

SOCIO-DEMOGRAPHIC FACTORS ASSOCIATED WITH
INTIMATE PARTNER VIOLENCE BEFORE AND DURING PREGNANCY

by

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List of Abbreviations

aOR	Adjusted Odds Ratio
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
DHS	Department of Human Services
IPV	Intimate Partner Violence
IPVP	Intimate Partner Violence During Pregnancy
IPVB	Intimate Partner Violence in 12 months Before Pregnancy
OR	Odds Ratio
PRAMS	Pregnancy Risk Assessment Monitoring System

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ABSTRACT

Purpose: The first purpose of this study was to evaluate the association between income and 1) Intimate Partner Violence in the 12 months prior to pregnancy (IPVB) and 2) Intimate Partner Violence during Pregnancy (IPVP). The second purpose of this study was to examine the impact that other socio-demographic risk factors have on the association. This data was then used to make a comparison of women who are hit during pregnancy to those who are not and also to look at differences between women hit at different times around pregnancy.

Methods: The prevalence of socio-demographic risk factors for IPVB/IPVP among 3327 postpartum women who gave birth in the years 2000 and 2001 using data from Oregon Pregnancy Risk Assessment Monitoring System (PRAMS) were estimated, a cross-sectional study. The associations between these risk factors and IPVB and IPVP were evaluated using univariate and multivariate logistic regression. Further analysis was conducted using a multi-log analysis to directly compare women who were hit during pregnancy to those who were not.

Results: *IPVB:* Multivariate analysis showed IPVB was significantly associated with income level and with smoking. IPVB was higher among women with <100% Federal Poverty Level (FPL) than women who had >200% FPL (aOR 3.29; 95% CI 1.44-7.52). IPVB was higher among women smokers than in non-smokers (aOR 7.63; 95% CI 4.05-14.37).

IPVP: In multivariate analysis IPVP was higher among women who fell <100% FPL than those who were >200% FPL (aOR 7.48; 95% CI 2.75-20.33). Women with 100%-200% FPL were more likely than women with >200% FPL to report IPVP (aOR 3.66; 95% CI

1.31-10.23). Smokers were also more likely to report abuse during pregnancy (aOR 6.31; 95% CI 2.93-13.56). Maternal education was not statistically significant however, it was found to confound the association between income level and IPV.

Timing of Abuse around Pregnancy: Abuse both before and during pregnancy vs. Abuse during pregnancy only- When looking at the subpopulation of abused women, being unmarried (aOR 0.08; 95% CI 0.01-0.61) or a non-smoker (aOR 0.07; 95% CI 0.01-0.40) were associated with a decrease in odds of experiencing abuse both before and during pregnancy than abuse during pregnancy only. Being less than 25 years old at the time of delivery was associated with an increase in odds of experiencing abuse both before and during pregnancy rather than during pregnancy only (aOR 4.90; 95% CI 1.18-20.36) .

Abuse before pregnancy only vs. abuse during pregnancy only- A comparison of women who were only abused before pregnancy vs. those only abused during pregnancy showed that Hispanic women have higher odds of experiencing abuse during pregnancy, compared to the time period before pregnancy (aOR 4.78; 95% CI 1.01-22.76).

Unmarried women were also more likely to experience abuse during pregnancy only (aOR 14.94; 95% CI 3.01-74.14) compared to experiencing abuse before pregnancy only.

Non-smokers are more likely than smokers to experience abuse during pregnancy only and not before pregnancy (aOR 6.11; CI 1.35-27.73). *Abuse before and during pregnancy*

vs. Abuse before pregnancy only- Comparison of women who experienced abuse at both time periods vs. those who only experienced abuse before pregnancy showed no significant differences between the two groups.

Conclusion: Low income and smoking are strongly associated with an increased prevalence of intimate partner violence before and during pregnancy, even after

adjustment for other socio-demographic characteristics. Additionally, comparisons between women abused during different time periods indicate that women who are abused only during pregnancy constitute a different population than those who are abused during other time periods.

Hypotheses

- 1) Low income will be independently associated with IPV and IPVP.
- 2) The association between low income and IPV and IPVP will be mitigated by other socio-demographic variables.
- 3) Women who experience abuse during pregnancy will be significantly different with regard to at least one socio-demographic factor from those who are abused prior to pregnancy.

INTRODUCTION

Intimate Partner Violence

Physical abuse is a widespread problem, which, in 1997 was estimated to touch the lives of 4.4 million adult women in the United States every year (1). Awareness regarding domestic abuse has increased in past years. However abuse is still occurring across the United States. The National Violence Against Women Survey conducted in 2000 found that 22.1 % of all women were physically assaulted by an intimate partner during their lifetime (2). In Oregon it is estimated that 13.3% of adult women are victims of physical or sexual intimate partner violence each year, equaling approximately 132,800 women (3). Abuse can cause physical damage as well as have lasting psychological effects on women and families, making this a long term public health concern (4-6).

Intimate Partner Violence During Pregnancy

Fifty-three percent of abuse victims in Oregon indicated that they continued to experience abuse during pregnancy at the same or greater frequency than prior to becoming pregnant (3). Intimate partner violence during pregnancy (IPVP) has been reported to range between 0.9% and 20.1% (7). Traditionally, pregnancy has been viewed as a time of increased risk of domestic violence. However, there is some controversy over whether or not the prevalence of abuse increases during pregnancy. Some studies imply that abuse increases during pregnancy (8-11), while others show that prevalence of abuse decreases during pregnancy (12-14).

Aside from the question of whether or not the prevalence of abuse increases, some studies have indicated that abuse during pregnancy is a marker for extreme danger to the woman and family (15). Some of the associated maternal perinatal consequences of IPVP include miscarriage, abruptio placentae low birth weight, premature labor or birth, intrauterine fetal death, intrauterine growth restriction, depression, drug use, anxiety, inadequate prenatal care, alcohol use, and psychosocial stress (16-24). The increased danger and negative health consequences associated with abuse during pregnancy, motivates us to study this particular population in search of clues that may help us to distinguish these women from others and provide assistance to them.

This study will use intimate partner violence in the period 12 months prior to pregnancy (IPVB) as a proxy for intimate partner violence (IPV). It will identify variables associated with IPVB and IPVP, respectively and evaluate whether in fact those being abused during pregnancy are a special population of abused women for whom the predictors are different from women who are abused before pregnancy. This study has the

unique opportunity to directly compare data regarding abuse for the time period before and during pregnancy.

Predictors of IPVB and IPVP

Income

People of low income have been shown to have poorer health with regard to morbidity and mortality (25). One study has looked at overall measurements of hostility across various socio-economic strata (26). Using the Cynical Distrust Scale (27), they found that there was a negative correlation between income and overall Cynical Distrust Scale (CynDis), indicating that people of lower income had higher overall scores on the CynDis. These findings may imply that lower income groups may live in a more hostile environment. Given these findings it is not surprising that women of lower income report more occurrences of IPV and IPVP (12-14, 28-32). It seems possible that lower income families live in neighborhoods and social environments that are generally more hostile and violent in nature, which may normalize domestic violence to some extent. One study examined neighborhood poverty levels as a predictor of intimate partner violence (both male to female and female to male) and found that couples living in impoverished neighborhoods were at increased risk for domestic violence (29).

When examining income as a predictor for intimate partner violence around pregnancy, it is difficult to make any comparisons between studies as the methods of measuring income vary from study to study. Some use reported income of the victim only while others use household income. Similarly the methods of categorizing income can differ between studies. Due to this variability it is difficult to make comparisons between findings.

Race and Ethnicity

Race and ethnicity is a hotly debated risk factor for domestic violence and the evidence found in the literature is inconclusive and conflicting. Some studies find that there are significant differences by race (32-34) and others finding no differences between race/ethnicity (35-36). One study on Native American women found an increased prevalence of lifetime abuse among low-income Native American women seeking care at tribal clinics relative to baseline national prevalence (31). Additional confusion is added when we consider that some of these results found conflicting directions of associations. For example, one study performed in an obstetric clinic reported a prevalence rate of abuse that was three times higher among Anglo American women relative to Hispanic American women and 1.6 times higher compared to African American Women (8). Another study using PRAMS (n=12,612) found that non-White mothers had higher rates of violence than mothers who were White (37). These conflicting results may imply there is a more complex relationship between IPV and race. Differences in sampling techniques, assessment of abuse and statistical methods may contribute to these discrepancies.

