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Intimate Partner Violence and Maternal Cigarette Smoking Before and During Pregnancy

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Abstract

OBJECTIVE—To determine the association of intimate partner violence with maternal cigarette smoking before and during pregnancy.

METHODS—Data were obtained for 196,391 U.S. mothers who delivered live neonates from 2004–2008 and completed the Pregnancy Risk Assessment Monitoring System survey 2–9 months postpartum. Intimate partner violence was defined as being physically hurt by a current or expartner in the year before or during pregnancy. Weighted descriptive and multivariate analyses were performed.

RESULTS—Compared with nonphysically abused women, those who experienced physical abuse were 2.1 times more likely to smoke before pregnancy (44.0% compared with 21.0%, $P<.001$) and 2.6 times more likely to smoke during pregnancy (29.6% compared with 11.4%, $P<.001$). Smoking prevalence during pregnancy was highest for abused women who were non-Hispanic white (42.3% smoked) and lowest for nonabused college graduates (2.2% smoked). Smoking rates more than tripled for college graduates in abusive relationships (2.2% compared with 7.1%). After adjusting for potential confounding factors, abused women were significantly more likely to smoke during pregnancy than nonabused women (adjusted odds ratio 1.95, $P<.001$, 95% confidence interval 1.80–2.12).

CONCLUSION—Women who experienced intimate partner violence had significantly higher rates of smoking before pregnancy and were less likely to quit during pregnancy than women who did not experience intimate partner violence. The American College of Obstetricians and Gynecologists and the U.S. Public Services Task Force recommend routine intimate partner violence screening with appropriate interventions to prevent violence against women, optimize safety, and improve health. Additional and targeted intimate partner violence assessment of women who smoke during pregnancy may prove especially beneficial.

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Intimate partner violence is a term used to describe a pattern of abusive and controlling behavior inflicted by a current or former partner that causes physical, sexual, or psychological harm.¹ It is a serious public health problem affecting persons of any race, ethnicity, culture, age, socioeconomic strata, education level, gender, and sexuality. Physical injuries such as fractures, bruises, and lacerations are the most obvious health effects of intimate partner violence. However, many other medical disorders and unhealthy behaviors such as depression, anxiety, posttraumatic stress disorder, asthma, chronic pain, hypertension, heart disease, diabetes, headaches, unintended pregnancy, at-risk drinking, substance use disorders, and cigarette smoking are associated with intimate partner violence.^{2–5} These comorbid conditions can be especially problematic during pregnancy.

Maternal prenatal tobacco use is one of the most serious yet preventable risk factors for adverse pregnancy and neonatal outcomes including fetal death, spontaneous abortion, premature birth, neonatal low birth weight, placental complications, sudden infant death syndrome, and childhood respiratory or behavioral disorders.⁶ A few studies have reported a general association between cigarette smoking during pregnancy and intimate partner violence,^{7–10} but comparisons among different demographic groups and different perinatal time periods using a U.S. population-based study have not been well studied. The objective of this study was to estimate the prevalence of preconception and antenatal cigarette smoking among various strata of U.S. women who recently experienced intimate partner violence and to compare their rates of smoking with women who did not report intimate partner violence.

MATERIALS AND METHODS

Data were derived from the secondary analysis of postpartum survey responses collected through the Pregnancy Risk Assessment Monitoring System. The Pregnancy Risk Assessment Monitoring System is an ongoing population-based surveillance conducted by individual states under a cooperative agreement with the Centers for Disease Control and Prevention (CDC). The present analyses used data from 196,391 mothers who were surveyed 2–9 months after delivery of a live birth during 2004–2008. Data from 33 states and New York City were included if their overall response rate was at least 70% for 2004–2006 and at least 65% or more for 2007–2008 as per recommended thresholds established by the CDC to minimize nonresponse bias. Data were used for all 5 years (2004–2008) from 19 states: Alaska, Arkansas, Colorado, Georgia, Hawaii, Illinois, Maine, Maryland, Michigan, Minnesota, Nebraska, New Jersey, New York (excluding New York City), Oklahoma, Oregon, Rhode Island, Utah, Vermont, and West Virginia; for 4 years from New York City, North Carolina, Ohio, and South Carolina; and for 1–3 years from Delaware, Florida, Louisiana, Massachusetts, Mississippi, Missouri, New Mexico, Pennsylvania, Tennessee, Wisconsin, and Wyoming.

