital status, all the demographic factors were related to pregnancy loss. Age and partner's age were related to fetal loss ($p < 0.001$ in each case), with higher relative risk for women aged 15-19

Table 2
Rate of fetal loss classified by number of pregnancies for socioeconomic status, domestic violence, and sexual behavior.

Determinant variables	Number of pregnancies						
	1	2	3	4	5	6-7	8+
Total number of women	945	1,333	1,441	1,258	1,007	1,278	1,219
Fetal loss rate (%)	4.3	5.8	7.6	7.4	7.9	8.0	7.2
By socioeconomic status							
Woman's education							
No educ/primary	4.5	6.7	6.1	6.1	7.2	7.2	7.1
High school/voc-tech	4.7	5.3	7.9	7.8	7.9	8.4	7.8
College	3.7	5.6	9.3	9.2	9.9	11.1	8.7
Partner's education							
No educ/primary	4.3	5.6	7.2	5.9	6.9	7.1	7.0
High school/voc-tech	4.3	6.1	7.4	7.3	7.9	8.4	8.0
College	4.4	5.6	8.3	9.9	10.4	10.7	7.8
Paid helper at home							
Yes	2.2	6.9	9.2	8.7	9.2	10.8	6.4
No	4.6	5.6	7.5	7.2	7.8	7.8	7.3
Say in income spent							
Yes	4.6	5.8	7.6	7.5	8.0	8.0	7.2
No	1.4	3.8	8.9	6.1	4.9	7.2	8.1
By domestic violence							
Physical abuse							
Yes	7.8	8.4	10.6	7.5	8.1	9.2	7.9
No	4.0	5.5	7.3	7.4	7.9	7.8	7.2
Forced to have sex							
Yes	10.3	10.0	7.4	10.2	5.2	7.9	6.4
No	4.1	5.6	7.6	7.3	8.0	8.0	7.3
By sexual behavior							
Partner had sex other							
Yes	0.0	4.1	9.1	9.5	8.4	10.7	8.5
No	4.5	5.8	7.5	7.2	7.9	7.6	7.1
Partner pay women for sex							
Yes	8.3	5.6	12.9	10.7	7.6	10.6	8.6
No	4.2	5.8	7.4	7.2	7.9	7.8	7.2
Other partners							
Yes	7.5	6.7	8.9	8.5	9.1	7.9	6.5
No	4.2	5.7	7.6	7.3	7.8	8.0	7.3
By unwanted pregnancy							
Yes	4.9	4.6	7.1	7.0	8.0	7.6	7.6
No	4.3	6.0	7.8	7.5	7.9	8.2	7.0

years (OR=1.49, 95%CI 1.22-1.82) and for women whose partners were aged 17-29 years (OR=1.45, 95%CI, 1.25-1.70). Fig 2 shows a plot of the 95% confidence intervals for the individual odds ratios in each woman's age group before and after adjusting for the number of pregnancies. However the homogeneity test failed for woman's age group ($p = 0.003$), indicating an effect modification for this variable. Women living in urban areas had a higher risk of fetal loss (OR=1.14, 95%CI 1.03-1.26) than those living in rural areas. Luzon region had a higher risk of fetal loss than the other regions (OR=1.19, 95%CI 1.08-1.32).

Table 3
Rate of fetal loss classified by number of pregnancies for mother's health status.