Age

Maternal age has been shown to be associated with IPV and IPVP. Studies have indicated that teenagers (38) and young women (3, 30, 39-40) are at increased risk of abuse when compared to adult women. It remains unclear whether age is an independent predictor or the association between age and IPV/IPVP is mitigated by other socio-economic factors.

Marital Status

Berenson et al. (41) found that divorced women and smokers had an increased prevalence of IPV. Interestingly, Berenson et al. did not find that being unmarried was associated with an increase risk. Other studies have also indicated that marital status is associated with the prevalence of IPV/IPVP (9, 11-12). The findings are consistent with unmarried being associated with abuse, although, some do not distinguish between divorced and unmarried women.

Education

In a study evaluating socio-demographic variables and the inter-relationships between income, education, age, ethnicity and IPVP among postpartum women, Bohn et al. (14) found that education was the most important predictor of IPV before and during pregnancy. Women with at least a high school education were less likely to be abused both at the time of the survey (adjusted Odds Ratio [aOR] 0.50 [CI 0.34-0.72]) as well as during pregnancy (aOR 0.54 [CI 0.29-1.00]). However, the results of this study may not be applicable to the general population as it was based on a limited sample of women at six delivery centers in Florida and Massachusetts. 84.4% of the population had incomes of less than \$2000 per month. Given the narrow range of income it may be that differences between each of the income levels were not large enough to detect an association.

Socio-demographics across studies

All of the above mentioned studies used varying methods of analysis and samples and therefore cannot be directly compared. Often only the prevalence or a univariate odds ratio was reported and these variables were not included in the multivariate model, or as variables of primary interest. Conflicting results regarding the associations between socio-demographic variables and IPV and IPVP are yet to be resolved.

There are strong associations between these characteristics making it difficult to discern what is actually impacting the outcome. For example, young women are more likely to be unmarried and of lower income; racial/ethnic minorities are more likely to be less educated and of lower income. The relative effect and manner in which these factors interact and contribute to predicting IPVP have been inadequately researched. Many studies have focused on one or two subpopulations, such as low-income racial groups. (31, 42). It is essential that the focus is placed not just on categorizing women experiencing IPVB and IPVP but that we have a dialogue about what social factors are contributing to this public health problem and what we can do to prevent it. To do so the multiple effects that these variables have on IPVB and IPVP need to be untangled. The complexity of the relationship calls for statistical analysis that evaluates the impact of each factor as well as their interactions on IPVB and IPVP.

Public Health implications

Any woman may be at risk of experiencing violence from an intimate partner at any given time; however, pregnancy is a time of increased stress and may trigger changes in abusive behavior. It is also possible that violence that starts or continues during

pregnancy may be a marker for a more dangerous form of abuse. Oregon PRAMS enables us to assess the basic demographic features of postpartum women. This population-based survey will give a view of Oregon childbearing women with regard to income level and IPV/IVP. Additionally, it will allow us to explore how the association found between income and IPV/IVP is affected by other common socio-demographics factors. This analysis will identify factors associated to IPV/IVP and allow for an exploration of how different these two populations are.

METHODS

PRAMS

Oregon Pregnancy Risk Assessment Monitoring System (PRAMS) is a public health surveillance project of the Oregon Office of Family Health. PRAMS monitors events before, during and after pregnancy and identifies health outcomes to improve maternal and child health in Oregon. It was modeled after the multi-state PRAMS program supported by the Centers for Disease Control and Prevention (CDC). This study was approved by the Institutional Review Board of the Oregon Health & Sciences University.

Oregon PRAMS surveys Oregon resident mothers 2-6 months after a live birth. Mothers are identified using a stratified random sample of birth certificates with over-sampling of mothers who are Hispanic, non-Hispanic black, non-Hispanic American Indian/Alaskan Native and non-Hispanic Asian/Pacific Islander to ensure reliable estimates for each of these groups. Mothers who do not respond to a mailed survey receive a second mailed survey and telephone follow-up if necessary. Responses are weighted for over-sampling, non-response and non-coverage to create a sample representative of all Oregon live births. This sample method allows us to have large enough subpopulations to conduct simple statistical tests while the weighting method assures that our results provide a sample which represents the Oregon demographic. Details of the Oregon PRAMS methods appear elsewhere (43) and have been included in Appendix A.

Outcome of interest

The outcome of interest was intimate partner violence both before and during pregnancy. There are many different descriptions of different kinds of violence. Some studies include psychological abuse, some studies use any form of abuse within the family which, in the case of teenaged mothers, could be in the form of child abuse by a parent. Others looking at violence in general might include any form of violence a woman has experienced, regardless of the perpetrator. For the purposes of this study we are strictly interested in intimate partner violence. Intimate partner violence was addressed on the PRAMS survey by asking two questions: 1) Intimate Partner Violence *during* Pregnancy (IPVP) was assessed by asking mothers, “During your most recent pregnancy, did your husband or partner push, hit, slap, kick, choke or physically hurt you in any other way?” 2) Intimate Partner Violence *before* Pregnancy (IPVB) was assessed by asking mothers, “In the 12 months before you got pregnant, did your husband or partner push, hit, slap, kick, choke or physically hurt you in any other way?”

Women less than 20 years old at the time of childbirth were not asked about abuse. Oregon law requires mandatory reporting of child abuse, including hitting a person less than 18 years old. Because PRAMS asks about IPV in the 12 months before pregnancy began, women less than 20 years old at the time of childbirth were not asked about IPV in order to minimize the risk of mandatory reporting.

Variables derived from PRAMS

Variables considered in the analysis were gathered from PRAMS and linked birth certificate data. Those that came from PRAMS included: pregnancy intention, income,

maternal smoking in the 3 months before pregnancy and maternal drinking during the last 3 months of pregnancy.

Pregnancy intention was assessed by asking the question: "Thinking back to just before you got pregnant, how did you feel about becoming pregnant? Answers of "I wanted to be pregnant sooner" and "I wanted to be pregnant then" were classified as being Intended. Those who responded "I wanted to be pregnant later" were classified as Mistimed and those responding "I didn't want to be pregnant then or at any time in the future" were classified as Unwanted.

Self reported income and the number of people supported by this income in the year prior to becoming pregnant were used to calculate the Federal Poverty Level (FPL). The poverty thresholds were first developed in 1963-1964 by Mollie Orshansky of the Social Security Administration. Orshansky took the costs of the U.S. Department of Agriculture's economy food plan for families of three or more persons and multiplied the costs by a factor of three. She followed slightly different procedures to calculate thresholds for families of one or two persons in order to allow for the relatively larger fixed costs that small family units face. A factor of three was used because the Department of Agriculture's Household Food Consumption Survey (1955) found that in families of three or greater, the average cost of all food used during the week was equal to about one third of their total income after taxes. In 1965, the U.S. Office of Economic Opportunity adopted the use of these thresholds as semi-official definitions of poverty. In 1969, the U.S. Bureau of the Budget revised the poverty thresholds slightly and made them the official statistical definition of poverty (44). In this study, we use FPL as a measure of income because by taking into account the number of people within a

household we can better gauge the level of economic need a family faces. In terms of social-economic status it is important to take into account the number of people the income must support rather than taking the income dollar value as a proxy.

Each agency that uses FPL as a measure of income varies in the way in which income is included in the calculations; some use only working income while others will include benefits. PRAMS asks that reported income include benefits such as TANF and child support. The question stated by the PRAMS questionnaire is, "What is your family income, before deductions and taxes? Include ANY income or money you can use (for example, job, TANF [formerly AFDC], child support, etc.). Please give us your best guesses. All information will be kept private." The answers to this question are written in, meaning people can write in any amount and is then followed by check boxes for the person to indicate whether the income reported is weekly, monthly or yearly. A yearly income was then calculated for those who wrote in weekly or monthly incomes. PRAMS also asks women to check a box next to an yearly income range which accurately describes their household income. However, the written in value was used instead of the categorical responses because the FPL calculations are more accurate when calculated from one number rather than a range of numbers.

The guidelines for the FPL income cut offs are changed annually, therefore specific calculations were applied to women giving birth in 2000 and 2001. For example in the year 2000 a family of three must have an income of less than \$14,150 to be considered <100% FPL. In the year 2001 a family of three must have an income of less than \$14,630 to qualify as <100% FPL. For further examples of FPL categories please see Figure 1.

