



Trends in Smoking and Smoking Cessation During Pregnancy from 1985 to 2014, Racial and Ethnic Disparity Observed from Multiple National Surveys

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Abstract

Objective Current report assessed the trends in smoking prevalence and the percentage of smoking cessation during pregnancy among women from three major races/ethnicities. **Methods** Data were collected between 1999 and 2014 from the continuous National Health and Nutrition Examination Survey (NHANES). Smoking habits of women while pregnant with the child sampled by NHANES were assessed retrospectively. A total of 28,090 women who gave live birth between 1985 and 2014 were included. The prevalence ratios (PRs) of smoking and quitting smoking during pregnancy were calculated. The adjusted annual prevalence ratio (aaPR: the ratio associated with a 1-year increase in time) was estimated using logistic regression with the year of birth as a predictor. **Results** With child's race/ethnicity, gender, and mother's age controlled, the aaPR of smoking was 0.95 (95% confidence interval 0.92–0.97) for Hispanics, 0.96 (0.94–0.98) for whites, and 0.98 (0.94–1.00) for blacks. The aaPR of quitting smoking was 1.09 (1.02–1.16) for Hispanics, 1.01 (0.97–1.06) for whites, and 1.03 (0.95–1.12) for blacks. Compared with the counterparts aged 35 years or older, pregnant women younger than 20 years were more likely to smoke among whites [PR 1.56 (1.07–2.29)] but less likely among blacks [PR 0.37 (0.26–0.52)]. **Conclusions for Practice** Smoking prevalence has been declining continuously for all but at different rates among three major races/ethnicities. The risk profiles of smoking during pregnancy were race/ethnicity specific. Culturally appropriate programs should be developed to further reduce the maternal smoking during pregnancy.

Keywords Maternal smoking · Pregnancy · Smoking prevalence rate · Smoking cessation · NHANES

Abbreviations

CI Confidence interval
HP2020 Healthy people 2020

NHANES National Health and Nutrition Examination Survey
PRAMS Pregnancy Risk Assessment Monitoring System
SE Standard error

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Significance

What is already known on this subject? Smoking cessation interventions targeting pregnant women have met with some success. However, this was demonstrated with a short period of time (2004–2008) by the Pregnancy Risk Assessment Monitoring System (PRAMS), a subnational survey of postpartum women conducted in 32 states and New York City.

What does this article add? Using nationally representative samples over a longer period of time (1985–2014), we confirmed the conclusion from the PRAMS. We further observed that the disparities between races/ethnicities remained significant, and the associates of smoking during pregnancy were

race/ethnicity-specific. Culturally and ethnically appropriate programs should be developed to integrate smoking cessation with reproductive health.

Introduction

Smoking during pregnancy is one of the most prevalent preventable causes of infant morbidity and mortality (Dietz et al. 2010). Smoking is associated with increased risks for pregnancy complications, poor pregnancy outcomes, and significantly increases the risk of adverse effects on the child's health and development, including preterm delivery, sudden infant death syndrome, and childhood obesity (Alberg et al. 2014; Gorog et al. 2011). Healthy people 2020 (HP2020) identifies reducing smoking during pregnancy as one of the national health improvement priorities. Monitoring and elimination of racial/ethnic disparities is one critical strategy to achieve HP2020 objectives (Department of Health and Human Services 2001). However, to the best of our knowledge, the most recent report examining racial and ethnic disparity was generated from the 2004–2008 Pregnancy Risk Assessment Monitoring System (PRAMS), a subnational surveillance system conducted among postpartum women in 32 states and New York City (Tong et al. 2011), and the most recent report using national data was published almost 17 years ago (Ebrahim et al. 2000). Since then, several smoking related public policy events have occurred. Such events included Department of Health and Human Services' unveiling of HP2020, Centers for Disease Control and Prevention (CDC)'s addition of smoking to the list of nationally notifiable health conditions (Centers for Disease Control and Prevention 1997), the Department of Justice's suit against tobacco industry under the Racketeer Influenced and Corrupt Organizations Act, the legislation granting the Food and Drug Administration regulatory authority over tobacco products (Glantz et al. 2009), and expanding efforts from state governments to provide free pharmaceutical and counseling smoking cessation services to pregnant women of Medicaid recipients (Centers for Medicare and Medicaid Services 2011). The epidemiology of tobacco smoking, in particular, among vulnerable populations may have changed as a result of these efforts. Using the latest release from the National Health and Nutrition Examination Survey (NHANES), the current study quantified the trends in tobacco smoking during pregnancy since 1985, and examined the differences between three major races/ethnicities: non-Hispanic whites, non-Hispanic blacks and Hispanic Americans, which respectively account for about 65%, 13% and 18% of the US population in 2015.