Health status		Number of pregnancies						
		1	2	3	4	5	6-7	8+
Total number of women		945	1,333	1,441	1,258	1,007	1,278	1,219
Fetal loss rate (%)		4.3	5.8	7.6	7.4	7.9	8.0	7.2
Tuberculosis:	yes	-	9.5	11.1	9.4	7.3	8.6	7.8
	no	4.4	5.7	7.6	7.4	7.9	8.0	7.5
Diabetes:	yes	-	12.5	13.3	9.6	10.0	7.9	8.3
	no	4.4	5.7	7.6	7.4	7.8	8.0	7.5
Hypertension:	yes	5.4	7.1	9.3	8.8	8.1	8.0	8.0
	no	4.2	5.6	7.4	7.2	7.9	8.0	7.5
Malaria:	yes	8.7	6.5	7.1	8.2	6.8	10.0	7.7
	no	4.2	5.7	7.6	7.4	8.0	7.9	7.5
Hepatitis:	yes	14.3	3.6	2.2	12.5	9.1	12.8	11.5
	no	4.3	5.8	7.7	7.3	7.9	7.9	7.5
Kidney disease:	yes	7.8	8.0	5.3	9.1	9.1	9.7	8.0
	no	4.0	5.6	7.8	7.2	7.8	7.8	7.5
Heart disease:	yes	2.6	2.9	6.7	7.4	9.2	9.0	7.0
	no	4.4	5.8	7.7	7.4	7.9	7.9	7.6
Anemia:	yes	5.9	6.1	7.5	8.6	9.9	9.1	7.7
	no	4.2	5.6	7.7	7.2	7.4	7.7	7.5
Goiter:	yes	2.9	6.8	7.8	9.6	7.6	9.4	8.0
	no	4.4	5.7	7.6	7.3	7.9	7.9	7.5
Other medical	yes	6.6	6.4	8.6	9.1	8.8	9.5	6.9
problems:	no	4.1	5.7	7.6	7.2	7.8	7.8	7.6

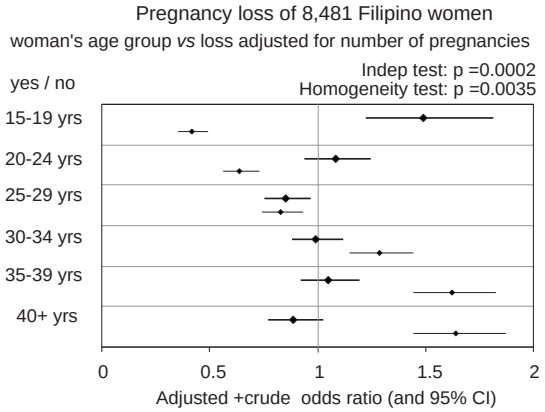

Fig 2–Odds ratios for age group *vs* fetal loss: association crude and adjusted association for number of pregnancies.

Turning to the social factors (Tables 5 and 6), no associations were found between fetal loss and the woman's say in how income was spent forced sex or the number of partners. The woman's education, her partner's education, having a paid helper at home and physical abuse were all risk factors. The risk of fetal loss increased with the level of education of the women and their partners. The odds ratio was 1.32 (95%CI 1.10-1.59) for women who had a paid helper at home. Women suffering physical abuse, or whose partner had sex with other women, or whose partner paid women for sex, had higher risks than others. Fig 3 shows the 95% confidence intervals for the odds ratios between physical abuse and fetal loss within each pregnancy number group. However, no increased risk was found for women who had an unwanted pregnancy. For this risk factor, the association was confounded by the number of pregnancies but there was no effect modification, as shown in Fig 4. Among the medical factors (Table 7) hypertension, hepatitis, kidney disease, anemia and other medical problems were all associated with fetal loss. However no associations were found between fetal loss and tuberculosis, diabetes, malaria, heart disease or goiter.

Table 4
Association between pregnancy loss and demographic factors after adjusting for number of pregnancies.

Predictors	Adjusted odds ratio and 95%CI		Crude odds ratio	Indep test	Homog test
Demographic factors					
Age (years)				<0.001	0.003
15-19	1.49	(1.22,1.82)	0.42		
20-24	1.08	(0.94,1.25)	0.64		
25-29	0.85	(0.75,0.97)	0.83		
30-34	0.99	(0.88,1.12)	1.29		
35-39	1.05	(0.92,1.19)	1.62		
≥40	0.89	(0.77,1.02)	1.64		
Partner's age (years)				<0.001	0.222
17-29	1.45	(1.25,1.70)	0.52		
30-34	1.07	(0.93,1.22)	0.80		
35-39	0.86	(0.76,0.98)	0.99		
40-44	0.99	(0.87,1.13)	1.46		
≥45	0.94	(0.83,1.05)	1.74		
Missing	0.79	(0.62,1.01)	0.62		
Marital status				0.102	0.330
Married	0.98	(0.83,1.14)	1.26		
Living together	1.17	(0.96,1.42)	0.89		
Widowed	0.82	(0.64,1.06)	0.69		
Residence				0.013	0.065
Urban	1.14	(1.03,1.26)	0.93		
Rural	0.88	(0.80,0.97)	1.07		
Region				<0.001	0.210
Luzon	1.19	(1.08,1.32)	1.04		
Visayas	1.00	(0.88,1.13)	1.04		
Mindanao	0.81	(0.72,0.91)	0.92		