Figure 1. Federal Poverty Level <100% dollar amount cut offs for 2000 and 2001.

Year	1 person	Each Additional Person	Family of 4
2000	\$ 8,350	\$ 2,900	\$ 17,050
2001	\$ 8,590	\$ 3,020	\$ 17,650

For the purposes of this study, categories were formed based on benefit criteria for state assistance programs. People who are <100% FPL are eligible for full Oregon Health Plan (OHP) coverage and is the lowest category of the study. The second category was formed based on the Family Health Insurance Assistance Program (FHIAP) which extends subsidized assistance to families with <200% FPL (45); therefore the middle income category was 100-<200% FPL. Those remaining (\geq 200% FPL) were considered the referent category.

Maternal smoking in the three months prior to pregnancy was broken down into no cigarettes reported or one or more cigarettes reported. Maternal drinking was assessed by attempting to identify habitual drinkers by using number of drinks reported per week as a proxy. To do this a dichotomous variable was created which indicated that the mother reported up to 6 drinks per week or 7 or more drinks per week. Habitual drinkers may represent a very different population of women. Habitual drinking was used instead of no drinking vs. some drinking because it is alcohol abuse that is most often associated with IPV (8, 39, 46-47)

Variables derived from Birth Certificates

Data from birth certificates included: county of residence, maternal age and education, parity, marital status, maternal race/ethnicity. County of residence was used to determine whether the mother originated from an urban or rural community. Counties

with less than 60 people per square mile were classified as rural; all others were considered urban. Maternal age was calculated using the mother's birth date. Education was broken down into four categories: less than 12 years of education, 12 years of education, some college (13-15 years), and college graduate or greater (≥ 16 years). While many studies use a dichotomous variable to describe education, we thought particularly since our study population excludes women who were less than 20 years old, most of the population would have completed high school. However, there may be significant differences in women who go to college versus those who do not, and further that those who complete or go onto pursue higher degrees may comprise a very different population of women as well. Therefore, four categories were used to represent each of these potentially different populations.

Parity was a dichotomous variable indicating that the pregnancy used in this analysis was a first birth for the mother or was not a first birth. Marital status was a dichotomous variable indicating whether the mother was married/separated or unmarried/divorced/annulled. Unfortunately birth certificate data do not distinguish between divorced and unmarried women or separated and married women despite the fact that there could be great differences between them. Maternal race/ethnicity covered non-Hispanic African American, non-Hispanic Asian/Pacific Islander, non-Hispanic American Indian/Alaska Native, Hispanic, and non-Hispanic White.

The socio-demographic variables of interest in this study were income, maternal age, maternal education, maternal race/ethnicity and marital status. All other variables were included based on indication by previous studies that they may be confounders for

IPV. Year of birth (2000 or 2001) was also put into the final model to see whether results varied significantly by year.

This analysis uses data collected from Oregon PRAMS for infants who were born in 2000 and 2001. Data was only collected through 11/4/01 instead of 12/31/01 because the last two monthly cohorts were used to a pilot study for a CDC system survey. All data presented are weighted except as indicated. Surveys were sent out to 5175 women, 3895 responded (unweighted response rate was 75.3%). Of those women who responded, 515 were less than 20 years old and therefore were not asked the questions about abuse. An additional 53 women did not answer the questions about abuse and are not included in the analysis. A total number of 3327 women are included in analysis.

Data analysis

Data were analyzed using SPSS 11.5 (SPSS Inc. Chicago, IL) and SUDAAN 9.0 (Research Triangle Institute, Research Triangle Park, NC) to accommodate the complex survey and design weight scheme. The prevalence of each variable of interest was calculated using SUDAAN 9.0. In order to evaluate possible bias caused by non-response, the prevalence of each variable was calculated for those women who skipped the questions about abuse (n = 53). These results were compared to the population used in this analysis (n = 3327). Pearson's Chi square test was used to make a formal evaluation of the differences between women who did not answer the questions about abuse and those who did. This was done for each variable of interest and a p-value of ≤ 0.05 was considered significant.

Associations between IPVB/IPVP and each variable were investigated first by using simple logistic regression; all variables with a p-value of ≥ 0.10 were then

considered in the multivariate model. Two multivariate models (one for IPVB and one for IPVP) were built using backward selection with all significant variables. Interactions were not included in the model building step as cell sizes were considered too small to yield enough power in analysis ($n < 10$). The Hosmer and Lemeshow Goodness-of-Fit test statistic (48) was calculated to assess the fit of the model. Confounding was assessed based on the definition of as a change of greater than or equal to 10% of the odds ratio estimate. After each model was built year of birth was entered into the model to evaluate whether results varied by year.

Additional analysis was conducted for the subpopulation of women who reported abuse during one or both of the time periods indicated using a generalized logit multinomial model. There were three outcome possibilities: Abuse Before Pregnancy Only (IPVB Only), and Abuse During Pregnancy Only (IPVP Only) and Abuse Both Before and During Pregnancy (IPV Both). Each category is exclusive

Initial univariate multinomial analysis was conducted for all variables; a multivariate multinomial model was then built for all variables that had univariate t-test p-values ≤ 0.10 . The Wald F-test did not evaluate each variable for each outcome separately, therefore individual t-test p-values were used instead of the F-test to determine significance of each variable.

RESULTS

The survey respondents were, by design, a representative sample of Oregon birthing women except for the exclusion of women who were less than 20 years old. Demographics of the sample are indicated in Table 1. The racial/ethnic dispersion was 33.1% white, 10.9% black, 11.1% American Indian/Alaska Native, 17.3% Asian Pacific Islander, and 27.5% Hispanic. Most respondents were married (69.1%), at least 25 years old (67.2%), intended to become pregnant (59.1%) and were residents of urban counties (80.0%). Slightly less than half (40.5%) reported incomes greater than 200% FPL and education levels were fairly evenly spread into approximate quartiles. These are the unweighted response demographics of the population. Table 1 also includes the weighted values for each category.

All 53 women who did not answer the questions about abuse skipped both questions all together. Analysis was conducted using chi-square test to test for significant differences for each characteristic between those who answered the questions about abuse and those who did not. All p-values were greater than 0.05. Therefore, women who did not respond to the questions about abuse were not significantly different from those who did answer the questions about abuse (data not shown here).

The multivariate analysis is reported in terms of odds ratios. Since IPVB and IPVP both have a low prevalence, the odds ratios can be used to estimate the relative risk.

Intimate partner violence before pregnancy

Univariate logistic analysis revealed that income, maternal education, marital status, race/ethnicity, maternal age, pregnancy intention, urban/rural county, parity

maternal drinking and maternal smoking were significantly associated with abuse in the 12 months prior to pregnancy at a level of $p \leq 0.10$ (Table 2) and were included in the multivariate modeling. Birth year was not a significant factor in this model ($p=0.73$). Multivariate analysis by backwards selection (Table 4) showed that only income $<100\%$ FPL (compared to $\geq 200\%$ FPL) and maternal smoking in the three months prior to pregnancy as significant predictors of abuse before pregnancy (HL p -value = 0.16). All other variables were not significantly associated and did not meet the definition of a confounder. Results for the multivariate model are reported in Table 4.

In multivariate analysis, compared with women whose income was $\geq 200\%$ FPL, women were more likely to report abuse if they fell beneath $<100\%$ FPL (OR 3.29; 95% CI 1.44-7.52). Those with 100% - $<200\%$ FPL were 2.02 (95% CI 0.87-4.71) times more likely to report abuse than those with $\geq 200\%$ FPL. Smoking emerged as a significant confounder; women who smoked in the 3 months prior to pregnancy were 7.63 (95% CI 4.05-14.37) times more likely to report abuse than those who did not report smoking (Table 4).

Intimate partner violence during pregnancy

Univariate logistic regression showed that FPL, maternal education, marital status, race-ethnicity, maternal age, parity, pregnancy intention, rural/urban county, and maternal smoking in the three months prior to pregnancy were significant at a level of ≤ 0.10 (Table 3) and therefore these variables were used in the multivariate model. Again, year of birth was not a significant factor ($p= 0.85$). Following the backward selection

outlined above the final model included: income, maternal smoking and maternal education (HL p-value 0.12; Table 5).