Methods

Data Sources and Study Participants

The NHANES was conducted by the National Center for Health Statistics, Centers for Disease Control and Prevention to assess the health and nutritional status of the US civilian, non-institutionalized US population (Centers for Disease Control and Prevention 2009). NHANES uses a complex multistage probability sampling design, with some subgroups oversampled. The unweighted response rate for the interviewed sample was above 80% (Johnson et al. 2013). The current study used the Early Childhood module of the NHANES, 1999–2014, which provides personal interview data for children from birth to 15 years old, including the age of the biological mother when the child was born, and the smoking habit of the woman while pregnant with the child (Centers for Disease Control and Prevention 2009). The analyses started with 28,242 women whose biological children were sampled by NHANES, and were classified as white, black or Hispanic. A total of 152 women who had missing data for age when her child was born were excluded, leaving 28,090 women with a complete set of information regarding smoking when pregnant with the child sampled for the NHANES. The current study was exempt from ethics review by the IRB committee.

Major Variables

The key variables of maternal smoking behaviors were: (1) smoking status when pregnant with the child sampled by NHANES, and (2) quitting anytime during pregnancy, if smoked. The proxy, mostly the biological mother, of the NHANES participant was asked, "Did the biological mother smoke at any time while she was pregnant with the survey participant." If the answer was in the affirmative, then a further question was asked, "At any time during the pregnancy, did the biological mother quit or refrain from smoking for the rest of the pregnancy." The smoking question (yes or no) was asked for the survey year 1999 through 2014 but the smoking cessation questions were asked for the survey years 1999 through 2008. The birth year of a child was calculated by subtracting the age of the child from the interview date, resulting in a range of birth years from 1985 to 2014. Child's race/ethnicity was classified originally as "non-Hispanic white," "non-Hispanic black," or "Mexican American," and "Other Hispanic". The 'Mexican American' and 'other Hispanic' were combined as "Hispanic".

Potential Confounders

Current socio-demographic status of the family from which the child was sampled was used as an indicator to characterize the demographic status of the biological mothers when pregnant with the child sampled. A poverty income ratio (PIR) is the ratio of family income to the appropriate poverty threshold defined by the US Census Bureau, and used to assess family income. For this study, four categories of PIR were considered, poor ($PIR < 1.0$), near poor ($1 \leq PIR < 2$), middle income ($2 \leq PIR < 4$), and high-income ($PIR \geq 4$) (Bloom et al. 2009). The family head is the first household member 18 years of age or older, who owned or rented the residence where members of the household resided. The marital status of the family head was collapsed into three categories: never married, previously, and currently married.