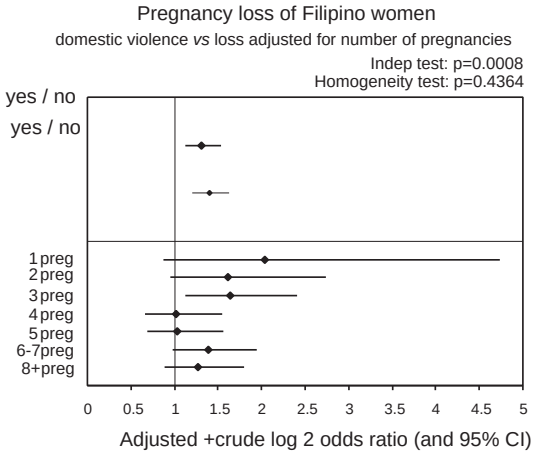

Fig 3–Domestic violence *vs* fetal loss, by number of pregnancies.

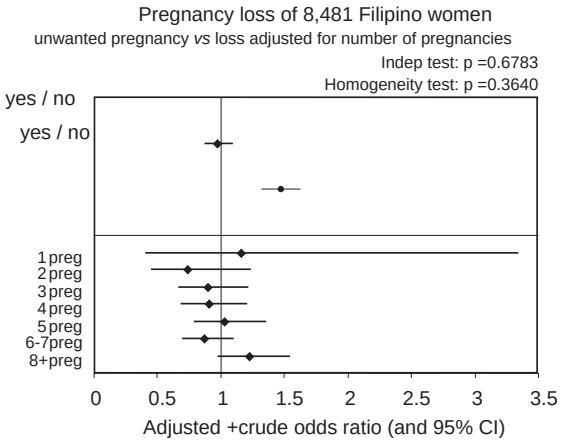

Fig 4–Unwanted pregnancy *vs* fetal loss, by number of pregnancies.

Table 5
Association between pregnancy loss and socioeconomic status, and domestic violence after adjusting for number of pregnancies.

Predictors	Adjusted odds ratio and 95%CI		Crude odds ratio	Indep test	Homog test
By socioeconomic status					
Women's education				<0.001	0.022
No. educ/primary	0.72	(0.65,0.81)	1.36		
High school/voc-tech	1.08	(0.97,1.21)	0.82		
College	1.49	(1.30,1.70)	0.82		
Partner's education				<0.001	0.016
No. educ/primary	0.71	(0.64,0.79)	1.24		
High school/voc-tech	1.07	(0.96,1.20)	0.90		
College	1.48	(1.31,1.68)	0.84		
Paid helper at home					
Yes	1.32	(1.10,1.59)	0.93	0.003	0.219
No	0.76	(0.63,0.91)	1.08		
How income spent					
Yes	1.15	(0.89,1.50)	1.24	0.294	0.233
No	0.87	(0.67,1.13)	0.81		
By domestic violence					
Physical abuse					
Yes	1.31	(1.15,1.47)	1.40	0.001	0.436
No	0.76	(0.65,0.89)	0.71		
Forced to have sex					
Yes	1.02	(0.75,1.37)	1.08	0.918	0.158
No	0.98	(0.73,1.33)	0.92		

Table 6
Association between pregnancy loss and sexual behavior after adjusting for pregnancy number.