Compared to women with income \geq 200% FPL, women with $<$ 100% FPL were 7.48 (95% CI 2.75-20.33) times likely to report abuse during pregnancy. Compared to the same referent, women with 100%- $<$ 200% FPL were 3.66 (95% CI 1.31-10.23) times as likely to report abuse. Smoking before pregnancy was a significant confounder ($p < 0.0001$), and women who smoked were more likely to have reported abuse during pregnancy (OR 6.31; 95% CI 2.93-13.56). While maternal education remained insignificant with regard to association with IPVP, the addition of this variable to the model caused a greater than 10% change in the odds ratio and was kept in the model due to this confounding effect.

Prevalence of abuse before pregnancy and during pregnancy

The overall reported prevalence of abuse was 3.9% (95% CI; 2.98-5.23) in the 12 months prior to pregnancy and 2.5% (95% CI; 1.79-3.59) during pregnancy. It appears that pregnancy may be protective.

Comparisons between timing of abuse around pregnancy

Within the population of women who indicated they had been abused during one or both of the time periods 49.62% (n=77) had been abused during both time periods, 41.46 (n=71) had experienced IPV Only, and 8.92% (n=26) had experienced IPVP Only (Table 6). Comparisons made are exclusive; IPV Both vs. IPV Only compares the 77 women who indicated abuse in both time periods to the 71 women who indicated abuse

prior to pregnancy only. IPV Both vs. IPVP Only compares those 77 women who experienced abuse during both time periods to the 26 women who experienced abuse only during pregnancy. Similarly, IPVP Only vs. IPVB Only compares the 26 women who indicated they had been abused during pregnancy only to the 71 women who indicated they had experienced abuse prior to pregnancy only. Maternal drinking had cell sizes that were too small for analysis; therefore, this variable was dropped from the analysis.

The univariate multinomial model showed that low income was significantly associated with experiencing IPV Both relative to IPVB Only or IPVP Only. Univariate multinomial analysis also indicated that Asian/Pacific Islander and Hispanic women were less likely to experience IPV Both rather than experiencing IPVB Only or IPVP Only. Those who were less than 25 years old at the time of delivery had greater odds of experiencing IPV Both relative to experiencing IPVP Only. Being unmarried or a non-smoker was associated with an increased risk of experiencing abuse IPVP Only relative to those who experienced IPVB Only. Non-smokers had lower odds of experiencing IPV Both compared to women who experienced IPVB (Table 7).

In the multivariate multinomial model income was not significantly associated with abuse for any of the three outcomes (Table 8). Socio-demographic characteristics were not significantly different between women who experienced IPV Both and women who experienced IPVB Only. Compared to women who experienced abuse during pregnancy only, women less than 25 years old at the time of delivery had odds of experiencing IPV Both 4.90 (95% CI 1.18-20.36) times those greater than 25 years old at the time of delivery. Unmarried and non-smoking women had decreased odds of

experiencing IPV Both (aOR 0.07; 95% CI 0.01-0.40, aOR 0.08; 95% CI 0.01-0.61) than IPV Only.

In a comparison of women who experienced abuse before pregnancy only vs. those who experienced abuse during pregnancy only, women who were unmarried (aOR 14.94; 95% CI 3.01-74.14), non-smoking (aOR 6.11; 95% CI 1.35-27.73), or Hispanic (aOR 4.78; 95% CI 1.01-22.76) had higher odds of experiencing abuse during pregnancy. Women with less than a high school education had lower odds of experiencing abuse during pregnancy only (aOR 0.13; 95% CI 0.02-0.87) relative to experiencing abuse before pregnancy only.

CONCLUSIONS

The first hypothesis of this study was that income was associated with IPVB and IPVP. The analysis revealed that income was independently associated with both IPVB and IPVP, though the magnitude of the association was higher for IPVP. Therefore the first hypothesis was found to be true. Abuse during pregnancy can lead to serious adverse health outcomes; impoverished women may have be more susceptible to this form of abuse and have fewer resources to fall back on.

The second hypothesis of this study was that other characteristics would alter the association between income and IPVB and IPVP. Maternal smoking in the three months prior to pregnancy was also an independent risk factor for both IPVB and IPVP. Maternal education affected the association between income and IPVP only but not the association between income and IPVB. While many of the commonly studied variables including, race, maternal age, etc, were significant in the univariate analysis, these variables were not independently associated with IPVB in the multivariate analysis.

The third hypothesis of this study was to determine whether there are differences in the demographic characteristics of women who experience abuse only before pregnancy, only during pregnancy, or at both times. Direct comparison using a multinomial model showed that women abused only during pregnancy differed significantly in age, marital status, education, race and smoking status, from women abused at other times implying that this group of women is different from abused women in general.

DISCUSSION

Neither smoking nor income is likely to have a causal relationship with IPV or IPVP. It could be that income is a marker for other social, demographic and cultural influences. Similarly, smoking may be a marker for other social influences such as life stress. It is known that stress can trigger smoking and studies have shown that life stress has been associated with IPV and IPVP (49, 50). This study is focused on socio-demographic factors, therefore direct associations between stressful life events and IPV/IPVP were not examined.

Maternal age and race-ethnicity

In both multivariate logistic models it is very important to note those variables which are not associated with IPV/IPVP, such as maternal age and race/ethnicity. While these variables were associated in a univariate analysis they drop out when other variables are introduced to the multivariate model. The PRAMS survey did not include women under the age of 20 at the time of delivery. Therefore, it is possible that some age effect was missed. Given that many young mothers are either still in school or working low wage jobs, income could have diminished impact among young women. The exclusion of this group of women may bias our results, showing a greater effect than exists in the whole population of child bearing women.

Race and ethnicity are over-sampled by the PRAMS survey specifically to increase our power to detect effects among these populations. The fact that race/ethnicity dropped out of the multivariate model make it likely that increased risks of IPV/IPVP

are not due to cultural differences, but rather that poverty is the issue we should be more closely examining.

Income

This study found results that are different from other studies. Namely that income is the primary predictor of abuse around pregnancy in a multivariate model. There could be several contributing factors for why this is. First there are many studies that did not use multivariate modeling but presented the prevalence of abuse by income level (13, 30, 32) or selected a limited population (31) such that the results may not be applicable to the general population. Several studies focused directly on low income populations; given the constrained variability of such a population income data were not collected or there was not enough variability in income to find a difference; this method would bias the results toward the null (8, 10, 41). One study included income in the multivariate model to control for the effect it might have had, however, the multivariate odds ratio was not reported as the association of interest was IPV and maternal complications (28).

Maternal education

Bohn et al. (14) set out to study the associations between socio-demographic variables and IPV and IPVP, however, their results differ from ours. Their results show that education is the most strongly associated characteristic for IPV and IPVP in the multivariate model. Income drops out of their model, however, differences in populations and in measurement methods may be the cause of the different results seen in this study. Data collection was conducted differently. Bohn et al. (14) conducted face-to-face

interviews instead of self-report survey, which as previously mentioned can result in an increase in abuse disclosure (7). Additionally, IPV in the Bohn study was defined as “has your partner ever hurt you” while this study limited the definition of IPV to the 12 months prior to pregnancy (i.e., IPV_B). Their study included women down to 15 years of age while we limited ours to at least 20 years. Inclusion of younger women could have caused the income variable to have less impact. This study used FPL to classify income while Bohn et al. just used monthly income.

The analysis of this study were re-run using the same income and education (<12 yrs; >= 12 yrs) categories as Bohn et al. yet our results did not change. There was some concern that by placing education into four categories we may have diminished power to show effects. Therefore the analysis was also re-run with the education variable placed into two categories (<16 yrs, >= 16 yrs). Again, this did not change our results.

To my knowledge this is the first study to use a multinomial analysis to compare socio-demographics of women abused during different time periods, therefore no direct comparison to other studies may be made.

Measurement of IPV

Differences in the measurement of income and of IPV may also play a role in the differences seen. Several studies use method of payment (i.e., Medicaid) as a proxy for income (12, 30, 41). By using a proxy like Medicaid some resolution is lost. Also, there may be some differential misclassification issues. This might occur because some people who would qualify for Medicaid may not use it. This kind of misclassification would

place some low income people in the higher income bracket, which would diminish any income effect.