The mothers were randomly selected from a stratified systematic sample with the majority of states intentionally oversampling women who delivered low-birth-weight neonates. Stratification is electively done by each state to assure adequate data collected for small but high-risk populations. Questionnaires were initially mailed monthly to 100–300 new mothers per state 2–3 months after delivery and followed by one to two subsequent mailed

surveys unless a response is received. A telephone interview is conducted if there has been no response to the mailed surveys. Per CDC protocol, at least 10% of data entries for both mail and phone responses are crosschecked by another person to assure accuracy. The data are weighted by the CDC to make the results representative of all women delivering a live neonate in each respective state and to account for survey design, stratification, noncoverage, and nonresponse. The weighting process provides estimates of state risk factors within 3.5% at 95% confidence. Further details about the Pregnancy Risk Assessment Monitoring System methodology are described by Shulman and colleagues.¹¹ Information is also available at www.cdc.gov/prams and includes all the survey questions.

Variable measures were derived from Pregnancy Risk Assessment Monitoring System survey questions. Women were asked whether they smoked cigarettes “during the 3 months before pregnancy” and “during the last 3 months of pregnancy.” For this study, intimate partner violence was defined as a positive response to being “pushed, hit, slapped, kicked, choked, or physically hurt” by a current or exhusband or partner during pregnancy or the 12 months before pregnancy. An intended pregnancy was defined as a pregnancy that was wanted by the mother then or sooner. An unintended pregnancy was defined as a pregnancy that was wanted later or not wanted then or at any time in the future. Maternal age, race, educational level, and marital status were derived from the birth certificate. Annual household income was obtained from the Pregnancy Risk Assessment Monitoring System survey.

Weighted univariate and bivariate analyses were conducted using STATA 12.0. The weighted univariate analysis applying the χ^2 test was performed to evaluate the association of the individual independent variables or confounders with intimate partner violence using $P < .05$ as the level of significance. Weighted univariate and multivariate logistic models analyses were performed to report adjusted odds ratios. Backward logistic regression model analysis was performed manually adjusting for important potential confounders and included age, race, Hispanic ethnicity, years of education completed, annual household income, marital status, and pregnancy intention. A small percentage of women (1.76% of 199,917) who otherwise completed the survey but did not answer questions about intimate partner violence and smoking were not included in our analyses of 196,391 women. Missing responses from all maternal variables analyzed accounted for less than 5% of the population from any strata and were excluded. The Maryland Department of Health and Mental Hygiene institutional review board qualified this project, a secondary analysis of an existing public deidentified data set, as exempt research.

RESULTS

Of the 196,391 mothers who responded to the 2004–2008 Pregnancy Risk Assessment Monitoring System survey, 6.4% reported that they were physically abused by a current or former partner during pregnancy or the year before pregnancy (Table 1). Overall, 22.5% of women smoked during the 3 months before pregnancy, 12.5% smoked during the last 3 months of pregnancy, and 17.5% smoked postpartum (Table 1). Cigarette smoking during the 3 months before pregnancy was reported by 21.0% of mothers who were not physically

abused and by 44.0% of abused mothers (Table 2). Fifty-six percent of abused women did not smoke before pregnancy (data not shown).

Compared with smoking rates before pregnancy, smoking rates during pregnancy decreased 46% among nonabused women (from 21.0% to 11.4%) and decreased 33% among abused women (from 44.0% to 29.6%) (Table 2). Smoking prevalence during pregnancy was highest for abused women who were non-Hispanic white (42.3% smoked), whose annual household income was less than \$15,000 (34.8% smoked), or had completed no more than 12 years of education (34.3% smoked). Smoking rates during pregnancy were lowest for nonabused women who were college graduates (2.2% smoked), Hispanic (3.8% smoked), or had total annual household incomes greater than \$50,000 (4.1% smoked). College graduates who experienced abuse had 3.2 times the antenatal smoking rate of college graduates who did not (7.1% compared with 2.2%, $P<.001$). Overall, smoking rates during pregnancy were 2.6 times higher among abused women than nonabused women (29.6% compared with 11.4%, $P<.001$). After controlling for age, race–ethnicity, education, marital status, pregnancy intention, and income, the adjusted odds ratio was 1.95 (95% confidence interval 1.80–2.12, $P<.001$; Table 3). Postpartum, the overall smoking prevalence was 37.5% among abused women and 16.1% among nonabused women (data not shown).