Statistical Analyses

We used Statistical Analysis Software (SAS, v9.3, Cary, NC, USA) procedures specifically developed for non-random sampling surveys. Preliminary analysis revealed linear trends in the prevalence rate of smoking and the percentage of women who quit smoking during pregnancy over the years. Therefore, we developed simple linear regressions using birth year as an explanatory variable to estimate the annual change of the prevalence of smoking and the percentage of cessation during the index pregnancy. The observed prevalence and the percentage of smoking women who quit smoking during index pregnancy were calculated using PROC SURVEYFREQ procedure with appropriate weighting and nesting variables. The annual change of prevalence was measured by the coefficient (β) of the variable of year in the equation: $annual\ prevalence = intercept + \beta \times calendar\ year + e$ (error term). To adjust for the change of population composition, we conducted logistic regression with the birth year included as a predictor to estimate the adjusted annual prevalence ratio (aaPR: the ratio associated with a 1-year increase in time) of smoking during pregnancy and quitting smoking at any time during pregnancy. The prevalence ratios (PR) of smoking and smoking cessation were calculated between the levels of variables. The logistic regression was conducted on individual participants with the birth year of the sampled child included as a predictor. Potential confounders included were woman's age when the child was born, and child's race/ethnicity and gender, family income, education attainment and marital status of family head when the interview was conducted. The critical p value to judge the statistical significance or calculate confident intervals was 0.05 (two-sided).

Results

At the time when the interviews were conducted, the child's age ranged from 0 to 15 years with an average of 7.6 years. The mean age of the biological mothers when the sampled child was born was 27 years with a range of 14–45 years (To protect the confidentiality of participants, any reported ages under 14 years were coded as 14 years and any reported values over 45 years were coded as 45 years). Approximately, 61% of the weighted populations were white, followed by Hispanic (23%) and black (15%). Sample children were almost evenly divided between boys (51%) and girls (49%). The average smoking prevalence for the entire study period was 20.2 (SE 0.9)% for white women, 12.6 (0.78)% for black women, and 6.4 (0.5)% for Hispanic women. Among those women who smoked during pregnancy, 37.8 (2.0)% of whites, 35.3 (2.5)% of blacks, and 44.6 (4.1)% of Hispanics quit during the pregnancy (data not shown).

Without stratification by race/ethnicity, the prevalence of smoking at any time during pregnancy decreased from 26.4 (5.5)% in 1985 to 10.7 (1.6)% in 2014 (p for the trend < 0.01), and the percentage of quitting anytime during the index pregnancy increased from 36.6 (8.2)% in 1985 to 54.9 (5.3) % in 2008 ($p < 0.01$, data not shown). Figure 1 presents the observed and modeled prevalence by birth year. The annual changes of prevalence were statistically significant for all groups, -0.58 (0.07) for whites, -0.28 (0.05) for blacks, and -0.23 (0.06) for Hispanics ($p < 0.01$ for all groups). There were no overlaps between the bands of 95% confident limit for three groups, indicating that the smoking prevalence rate differed significantly between races/ethnicities.

With child's race/ethnicity, gender, and woman's age included in the regression, the aaPRs of smoking during pregnancy were presented in Table 1. The aaPR among Hispanic women was 0.95 (95% CI 0.92–0.97), translating into an annual decrease of 5%, which is greater than the estimate from unadjusted linear estimate. The aaPR was significant for whites [0.96 (0.94–0.98)] but was of borderline significance for blacks [0.98 (0.95–1.00)]. The associations between maternal age and smoking during pregnancy were different between races/ethnicities. Compared with counterparts 35 years or older, pregnant women younger than 20 years were more likely to smoke among whites [PR 1.56 (1.07–2.29)] but less likely among blacks [PR 0.37 (0.26–0.52)]. Compared with women whose education level was below high school (or living with a household head educated below high school), women with a high education attainment or living with a household head with a high education attainment were more likely to be smokers among Hispanics but less likely among blacks and whites.