Some studies conducted face-to-face interviews (8, 14, 30, 41), while others used questionnaires in doctor offices (31) and, like our study, others still used PRAMS which sends questionnaire to postpartum women at home (29). It has been shown that disclosure is higher in situations where women are asked directly about abuse (7).

Poverty

Poverty has long been associated with poor health. In this study our measure of poverty is one that is relative to the norms of our society. A large body of literature points toward inequality of income as being a better predictor of disparities in health. (51-53). Low income people have been assessed as having a poor self assessment of personal health (54-55) as well as having a lower perceived level of control over their lives (54). Illness can often lead to poverty by sheer cost of health care and as a result of being unable to work. Similarly, there is some debate about the direction of the association found between poverty and IPV/IPVP. It is plausible to imagine that poverty causes a great deal of stress which could manifest itself as violent behaviors. On the other hand it some may argue that behavioral tendencies toward violence could result in an impoverished status. On the part of the violent partner this may be due to defiance and an inability to move ahead in the work place, while on the part of the victim emotional scars as well as physical ones could impede economical gain. Some women may call in sick due to chronic depression or may not attempt to seek educational or employment advances due to lower self esteem caused by abuse.

Intimate partner violence before and during pregnancy

Prevalence and associations

Many studies imply that pregnancy is a special time of particular risk relative to all other times in life. This study's finding that the prevalence of abuse before pregnancy (3.9%) was higher than abuse during (2.5%) pregnancy is similar to the four previous PRAMS studies. This sample was relatively small and did not detect a statistically significant difference, but the two large multi-state PRAMS studies have detected a significant difference (12, 32). This implies that pregnancy is a protective factor for many women. In this study, the prevalence of abuse before pregnancy was lower than other studies have found when surveying the entire state population (3). This is likely due to the fact that while PRAMS is a population based survey, only a subpopulation of all women are sampled. PRAMS only reaches women who 1) became pregnant and 2) those who had pregnancies resulting in a live birth.

Looking further into the differences between the populations of women abused before pregnancy vs. those abused during pregnancy, the univariate and multivariate analyses showed that the characteristics that were significantly associated with each outcome were the same for each model (i.e., smoking and income). The association between income and IPVP were of a higher magnitude than that for IPV. Abuse during pregnancy may be even higher among low income women due to an increase in vulnerability. Pregnancy is a delicate time and the effect of poverty may be magnified when the stress of a pregnancy is added to the equation. The increased magnitude of the association between income and IPVP indicated that those who experience IPVP are a part of a special subpopulation of abused women.

Maternal education and financial independence

Education was an important confounder in the IPVP model; it could be speculated that education plays a more important role with regard to IPVP because those women hit during pregnancy may find it harder to leave an abusive relationship due to a lack of empowerment. Financial independence may also be more important for women who are hit during pregnancy rather than before. Without economic resources it can be difficult to leave an abusive situation. When a woman becomes pregnant she is worried about her ability to support herself as well as her child. Without the extra burden of supporting a child women may find it easier to leave abusive situations prior to pregnancy; this difference may account for the difference in magnitude and strength of association between income and IPV and IPVP (14). Without information on why abuse stops for some and not for others we are unable to make any concrete deductions from this. It is possible that some men stop abuse out of concern for the baby, if this is the case a woman's ability to leave the situation becomes less of a point of interest.

Violent environments

Lower income women may come from environments in which violence is more prevalent and generally normal to see and experience. Haukkala (28) found that lower income people had higher scores on the Cynical Distrust Scale which measures different kinds of hostility. Work by Cunradi et al. (29) showed that neighborhood poverty was a strong indicator of both male to female and female to male intimate partner violence. This is interesting because income plays an important role in determining if abuse

occurred around pregnancy and yet is insignificant when looking differences between each time period.

Timing of abuse

By evaluating the differences between discrete groups of women within the population of abused women this study teased out subtle differences between the time periods surrounding pregnancy. Most interesting was that there were no significant differences between women who experienced abuse during both time periods and those who were abuse before pregnancy only. This is important because it appears that there is no specific difference that differentiates women who somehow get away from the abuse and those who don't.

Marital status

Significant differences in a number of demographics emerged for women who only experienced abuse during pregnancy. Being unmarried was associated with increased risk of experiencing abuse during pregnancy relative to both before pregnancy only and before and during pregnancy. It could be that for women who have partners who are not fully invested in the relationship the pregnancy may be unwanted by the male partner and could trigger acts of hostility.

Maternal age and education

Being a young mother was associated with experiencing abuse during both time periods relative to only during pregnancy. This could be due to the fact that young

women have been shown to experience more abuse in general. Women with less than a high school degree were more likely to experience abuse before pregnancy only rather than abuse during pregnancy only. Significant differences in age and education level point towards empowerment as being an important factor in determining if abuse will occur during pregnancy.

Maternal race-ethnicity

Another interesting factor that emerged was that Hispanic women had significantly higher odds of experiencing abuse during pregnancy rather than before pregnancy. This finding is interesting and further studies should follow up on it; we could be detecting a difference in cultural norms regarding violence.

Maternal smoking

Oddly, being a non-smoker in the three months prior to pregnancy was associated with abuse only during pregnancy. I would suggest that this is an artifact of small sample size; many more women were non-smokers than smokers therefore this observation could be due to chance.

Empowerment

Overall, the sub-analysis of abused women implies that it may be interesting to look more closely at women who stay in abusive relationships vs. those who experience abuse once or twice and then leave. The fact that income is not significantly associated with any difference between abuse during each time period indicates that while poverty is

associated with abuse around pregnancy; other socio-demographic factors related to empowerment and social support such as marital status, age and education may be more important in determining the pattern of abuse.

Limitations

While PRAMS is a population based survey it is important to note that this survey only represents women who became pregnant and for whom that pregnancy resulted in a live birth. Therefore we are by definition excluded all miscarriages, elective abortions, still births etc., as well as all women of reproductive age who did not become pregnant during the study years. As such, we are excluding a population of women who experienced IPV, but who did not go on to have a child with the partner perpetrating the abuse. IPV, therefore, may not be a good proxy for IPV in general. Additionally, this study is cross-sectional and therefore cannot be used to detect causality. This study does not seek to show a causal mechanism, instead, it is geared at describing the characteristics associated with women suffering from IPV around the time of pregnancy. Another problem that may arise with the study is that the nature of this survey leaves it prone to recall bias. Women are asked about events that may have occurred up to 25 months prior to the survey. Bias may also be introduced by selective reporting since these surveys are based on self-reported incidences. Some women may not feel comfortable answering these surveys, or since this is conducted at the home it is conceivable that a controlling partner may prevent the woman from disclosing information.

There are some indications that information regarding the partner of the woman might be useful in predicting IPV and IPVP (56-57). This study was limited to those

primarily to information about the female partner. Additionally, this study is based on a survey which has a limited ability to measure some complicated aspects of people's lives and generate variables necessary to fully understand the relationships between these variables and IPV or IPVP. Perhaps most important is that IPV and IPVP status are based on one question apiece. We may be missing some cases by measuring abuse only once, a multi-measurement assessment tools would be more sensitive.

Another limitation is age. We could only evaluate those women 20 years old or greater due to Oregon child abuse laws. This may leave out an important population and may make it difficult to discern any differences that may exist given the limitations placed on this measurement. Marital status is a problem being that it was categorized as "Married/Separated" or "Divorced/Annulled/Single". In reality there may be vast differences between such categories as married and separated. A final limitation to our study is that IPV was assessed by asking about a time period consisting of 12 months, with IPVP was addressed by asking about a 9 month time period. The difference in the two time frames may be why we notice a decrease in the prevalence of abuse during pregnancy. IPV is often a repetitive act (58) therefore a 9 month time frame cannot be extrapolated to represent a 12 month time frame.

Policy and Future Studies

Future studies are needed to fully examine the possible differences that may differentiate women who are hit during pregnancy from other IPV victims. Given past findings (15) indicating that women who are hit during pregnancy are at increased risk of femicide and the findings of this study showing different magnitudes of association

between income and IPV or IPVP, it would be interesting for future studies to specifically address whether or not this population of women is truly a unique one, and what role economic pressures play in the problem. To do this it would be beneficial to use a multi-state PRAMS sample to examine, using multivariate modeling, those women who are only hit during pregnancy. Additionally, interaction effects may prove to be enlightening particularly with regard to race/ethnicity and income. Studies have found that while black Americans show an increase in health status as income increases, the effect is not as dramatic as it is among white Americans (59, 60). It is possible that there could be a similar interaction in this case.