DISCUSSION

The findings for women who did not report abuse were consistent with other studies showing that approximately 40–50% of women who smoked before pregnancy were able to quit during pregnancy.^{12,13} Alarming, this study revealed that women who reported recent physical abuse were significantly more likely to smoke before pregnancy and less likely to quit during pregnancy than their nonabused counterparts. Compared with women who were not abused, the 2.6 times higher prevalence of smoking during pregnancy among abused women (29.6% compared with 11.4%) exposes more than twice as many of their pregnancies to the substantial risks associated with prenatal nicotine. According to a recent meta-analysis, abused women had higher rates of poor pregnancy outcomes such as premature birth and low neonatal birth weight.¹⁴ These adverse outcomes may, at least in part, be the result of high rates of tobacco use and therefore may be minimized by smoking cessation. It is estimated that 5–8% of preterm deliveries, 13–19% of term neonates with low birth weight, 23–34% cases of sudden infant death syndrome, and 5–7% of preterm neonatal deaths can be prevented by not smoking during pregnancy.¹⁵

Many smoking cessation tools are available to help women during pregnancy. The American College of Obstetricians and Gynecologists (the College) recommends that obstetricians use office-based interventions such as the “5 As” (Ask, Advise, Assess, Assist, Arrange) to help women quit smoking.^{16,17} Also, a web-based training endorsed by the College was created to help health care providers use various smoking cessation tools targeted for pregnant and nonpregnant women.¹⁸ Pregnant and postpartum women can easily access the National Quitline at 1-800-QUIT-NOW and the National Cancer Institute smoking cessation web site at www.women.smokefree.gov to review specific materials that are specifically designed for the perinatal time period. Despite the various tools available to help pregnant women stop

smoking, little is known about whether women who experience abuse have comparable success with these traditional smoking cessation methods.

Intimate partner violence is relatively common—one of three women has experienced intimate partner violence during her lifetime¹⁹ and is often isolated from friends and family with little to no support to overcome her addictive behavior. The health care setting may be the only outside professional point of contact for these women and offers a unique opportunity to assess for intimate partner violence. Knowledge about a woman's history of intimate partner violence may provide insight into why she smokes and is not able to quit. Universal prenatal intimate partner violence assessment during each trimester and at postpartum, as recommended by the College,²⁰ will help to identify women who have experienced intimate partner violence and facilitate appropriate services and support for them. Also, smoking during pregnancy may be a marker for a subgroup of women who experience intimate partner violence. Smoking or inability to quit during pregnancy should trigger additional intimate partner violence counseling or screening by prenatal care providers. Although causal conclusions cannot be drawn from the reported associations, providing the abused woman with resources to feel safe and prevent violence may potentially enhance her ability to minimize associated unhealthy behaviors such as smoking. By partnering with a local domestic violence organization, obstetric providers can help their patients in abusive relationships access counseling, legal aid, safety planning, and other useful information. A randomized controlled trial of tailored intimate partner violence-related counseling sessions and cognitive-behavioral therapy was effective in decreasing postpartum smoking relapse rates and improving pregnancy outcomes in a prenatal clinic serving mainly black women, 29% of whom had experienced physical or sexual abuse.^{7,21}

In this study, 44% of abused women responded that they had smoked “in the 3 months before [they] got pregnant.” These results are in accordance with past studies that reported a similar association between intimate partner violence and smoking in nonpregnant women.^{22–24} Routine intimate partner violence assessment of women of reproductive ages, as recommended by the U.S. Preventive Services Task Force,²⁵ will potentially help educate women about healthy relationships, increase their knowledge about how to access appropriate interventions to be safe, and reduce intimate partner violence-related health risks such as smoking. Implementation of both intimate partner violence assessment and smoking cessation intervention during the prepregnancy and interpregnancy time period would enable more women to begin pregnancy in a healthier nonsmoking state.