Fig. 1 Trends in prevalence of smoking during pregnancy by race/ethnicity, sample of 28,090 women giving a birth between 1985 and 2014, United States. The questions about smoking habits of the mother while she was pregnant with the NHANES participant were asked in the home by trained interviewers using the computer-assisted personal interviewing (CAPI) system. The question “Did biological mother smoke at any time while she was pregnant with the survey participant” was asked in 1999–2014 surveys. *Note* NHANES National Health and Nutrition Examination Survey

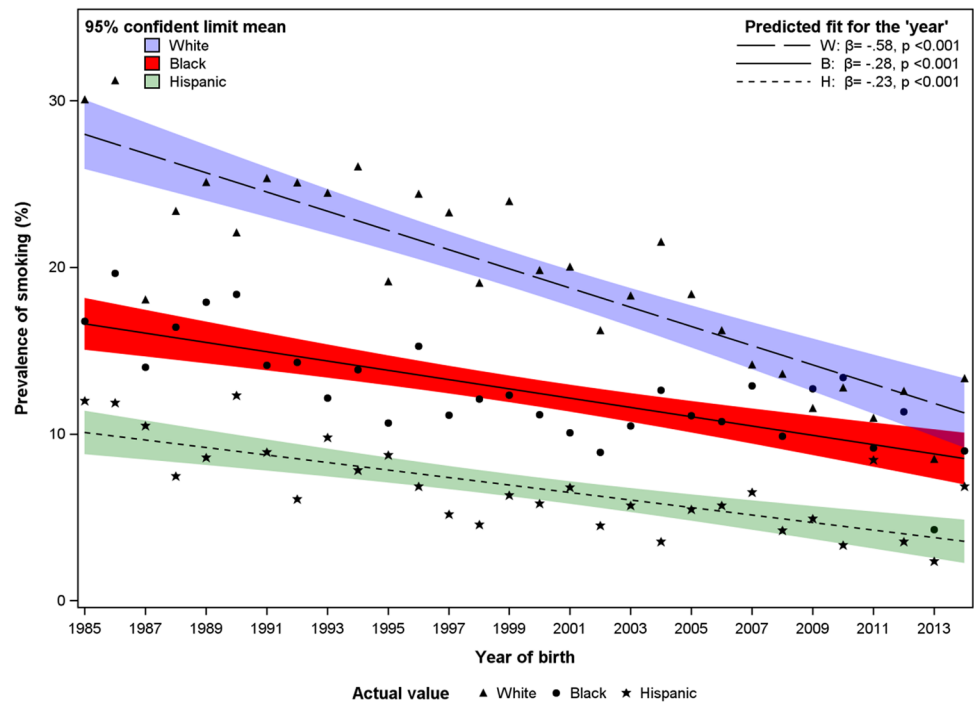


Figure 2 presents the observed and modeled percentage of women who quit smoking anytime during pregnancy. Due to a relatively small number of smoking women, the data were more scattered compared with the data presented in Fig. 1. The percentage of smoking cessation increased linearly across the study period, and the increase was statistically significant for all three groups with the largest increase occurring with Hispanics ($\beta = 1.19$, $p = 0.008$). The bands of the 95% confident limit overlapped substantially between groups, indicating that the percentages of women who quit smoking did not statistically differ between races/ethnicities. After being adjusted for potential confounders, only the aAPR for Hispanic women was significant, i.e. 1.09 (1.02–1.16), equivalent to an annual increase of 9% (Table 2).

Discussion

Consistent with the reports generated from other data sources (Tong et al. 2011, 2009), current study found that the smoking prevalence rates among pregnant women declined continuously since 1985 in all three major races/ethnicities. However, large disparities between races/ethnicities remained. The association of smoking and quitting smoking during pregnancy were also race/ethnicity specific.

Many efficacious interventions for promoting smoking cessation underline the declining trends in smoking and the increasing trends in quitting smoking during pregnancy.