PRAMS is working on becoming a longitudinal study in which the same mothers who were sampled postpartum will be followed for several years. With the addition of this portion of PRAMS it will be possible to examine with greater clarity the pattern of abuse. However, it will be important that we include questions regarding the partner. Without knowing if the partner stays consistent or changes we cannot say anything about whether or not these women are leaving abusive relationships. Additional demographic information about the partner could also be important for this analysis. It would be interesting to use PRAMS-2 to look at trends in income and abuse. It may be that those women who escape abusive situations increase their economic standing while those who continue or begin abuse decrease their economic situation. More likely is that women of low income will be more likely to report constant abuse, while income will not be an important predictor of sporadic or one time only abuse. Additionally, it would be important to add more items characterizing the severity, frequency, and type of abuse, as well as items about factors that may empower women to end an abusive relationship.

The current public health message is that all women are at risk for abuse. This study supports that message in that there are women across each demographic who report abuse both before and during pregnancy. However, this study also clearly shows that low income women are much more likely to report abuse than those of relatively higher income. The discrepancy between the public health message and what is found in the literature is reasonable. It would be a disservice to focus all of our efforts on one particular economic population. We cannot say that because the literature has found poorer women to be a higher risk of abuse we should focus exclusively on that population. Instead we should use this information as a method of directing the relative allocation of funds and efforts. More effort should be placed on reaching out to lower income women, who do not have the same resources as others may. Prevention campaigns, counseling services, and women's shelters should be placed in areas aimed at those most at risk. Additionally, efforts should be made to reduce community poverty. Currently many people are bombarded with violent images via the media as well as at home. Policies that foster employment opportunities, school funding, parks, libraries and other public institutions could be a useful prevention strategy.

Table 1. Population Characteristics

Characteristic	n*	Unweighted %	Weighted %
Total	3327		
IPVB			
Yes	148	2.9	4.0
No	3179	95.6	96.0
IPVP			
Yes	97	4.4	2.5
No	3230	94.1	97.5
Income[§]			
< 100% FPL	676	20.1	16.2
100%-< 200% FPL	899	26.9	28.3
>= 200% FPL	1364	40.5	55.5
Maternal Education			
< 12 years	748	22.5	16.3
12 years	1005	30.1	32.4
13-15 years	769	23.1	25.0
>= 16 years	805	24.2	26.4
Marital Status			
Married/Separated	2292	69.1	76.6
Not Married/Divorced/Annulled	1035	30.9	23.4
Race-Ethnicity of Mother			
Non-Hispanic White	1100	33.1	75.8
Non-Hispanic Black	367	10.9	1.9
Non-Hispanic American Indian/Alaska Native	369	11.1	1.4
Non-Hispanic Asian/Pacific Islander	572	17.3	5.2
Hispanic	919	27.5	15.7
Maternal Age at Birth			
20-24	1100	32.8	32.8
> 24	2227	67.2	67.3
Parity			
1 st Child	1224	36.9	36.4
Not 1st Child	2103	63.1	63.62
Pregnancy Intention			
Intended	1987	59.1	63.4
Unintended	336	10.0	8.7
Mistimed	947	28.2	25.8
Urban/Rural			
Urban	2661	80.0	77.5
Rural	666	20.0	22.5
Maternal Smoking			
Yes	664	19.8	22.4
No	2641	78.5	77.6
Maternal Drinking[¶]			
> 6 drinks / week	63	1.9	2.7
0-6 drinks / week	3213	95.1	94.4

* Unweighted number of respondents.

§ Based on annual family income before pregnancy.

|| Maternal smoking in three months prior to pregnancy.

¶ Maternal drinking > 6 drinks/week in three months prior to pregnancy.

Table 2. Weighted prevalence of IPV and univariate analysis.

Characteristic	n*	Sample (%) [†]	IPVB (%) [‡]	OR (95% CI)	p-value
Total	3327				
Income[§]					
< 100% FPL	676	16.17	9.13	5.42 (2.37-12.41)	0.0001
100%- < 200% FPL	899	28.34	4.82	2.73 (1.19-6.25)	0.0173
≥ 200% FPL	1364	55.49	1.82	Referent	
Maternal Education					
< 12 years	748	16.31	6.40	Referent	
12 years	1005	32.35	5.01	0.77 (0.36-1.65)	0.5046
13-15 years	769	24.95	3.42	0.52 (0.22-1.22)	0.1321
≥ 16 years	805	26.38	1.65	0.25 (0.08-0.73)	0.0116
Marital Status					
Married/Separated	2292	76.62	2.91	0.38 (0.21-0.69)	0.0016
Not Married/Divorced/Annulled	1035	23.38	7.36	Referent	
Race-Ethnicity of Mother					
Non-Hispanic White	1100	75.78	3.98	Referent	
Non-Hispanic Black	367	1.88	6.91	1.79 (1.02-3.15)	0.0438
Non-Hispanic American Indian/Alaska Native	369	1.44	9.46	2.52 (1.49-4.26)	0.0006
Non-Hispanic Asian/Pacific Islander	572	5.21	1.62	0.40 (0.17-0.92)	0.0303
Hispanic	919	15.68	3.71	0.93 (0.55-1.56)	0.7736
Maternal Age at Birth					
20-24	1100	32.75	6.65	2.63 (1.44-4.81)	0.0017
> 24	2227	67.25	2.64	Referent	
Parity					
1st Child	1224	36.38	2.46	0.50 (0.25-1.00)	0.0512
Not 1st Child	2103	63.62	4.81	Referent	
Pregnancy Intention					
Intended	1987	63.4	2.84	Referent	
Unintended	336	8.7	9.13	3.44 (1.53-7.72)	0.0027
Mistimed	947	25.8	4.58	1.65 (0.82-3.31)	0.1632
Urban/Rural					
Urban	2661	77.46	3.28	Referent	
Rural	666	22.54	6.27	1.98 (1.04-3.76)	0.0376
Maternal Smoking					
Yes	664	22.37	11.84	7.86 (4.27-14.47)	<0.0001
No	2641	77.63	1.68	Referent	
Maternal Drinking[¶]					
Yes	63	2.70	9.95	2.87 (0.84-9.76)	0.0913
No	3213	3213	3.71	Referent	
Year of Birth					
2000	1779	53.51	3.77	0.90 (0.49-1.64)	0.7316
2001	1548	46.49	4.17	Referent	

* Unweighted number of respondents.

† Weighted percentage.

§ Based on annual family income before pregnancy.

|| Maternal smoking in three months prior to pregnancy.

¶ Maternal drinking > 6 drinks/week in three months prior to pregnancy.

Table 3. Weighted Prevalence IPVP and Univariate Odds Ratios

Characteristic	n *	Sample (%) [†]	IPVP (%) [†]	OR (95% CI)	p-value
Total	3327				
Income[§]					
< 100% FPL	676	16.17	6.85	9.70 (3.51-26.84)	<0.0001
100%-< 200% FPL	899	28.34	3.18	4.34 (1.51-12.41)	0.0063
> = 200% FPL	1364	55.49	0.75	Referent	
Maternal Education					
< 12 years	748	16.31	2.98	Referent	
12 years	1005	32.35	3.77	1.27 (0.48-3.35)	0.6226
13-15 years	769	24.95	2.37	0.79 (0.27-2.34)	0.6681
> = 16 years	805	26.38	0.91	0.30 (0.07-1.31)	0.1094
Marital Status					
Married/Separated	2292	76.62	1.51	0.24 (0.12-0.51)	0.0002
Not Married/Divorced/Annulled	1035	23.38	5.91	Referent	
Race-Ethnicity of Mother					
Non-Hispanic White	1100	75.78	2.46	Referent	
Non-Hispanic Black	367	1.88	5.25	2.20 (1.12-4.31)	0.0221
Non-Hispanic American Indian/Alaska Native	369	1.44	4.66	1.94 (0.97-3.86)	0.0609
Non-Hispanic Asian/Pacific Islander	572	5.21	0.96	0.39 (0.14-1.06)	0.0656
Hispanic	919	15.68	2.92	1.19 (0.64-2.21)	0.5778
Maternal Age at Birth (years)					
20-24	1100	32.75	4.66	3.20 (1.54-6.62)	0.0018
> 24	2227	67.25	1.51	Referent	
Parity					
1 st Child	1224	36.38	1.56	0.49 (0.22-1.10)	0.0847
Not 1st Child	2103	63.62	3.10	Referent	
Pregnancy Intention					
Intended	1987	63.40	1.40	Referent	
Unwanted	336	8.70	5.59	4.17 (1.48-11.78)	0.0070
Mistimed	947	25.80	3.92	2.88 (1.25-6.64)	0.0133
Urban/Rural					
Urban	2661	77.46	1.96	Referent	
Rural	666	22.54	4.53	2.38 (1.11-5.08)	0.0253
Maternal Smoking					
Yes	664	22.37	7.06	6.13 (2.97-12.63)	<0.0001
No	2641	77.63	1.22	Referent	
Maternal Drinking[¶]					
> 6 drinks / week	63	2.70	5.83	2.42 (0.56-10.49)	0.2368
0-6 drinks / week	1323	94.40	2.49	Referent	
Year of Birth					
2000	1779	53.51	2.62	1.07 (0.51-2.25)	0.8542
2001	1548	46.49	2.45	Referent	0.8542

* Unweighted number of respondents.