Predictors	Adjusted odds ratio and 95%CI		Crude odds ratio	Indep test	Homog test
By sexual behavior					
Partner has sex other					
Yes	1.45	(1.22,1.72)	1.71	<0.001	0.074
No	0.69	(0.58,0.82)	0.58		
Partner pay women for sex					
Yes	1.59	(1.28,1.97)	1.72	<0.001	0.206
No	0.63	(0.51,0.78)	0.58		
Other partners					
Yes	1.05	(0.87,1.27)	1.29	0.581	0.438
No	0.94	(0.79,1.14)	0.77		
By unwanted pregnancy					
Yes	0.98	(0.87,1.09)	1.47	0.678	0.364
No	1.02	(0.92,1.15)	0.68		

Table 7
Association between pregnancy loss and mother's health status after adjusting for pregnancy number.

Predictors		Adjusted odds ratio and 95%CI	Crude odds ratio	Indep test	Homog test
Health status					
Tuberculosis:	Yes	1.28 (0.92,1.78)	1.72	0.918	0.158
	No	0.63 (0.51,0.78)	0.58		
Diabetes:	Yes	1.48 (0.95,2.29)	1.98	0.076	0.940
	No	0.68 (0.44,1.05)	0.52		
Hypertension:	Yes	1.20 (1.03,1.41)	1.34	0.023	0.859
	No	0.83 (0.71,0.98)	0.74		
Malaria:	Yes	1.17 (0.91,1.51)	1.51	0.234	0.698
	No	0.86 (0.66,1.10)	0.66		
Hepatitis:	Yes	1.83 (1.12,2.99)	1.67	0.019	0.069
	No	0.54 (0.33,0.89)	0.60		
Kidney disease:	Yes	1.30 (1.10,1.54)	1.39	0.002	0.123
	No	0.77 (0.65,0.91)	0.72		
Heart disease:	Yes	1.01 (0.81,1.25)	1.29	0.946	0.572
	No	0.99 (0.80,1.23)	0.77		
Anemia:	Yes	1.27 (1.15,1.40)	1.44	<0.001	0.357
	No	0.79 (0.69,0.89)	0.70		
Goiter:	Yes	1.23 (0.98,1.53)	1.39	0.073	0.821
	No	0.82 (0.65,1.02)	0.72		
Other medical problems:					
	Yes	1.21 (1.01,1.44)	1.26	0.033	0.587
	No	0.83 (0.69,0.99)	0.79		

DISCUSSION

Our primary objective was to investigate the associations between fetal loss and demographic, social and medical risk factors. We were particularly interested in the association between domestic violence and fetal loss. The outcome was whether or not a subject in the target population had had a fetal loss. We could have carried out a pregnancy-based analysis to model the risk of a fetal loss as a function of parity (and/or age) and the risk factors of interest. However, pregnancy outcomes are probably correlated within subjects, violating the statistical independence assumption, and thus necessitating a more complex method of analysis. To ensure independence of outcomes we chose to treat the woman rather than the pregnancy as the experimental unit. As a consequence, the risk of the outcome increases with the number of pregnancies, and thus the number of pregnancies is likely to be a confounder in the associations of interest. To eliminate this confounding effect we divided the sample into seven groups according to the number of pregnancies, and then recombined the estimates to obtain odds ratios, using the Mantel-Haenszel method. As Fig 1 shows, classifying by number of pregnancies largely eliminates the effect of age on fetal loss, as would be expected. Fig 2 shows very clearly the confounding effect of the number of pregnancies. The crude association between fetal loss and age group indicates increasing risk with age, as expected, but this association is reversed when one adjusts for the number of pregnancies. Fig 3, which is essentially a meta-analysis plot, graphically illustrates the association between domestic violence and fetal loss. For this risk factor, there is little if any confounding with the number of pregnancies, and it is interesting to note that the associations within each pregnancy-number group are mostly inconclusive; when these results are combined a substantial association emerges.

The association between fetal loss and whether or not the pregnancy was wanted is also shown graphically in Fig 4. Here the number of pregnancies is a very strong confounder. The crude odds ratio indicates a strong association between fetal loss and the pregnancy being unwanted, but after adjusting for the number of pregnancies this association completely disappears.

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