There are strengths and limitations to this study. The main strength is the use of data collected from the largest national probability sample of women who have recently delivered a live birth in the United States. This study provides estimates of maternal smoking status among various strata by intimate partner violence status at specific perinatal time intervals. Limitations also should be noted. Studies have shown that postpartum relapse is experienced by approximately half of the women who have quit smoking during pregnancy^{12,13} and this is generally consistent with our data. However, because Pregnancy Risk Assessment Monitoring System surveys are completed at varying times after delivery, women who responded to the survey 9 months postpartum have a greater time period for smoking to relapse than women who completed the survey 2 months postpartum. This made

comparisons between abused and nonabused postpartum women somewhat inconclusive because of the lack of data on when the survey was actually completed. The analysis of postpartum data was therefore abbreviated.

Questions about intimate partner violence on the Pregnancy Risk Assessment Monitoring System survey were somewhat restrictive. Women were only asked about physical abuse although both sexual and emotional abuse may be just as associated with unhealthy behavior.^{26,27} Broadening the definition of intimate partner violence would make the prevalence higher than reported in this study. Similarly, only intimate partner violence history up to 1 year before pregnancy was surveyed. Earlier experiences of abuse may have been influential in smoking initiation at a young age. As to be expected with any survey that asks about previous behaviors or experiences, responders to this postpartum study may not have accurately recalled their smoking status or episodes of physical abuse that occurred up to nearly 2 years ago. Self-report data on unhealthy habits or stigmatized conditions are also inherently subject to social desirability, inaccurate responses, nonresponse, and responder bias—all usually resulting in potentially lower reported rates of intimate partner violence and smoking. Also, only mothers with live births are surveyed by the Pregnancy Risk Assessment Monitoring System. No information is available about mothers who have had a miscarriage, stillbirth, or other nonviable pregnancy outcome although tobacco use and intimate partner violence can adversely affect these pregnancies.

Cigarette smoking is the leading known preventable cause of adverse pregnancy and neonatal outcomes. In this study, women who reported intimate partner violence 1 year before or during pregnancy had greater than twice the prevalence of smoking before pregnancy and were less likely to quit during pregnancy than women who had not reported intimate partner violence. Approximately 30% of abused women smoked during pregnancy. The significant and strong association between intimate partner violence and maternal smoking suggests that smoking may be a marker for a subgroup of women who are abused. It also indicates an important role for intimate partner violence assessment among reproductive-aged women as recommended by the College and the U.S. Preventive Services Task Force. In addition to the anticipated goal of preventing violence, routine intimate partner violence screening and appropriate interventions for these vulnerable women may greatly improve health. Knowledge of intimate partner violence status may contribute to the utilization of targeted or supplemental methods to help women in abusive relationships quit smoking.

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REFERENCES

1. World Health Organization. Geneva (Switzerland): World Health Organization; 2010. Preventing intimate partner and sexual violence against women: taking action and generating evidence.
2. Campbell JC. Health consequences of intimate partner violence. *Lancet*. 2002; 359:1331–1336. [PubMed: 11965295]