† Weighted percentage.

§ Based on annual family income before pregnancy.

|| Maternal smoking in three months prior to pregnancy.

¶ Maternal drinking > 6 drinks/week in three months prior to pregnancy.

Table 4. Multivariate Model for IPV B

Variable	Odds Ratio (95% CI)	Overall P-value
Income*		0.0189
<100 FPL	3.29 (1.44-7.52)	
100%-< 200% FPL	2.02 (0.87-4.71)	
> = 200% FPL	Referent	
Maternal Smoking[†]		<0.0001
Yes	7.63 (4.05-14.37)	
No	Referent	

HL Goodness-of-Fit Test p-value = 0.16

* Based on annual family income in year prior to pregnancy.

[†] Maternal smoking in the three months prior to pregnancy.

Table 5. Multivariate Model for IPV P

Variables	Odds Ratio (95% CI)	Overall P-value
Income		0.0004
< 100% FPL	7.48 (2.75-20.33)	
100%-< 200% FPL	3.66 (1.31-10.23)	
> = 200% FPL	Referent	
Maternal Smoking[†]		< 0.0001
Yes	6.31 (2.93-13.56)	
No	Referent	
Mother's Education		0.5608
< 12 yrs	Referent	
12 yrs	2.33 (0.70-7.74)	
13-15yrs	2.27 (0.57-9.08)	
> = 16yrs	2.42 (0.46-12.81)	

HL Goodness-of-Fit Test p-value = 0.12

* Based on annual family income in year prior to pregnancy.

[†] Maternal smoking in the three months prior to pregnancy.

Table 6. Characteristics of abused women

Characteristic	Any Abuse: n*	Any Abuse: %†	IPV Both: N* (%)†	IPVB Only: n* (%)†	IPVP Only: n* (%)†
Total	174	100%	71 (49.62)	77 (41.46)	26 (8.92)
Income[§]					
< 100%	60	37.59	25 (48.59)	25 (26.86)	10 (30.51)
100%-200%	57	34.13	22 (40.30)	28 (30.10)	7 (21.13)
> 200%	36	28.28	13 (11.11)	17 (43.04)	6 (48.36)
Maternal Education					
< 12 years	43	25.02	15 (18.54)	21 (35.69)	7 (22.68)
12 years	77	40.19	34 (51.04)	31 (29.05)	12 (31.58)
13-15 years	36	21.10	17 (24.56)	14 (18.02)	5 (16.09)
>= 16 years	18	12.70	5 (5.86)	11 (17.24)	2 (29.64)
Marital Status					
Married/Separated	105	46.28	22 (49.22)	39 (65.25)	8 (25.14)
Not Married/Divorced/Annulled	69	53.72	49 (50.78)	39 (34.75)	18 (74.86)
Race-Ethnicity of Mother					
White [‡]	31	3.72	25 (80.53)	22 (71.48)	4 (34.04)
African American [‡]	11	2.63	13 (3.14)	12 (3.48)	6 (8.12)
American Indian/Alaska Native [‡]	36	3.33	15 (2.75)	19 (4.30)	2 (2.06)
Asian/Pacific Islander [‡]	45	17.68	2 (0.94)	6 (3.56)	3 (7.77)
Hispanic	51	72.63	16 (12.64)	18 (17.18)	11 (48.02)
Maternal Age at Birth					
< 25	87	52.78	39 (65.70)	36 (42.43)	12 (28.99)
> 24	87	47.22	32 (34.30)	41 (57.57)	14 (71.01)
Parity					
1st Child	47	25.36	16 (16.77)	20 (29.69)	11 (52.97)
Not 1st Child	127	74.64	55 (83.23)	57 (70.31)	15 (47.03)
Pregnancy Intention					
Intended	66	33.05	26 (37.32)	28 (59.53)	13 (36.79)
Unintended	37	20.24	13 (21.76)	21 (20.08)	3 (12.89)
Mistimed	67	46.71	30 (40.92)	27 (20.39)	9 (50.31)
Urban/Rural					
Urban	58	36.09	43 (59.52)	52 (69.79)	21 (61.00)
Rural	116	63.91	28 (40.48)	25 (30.21)	5 (39.00)
Maternal Smoking					
Yes	83	37.37	41 (70.40)	40 (62.92)	8 (16.12)
No	89	62.63	30 (29.60)	36 (37.08)	17 (83.88)
Maternal Drinking[¶]					
Yes	9	6.45	7 (7.38)	2 (6.77)	0 (0.00)
No	162	93.55	63 (92.62)	73 (93.23)	26 (100.00)

* Unweighted number of respondents.

† Weighted percentage.

§ Based on annual family income before pregnancy.

‡ Non-Hispanic

|| Maternal smoking in three months prior to pregnancy.

¶ Maternal drinking > 6 drinks/week in three months prior to pregnancy.

Table 7. Univariate Model: Timing of Abuse around Pregnancy

Characteristic	IPV Both vs. IPV Only (Referent)	p-value	IPVP Only vs. IPV Only (Referent)	p-value	IPV Both vs. IPVP Only (Referent)	p-value	Overall p-value
Income							0.1130
< 100% FPL	7.01 (1.36-35.98)	0.0197	1.01 (0.17-6.02)	0.9904	6.93 (1.06-45.33)	0.0433	
100%-< 200% FPL	5.19 (1.02-26.35)	0.0472	0.62 (0.10-3.79)	0.6089	8.30 (1.19-57.95)	0.0328	
> = 200% FPL	Referent		Referent		Referent		
Maternal Education							0.5416
< 12 years	1.53 (0.16-15.01)	0.7158	0.37 (0.03-3.99)	0.4120	4.14 (0.27-64.24)	0.3103	
12 years	5.17 (0.59-45.50)	0.1386	0.63 (0.06-6.57)	0.7011	8.18 (0.61-109.56)	0.1124	
13-15 years	4.01 (0.40-40.01)	0.2366	0.52 (0.04-6.33)	0.6073	7.72 (0.50-120.22)	0.1444	
> = 16 years	Referent		Referent		Referent		
Marital Status							0.0504
Married/Separated	1.94 (0.59-6.36)	0.2756	5.59 (1.41-22.23)	0.0145	0.35 (0.09-1.33)	0.1225	
Not Married /Divorced/Annulled	Referent		Referent		Referent		
Race-Ethnicity							0.0928
African American [‡]	0.80 (0.28 -2.25)	0.6720	4.90 (0.72-33.44)	0.1052	0.16 (0.02-1.08)	0.0607	
Asian/Pacific Islander [‡]	0.23 (0.04-1.28)	0.0933	4.59 (0.53-39.92)	0.1677	0.05 (0.00-0.55)	0.0141	
American Indian/ Alaska Native [‡]	0.57 (0.22-1.47)	0.2450	1.01 (0.12-8.25)	0.9955	0.57 (0.07-4.58)	0.5929	
Hispanic	0.65 (0.24-1.78)	0.4043	5.87 (0.91-37.65)	0.0620	0.11 (0.02-0.70)	0.0195	
White [‡]	Referent		Referent				
Maternal Age at Birth							0.5787
20-24	2.60 (0.80-8.46)	0.1127	0.55 (0.15-2.11)	0.3862	4.69 (1.25-17.62)	0.0220	
> 24	Referent		Referent		Referent		
Pregnancy Intention							0.3680
Mistimed	3.20 (0.83-12.40)	0.0921	3.99 (0.80-19.92)	0.0913	0.80 (0.16-3.94)	0.5513	
Unwanted	1.73 (0.37-8.01)	0.4838	1.04 (0.21-5.21)	0.9630	1.66 (0.31-8.90)	0.7857	
Intended	Referent		Referent		Referent		
Urban/Rural							0.7731
Urban	1.57 (0.44-5.57)	0.4842	1.48 (0.25-8.75)	0.6675	1.06 (0.19-5.90)	0.9436	
Rural	Referent		Referent		Referent		
Maternal Smoking[†]							0.0006
Yes	Referent		Referent		Referent		
No	0.71 (0.22-2.30)	0.5718	8.83 (2.29-34.09)	0.0016	0.08 (0.02-0.31)	0.0002	

[‡]Non-Hispanic[†]Maternal smoking in the three months prior to pregnancy.