3. Coker AL, Davis KE, Arias I, Desai S, Sanderson M, Brandt HM, et al. Physical and mental health effects of intimate partner violence for men and women. *Am J Prev Med.* 2001; 23:260–268. [PubMed: 12406480]
4. Plichta SB. Intimate partner violence and physical health consequences: policy and practice implications. *J Interpers Violence.* 2004; 19:1296–1323. [PubMed: 15534333]
5. Black MC. Intimate partner violence and adverse health consequences: implications for clinicians. *Am J Lifestyle Med.* 2011; 5:428–439.
6. U.S. Department of Health and Human Services. The health consequences of smoking: a report of the Surgeon General. Atlanta (GA): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004.
7. Kiely M, El-Mohandes AA, El-Khorazaty MN, Blake SM, Gantz MG. An integrated intervention to reduce intimate partner violence in pregnancy. *Obstet Gynecol.* 2010; 115:273–283. [PubMed: 20093899]
8. Lipsky S, Holt VL, Easterling TR, Critchlow CW. Impact of police-reported intimate partner violence during pregnancy on birth outcomes. *Obstet Gynecol.* 2003; 102:557–564. [PubMed: 12962943]
9. Silverman JG, Decker MR, Reed E, Raj A. Intimate partner violence victimization prior to and during pregnancy among women residing in 26 U.S. states: associations with maternal and neonatal health. *Am J Obstet Gynecol.* 2006; 195:140–148. [PubMed: 16813751]
10. Amaro H, Fried LE, Cabral B, Zuckerman B. Violence during pregnancy and substance abuse. *Am J Public Health.* 1990; 80:575–579. [PubMed: 2327535]
11. Shulman HB, Gilbert BC, Msphbrenda CG, Lansky A. The Pregnancy risk Assessment Monitoring System (PRAMS): current methods and evaluation of 2001 response rates. *Public Health Rep.* 2006; 121:74–83. [PubMed: 16416701]
12. Colman GJ, Joyce T. Trends in smoking before, during, and after pregnancy in ten states. *Am J Prev Med.* 2003; 24:29–35. [PubMed: 12554021]
13. Tong VT, Dietz PM, Morrow B, D'Angelo DV, Farr SL, Rockhill KM, et al. Trends in smoking before, during, and after pregnancy—pregnancy risk assessment Monitoring system, United States, 40 sites, 2000–2010. *MMWR Surveill Summ.* 2013; 62:1–19. [PubMed: 24196750]
14. Shah PS, Shah J. Knowledge Synthesis Group on Determinants of Preterm/LBW Births. Maternal exposure to domestic violence and pregnancy and birth outcomes: a systematic review and meta-analyses. *J Womens Health (Larchmt).* 2010; 19:2017–2031. [PubMed: 20919921]
15. Dietz PM, England LJ, Shapiro-Mendoza CK, Tong VT, Farr SL, Callaghan WM. Infant morbidity and mortality attributable to prenatal smoking in the U.S. *Am J Prev Med.* 2010; 39:45–52. [PubMed: 20547278]
16. Smoking cessation during pregnancy. Committee Opinion No.471. American College of Obstetricians and Gynecologists. *Obstet Gynecol.* 2010; 116:1241–1244. [PubMed: 20966731]
17. American College of Obstetricians and Gynecologists. Smoking cessation during pregnancy. A clinician's guide to helping pregnant women quit smoking. Washington, DC: American College of Obstetricians and Gynecologists; 2011.
18. Tong VT, Dietz PM, England LJ. "Smoking cessation for pregnancy and beyond: virtual clinic," an innovative web-based training for healthcare professionals. *J Womens Health (Larchmt).* 2012; 21:1014–1017. [PubMed: 22934934]
19. Black, MC.; Basile, KC.; Breidig, MJ.; Smith, SG.; Walters, ML.; Merrick, MT., et al. The national intimate partner and sexual violence survey (NISVS): 2010 summary report. Atlanta (GA): National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2011.
20. Intimate partner violence. Committee Opinion No. 518. American College of Obstetricians and Gynecologists. *Obstet Gynecol.* 2012; 119:412–417. [PubMed: 22270317]
21. El-Mohandes AAE, El-Khorazaty MN, Kiely M, Gantz MG. Smoking cessation and relapse among pregnant African-American smokers in Washington, DC. *Matern Child Health J.* 2011; 15(suppl 1):S96–S105. [PubMed: 21656058]

22. Breiding MJ, Black MC, Ryan GW. Chronic disease and health risk behaviors associated with intimate partner violence—18 U.S. states/territories, 2005. *Ann Epidemiol.* 2008; 18:538–544. [PubMed: 18495490]
23. Lemon SC, Verhoek-Oftedahl W, Donnelly EF. Preventive healthcare use, smoking, and alcohol use among Rhode Island women experiencing intimate partner violence. *J Womens Health Gend Based Med.* 2002; 11:555–562. [PubMed: 12225629]
24. Gerber MR, Ganz ML, Lichter E, Williams CM, McCloskey LA. Adverse health behaviors and the detection of partner violence by clinicians. *Arch Intern Med.* 2005; 165:1016–1021. [PubMed: 15883240]
25. Nelson HD, Bougatsos C, Blazina I. Screening women for intimate partner violence: a systematic review to update the U.S. Preventive Services Task Force recommendation. *Ann Intern Med.* 2012; 156:796–808. W-279, W-280, W-281, W-282. [PubMed: 22565034]
26. Gisladdottir A, Harlow BL, Gudmundsdottir B, Bjarnadottir RI, Jonsdottir E, Aspelund T, et al. Risk factors and health during pregnancy among women previously exposed to sexual violence. *Acta Obstet Gynecol Scand.* 2014; 93:351–358. [PubMed: 24490826]
27. Jun HJ, Rich-Edwards JW, Boynton-Jarrett R, Wright RJ. Intimate partner violence and cigarette smoking: association between smoking risk and psychological abuse with and without co-occurrence of physical and sexual abuse. *Am J Public Health.* 2008; 98:527–535. [PubMed: 17600272]

Table 1

Sample Characteristics, Pregnancy Risk Assessment Monitoring System Participants, 2004–2008 Births

Maternal Characteristic (Unweighted N=196,391)	Weighted % (unweighted n)
Race–ethnicity	
White, non-Hispanic	61.3 (104,853)
Black, non-Hispanic	16.2 (33,225)
Hispanic	13.7 (24,004)
Other, non-Hispanic	8.8 (28,164)
Age (y)	
Younger than 20	9.2 (20,029)
20–24	24.1 (48,685)
25–29	28.6 (53,687)
30 or older	38.1 (73,981)
Education (y)	
12 or less	47.0 (93,798)
13–15	23.2 (45,569)
16 or more	29.9 (54,275)
Marital status	
Married	62.7 (121,235)
Other	37.3 (75,041)
Pregnancy intention	
Intended	58.4 (111,663)
Unintended	41.6 (81,579)
Income, year before delivery	
Less than \$15,000	29.0 (57,105)
\$15,000–24,999	13.8 (25,697)
\$25,000–50,000	20.6 (38,584)
\$50,000 or greater	36.6 (59,849)
Intimate partner violence *	
Yes	6.4 (14,303)
No	93.6 (182,088)
Smoked, 3 mo before pregnancy	
Yes	22.5 (48,644)
No	77.5 (147,747)
Smoked, last 3 mo of pregnancy	
Yes	12.5 (29,061)
No	87.5 (165,120)
Smoked, postpartum †	
Yes	17.5 (38,471)
No	82.5 (155,737)

* Physical abuse, year before or during pregnancy.

[†]Smoked at time of survey completion, 2–9 months postpartum.

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Table 2**Intimate Partner Violence and Maternal Cigarette Smoking Before and During Pregnancy**