Table 8. Multivariate Multinomial Timing of Abuse Analysis

Characteristic	IPV Both vs. IPV Only		IPVP Only vs. IPV Only		IPV Both vs. IPVP Only		Overall p-value
	(Referent)	p-value	(Referent)	p-value	(Referent)	p-value	
Income*							0.2905
<100% FPL	4.00 (0.67-24.03)	0.1296	1.59 (0.31-8.00)	0.5767	2.52 (0.37-17.24)	0.3451	
100% - < 200% FPL	4.88 (0.89-26.86)	0.0687	0.84 (0.18-3.82)	0.8177	5.83 (0.90-37.76)	0.0643	
>= 200% FPL	Referent		Referent		Referent		
Education							0.1206
< 12 yrs	0.35 (0.04-2.90)	0.3303	0.13 (0.02-0.87)	0.0358	2.79 (0.21-28.90)	0.3903	
12 yrs	3.11 (0.47-20.54)	0.2385	0.85 (0.17-4.10)	0.8354	3.68 (0.61-22.13)	0.1549	
13-15 yrs	2.61 (0.33-20.45)	0.3619	0.44 (0.08-2.56)	0.3633	5.88 (0.84-41.04)	0.0738	
>= 16 yrs	Referent		Referent				
Marital Status							0.0034
Unmarried	1.20 (0.21-6.73)	0.8336	14.94 (3.01-74.14)	0.0009	0.08 (0.01-0.61)	0.0151	
Married	Referent		Referent		Referent		
Race/Ethnicity							0.1201
African American [‡]	0.41 (0.06-2.76)	0.3562	1.51 (0.22-10.50)	0.6778	0.27 (0.04-2.06)	0.2058	
Asian/Pacific Islander [‡]	0.36 (0.05-2.59)	0.3108	3.62 (0.35-37.63)	0.2816	0.10 (0.01-1.82)	0.1194	
American Indian /Alaska Native [‡]	0.42 (0.08-2.35)	0.3253	0.37 (0.04-3.22)	0.3667	1.15 (0.12-11.28)	0.9069	
Hispanic	1.15 (0.22-5.93)	0.8633	4.78 (1.01-22.76)	0.0492	0.24 (0.05-1.17)	0.0769	
White [‡]	Referent		Referent				
Maternal Age							0.0913
20-24	2.16 (0.67-6.97)	0.1961	0.44 (0.13-1.52)	0.1937	4.90 (1.18-20.36)	0.0288	
> 24	Referent		Referent		Referent		
Maternal Smoking[†]							0.0079
Yes	Referent		Referent		Referent		
No	0.41 (0.08-2.18)	0.295	6.11 (1.35-27.73)	0.0189	0.07 (0.01-0.40)	0.0032	

*Based on annual family income in year prior to pregnancy.

[‡]Non-Hispanic

[†]Maternal smoking in the three months prior to pregnancy.

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APPENDIX A: PRAMS METHODOLOGY

Overall Methodology

The sequence of events used to collect data for PRAMS is as follows:

1. Preletter: A letter is sent as an introduction to PRAMS, alerting the mother that the questionnaire will be arriving soon.
2. Initial Mail Questionnaire Packet: A packet is sent to all sampled mothers 3-7 days after the preletter.
3. Ticker: The Ticker is a thank you and reminder note sent 7-10 days after the initial mail packet.
4. Second Mail Questionnaire Packet: Sent to all sampled mothers who have not yet responded 7-14 days after the Ticker.
5. Telephone Follow-up: This is done for all non-respondents 7-14 days after the last questionnaire is mailed out.

This series of mailings are sent out 2-4 months after delivery. The Questionnaire asks about the early postpartum period; therefore, the mailings are timed to make sure that all women will be able to respond for that time period. The data collection period can last up to approximately 60 days. Each month, a stratified random sample is selected from the birth certificate file. A customized tracking system, PRAMTrac, was designed by the CDC to assist in tracking the data collection process. PRAMTrac assists with scheduling mailings, telephone calls, preparing letters, and tracking responses.

The packet that is sent out contains more than just the questionnaire. A cover letter describes PRAMS and its purpose, explains how and why the mother was

chosen and elicits the mother's cooperation. The cover letter included in the second and third letter is slightly different in that there are additional appeals to get the mother to respond. The questionnaire itself is also included within the packet. The booklet is 14 pages long, printed with a bright cover. There is an extra sheet at the end for any comments from the mother. A self-addressed return envelope is also included so that the questionnaire may be easily returned. An additional brochure is included which has more information about PRAMS. This brochure contains many of the frequently asked questions about PRAMS. The final component of this packet is a 3-year calendar which is intended to be a memory aid for answering the questions on PRAMS.

If a telephone follow up is needed they are staggered over different times of the day and various days of the week in order to attempt to make contact. The calling period for each batch of selected participants runs from 2-3 weeks. Up to 15 calls are made to one number in an attempt to reach a mother. Telephone interviewers may arrange call-back interviews so that they are more convenient.

PRAMS Questionnaire

Topics included in PRAMS include prenatal care, obstetric history, maternal use of alcohol and cigarettes, physical abuse, economic status, maternal stress, contraception use, and infant development and health status. Other questions address social support and services, mental health and injury prevention.

Two types of questionnaires may be used in PRAMS. The self-administered questionnaire is used in the mailing packet, however, if a person does not respond an

interviewer-administered questionnaire may be used in the telephone phase. The interviewer-administered questionnaire includes the same questions as the self-administered questionnaire; yet some of the questions have been formatted slightly different in order to facilitate the different method of administration. PRAMS may be administered in English or in Spanish.

PRAMS Weighting Methods

A stratified sample of 150-300 new mothers are drawn every month from eligible birth certificates in Oregon. Oregon over-samples for low birth weight and racial/ethnic minorities. Annually, sample sizes are 1000-3000, divided among six strata. The annual sample is large enough to estimate statewide risk factors within 3.5% with 95% confidence. Within each strata the estimated proportions are slightly less precise (approximately 5% with 95% confidence).

The responses to PRAMS are linked to birth certificate data. The availability of this information for all Oregon births is the basis for drawing stratified random samples and the basis for generalizing the results to the state population. Therefore, the availability of all sampled women, regardless of whether they responded or not, is necessary for deriving non-response weights.

Frame non-coverage weights are calculated by comparing a years worth of frame files for a year of births to the calendar year birth tape which is provided to the CDC by the state. Omissions are usually due to late processing and are generally scattered evenly across the state. However, clusters may arise by hospital, county or time of year. Non-coverage effectively takes into accounts any differences in the total there

from the sample frame and known total from the birth tape. The mail/telephone system used by PRAMS has a low magnitude of non-coverage (approximately 1%-5%), so the adjustment factor for non-coverage is not much greater than 1.

The weight used in the analysis is derived by multiplying together the sampling, non-response and non-coverage components of the weight. This number can then be interpreted as the number of women like herself in the population that each response represents.

Due to this complex sample design PRAMS data must be analyzed using software that can adjust for the weighting procedures used. A Taylor series approximation is used to calculate the approximate standard errors for the estimates that are produced.

Reference: <http://oregon.gov/DHS/ph/pnh/prams/9899/ar9899.shtml>