Maternal Characteristic	IPV Absent (Unweighted n=182,088)		IPV Present (Unweighted n=14,303)	
	Smoked Before Pregnancy [*]	Smoked During Pregnancy [†]	Smoked Before Pregnancy [*]	Smoked During Pregnancy [†]
Total	21.0 (20.7–21.3), n=41,667	11.4 (11.1–11.6), n=24,166	44.0 (42.5–45.4), n=6,977	29.6 (28.3–30.9), n=4,895
Race–ethnicity				
White, non-Hispanic	26.2 (25.8–26.6)	14.4 (14.1–14.8)	60.7 (58.6–62.7)	42.3 (40.2–44.3)
Black, non-Hispanic	14.9 (14.2–15.6)	8.7 (8.2–9.3)	29.6 (27.3–32.1)	19.6 (17.7–21.8)
Hispanic	9.8 (9.2–10.4)	3.8 (3.4–4.2)	20.6 (18.0–23.4)	10.2 (8.5–12.3)
Other, non-Hispanic	12.1 (11.4–12.9)	5.8 (5.3–6.4)	33.2 (29.0–37.8)	21.6 (18.1–25.6)
Age (y)				
Younger than 20	27.8 (26.6–29.0)	15.0 (14.1–15.9)	44.5 (41.2–47.9)	28.3 (25.5–31.3)
20–24	31.1 (30.3–31.8)	17.8 (17.2–18.5)	49.5 (47.3–51.8)	32.7 (30.6–34.9)
25–29	21.6 (21.0–22.2)	11.3 (10.9–11.8)	43.7 (40.9–46.6)	30.2 (27.6–32.9)
30 or older	13.1 (12.7–13.5)	6.8 (6.5–7.1)	31.8 (28.9–34.8)	23.3 (20.9–26.0)
Education (y)				
12 or less	29.0 (28.5–29.6)	18.1 (17.7–18.6)	47.8 (46.0–49.5)	34.3 (32.6–35.9)
13–15	22.6 (22.0–23.3)	10.6 (10.1–11.1)	41.1 (38.3–44.1)	23.9 (21.5–26.6)
16 or more	8.2 (7.9–8.6)	2.2 (2.0–2.4)	20.7 (16.9–24.9)	7.1 (5.2–9.7)
Marital status				
Married	14.9 (14.6–15.2)	7.0 (6.8–7.3)	34.9 (32.5–37.4)	21.2 (19.2–23.3)
Other	32.3 (31.7–33.0)	19.5 (18.9–20.0)	47.3 (45.6–49.1)	32.7 (31.1–34.3)
Pregnancy				
Intended	16.0 (15.7–16.4)	8.0 (7.7–8.3)	39.0 (36.8–41.3)	26.1 (24.2–28.2)
Unintended	28.4 (27.9–29.0)	16.3 (15.9–16.8)	46.6 (44.7–48.4)	31.1 (29.5–32.8)
Household income, year before delivery				
Less than \$15,000	31.1 (30.4–31.8)	20.5 (19.9–21.2)	49.1 (47.2–51.1)	34.8 (33.0–36.6)
\$15,000–24,999	27.5 (26.5–28.5)	15.6 (14.8–16.4)	41.8 (38.4–45.4)	25.8 (22.9–29.0)
\$25,000–50,000	22.4 (21.7–23.2)	11.3 (10.8–11.9)	39.1 (35.4–43.0)	23.6 (20.4–27.1)
Greater than \$50,000	12.0 (11.6–12.5)	4.1 (3.9–4.4)	27.7 (23.5–32.3)	11.8 (9.2–15.0)

IPV, intimate partner violence.

Data are weighted percent (95% confidence interval).

P .001 for all factors; statistically significant at *P* < .05.

^{*} Smoked 3 months before pregnancy.

[†] Smoked last 3 months of pregnancy.

Table 3

Adjusted Odds of Cigarette Smoking During Pregnancy Among Women Who Experienced Intimate Partner Violence

Maternal Characteristic	IPV vs No IPV*	<i>P</i>
Smoked during pregnancy	1.95 (1.80–2.12)	<.001
Race–ethnicity		
White, non-Hispanic	1	
Black, non-Hispanic	1.18 (1.08–1.29)	<.001
Hispanic	1.09 (0.98–1.21)	.078
Other, non-Hispanic	1.13 (1.04–1.29)	.042
Age (y)		
Younger than 20	1.38 (1.22–1.56)	<.001
20–24	1.37 (1.24–1.51)	<.001
25–29	1.18 (1.07–1.31)	.001
30 or older	1	
Education (y)		
12 or less	1.63 (1.42–1.87)	<.001
13–15	1.47 (1.28–1.68)	<.001
16 or more	1	
Marital status		
Married	1	
Other	1.99 (1.82–2.18)	<.001
Pregnancy intention		
Intended	1	
Unintended	1.37 (1.27–1.47)	<.001
Household income, year before delivery		
Less than \$15,000	3.22 (2.78–3.72)	<.001
\$15,000–24,999	2.31 (1.98–2.69)	<.001
\$25,000–50,000	1.63 (1.41–1.88)	<.001
Greater than \$50,000	1	

IPV, intimate partner violence.

Data are adjusted odds ratio (95% confidence interval) unless otherwise specified.

* Controlled for race–ethnicity, age, education, marital status, pregnancy intention, and income in each strata.