As parts of the policy efforts described in the introduction, proven comprehensive tobacco-control strategies intensively applied in the last several decades have significantly reduced smoking prevalence around the time of pregnancy, including increase in cigarette taxes and prices (Adams et al. 2012), lowering out-of-pocket costs for cessation treatments (Higgins et al. 2012), and free pharmaceutical and counseling smoking cessation services for pregnant women with Medicaid coverage starting in 2010 in most states (Centers for Medicare and Medicaid Services 2011). Beginning in the year 2014, the Affordable Care Act (ACA) precludes states from excluding tobacco-cessation drugs from the coverage for traditional Medicaid enrollees. Employers is mandates to provide health insurance coverage for all employees and not impose any cost sharing requirements on evidence-approved prevention services, including cessation counseling (United States 111th Congress 2010). The overall declining trend of smoking during pregnancy may be further accelerated by ACA in the future.

The disparities between races/ethnicities were likely the result of differences in the utilization of tobacco control programs and services, and perhaps biological differences in nicotine addiction (Centers for Disease Control and Prevention 1998). The data from Oregon’s perinatal surveillance system showed that, compared with white women, black women had increased odds of receiving all three steps (Ask, Advise, Assist) out of five As (Ask, Advise, Assess, Assist, Arrange) for smoking cessation intervention (Tran et al. 2010). The differences in socioeconomic determinants of

Table 1 Adjusted prevalence ratios of smoking during pregnancy by race/ethnicity, sample of 28,242 mothers giving live birth between 1985 and 2014, United States

Characteristics	Category	Adjusted prevalence ratio (95% confidence interval)		
		Hispanic	Black	White
One calendar year increase		0.95 (0.92–0.97)*	0.98 (0.95–1.00)	0.96 (0.94–0.98)*
Mom's age when giving birth	35+ years	1.00 (reference)	1.00 (reference)	1.00 (reference)
	26–35 years	0.73 (0.54–0.97)*	0.82 (0.63–1.07)	0.87 (0.66–1.15)
	20–25 years	0.79 (0.56–1.11)	0.55 (0.42–0.71)	1.26 (0.94–1.68)
	< 20 years	1.08 (0.68–1.72)	0.37 (0.26–0.52)	1.56 (1.07–2.29)
Child's age	< 2 years	1.00 (reference)	1.00 (reference)	1.00 (reference)
	2–5 years	0.72 (0.53–0.97)*	0.95 (0.70–1.28)	0.99 (0.80–1.22)
	6–11 years	0.69 (0.51–0.94)*	0.89 (0.62–1.27)	0.89 (0.71–1.11)
	12+ years	0.54 (0.35–0.84)*	0.89 (0.58–1.39)	0.80 (0.58–1.10)
Child's gender	Boys	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Girls	0.98 (0.82–1.16)	0.94 (0.82–1.08)	0.99 (0.86–1.14)
Family income ^a	Poor	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Near poor	0.76 (0.57–1.03)	0.74 (0.58–0.95)*	0.84 (0.64–1.10)
	Middle income	0.80 (0.57–1.12)	0.63 (0.45–0.88)*	0.57 (0.41–0.78)*
	High income	0.53 (0.32–0.90)	0.41 (0.27–0.63)*	0.35 (0.25–0.48)*
Education (family head)	Below high school	1.00 (reference)	1.00 (reference)	1.00 (reference)
	High School	1.82 (1.32–2.52)*	0.63 (0.50–0.81)*	0.68 (0.52–0.87)*
	Some college years	1.67 (1.17–2.38)*	0.52 (0.39–0.69)*	0.53 (0.40–0.69)*
	College or above	1.09 (0.61–1.94)	0.35 (0.22–0.57)*	0.15 (0.10–0.21)*
Marital status (family head)	Current	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Never	3.17 (2.28–4.41)*	1.21 (0.91–1.62)	2.15 (1.49–3.09)*
	Previous	2.17 (1.58–2.97)*	1.52 (1.15–2.02)*	1.21 (0.96–1.52)

Family income, education attainment, and marital status of the house heads refer to the current status rather than when the child was born

The total sample size used for this table was different from the total number used for the Fig. 1 due to missing information on covariates, including mom's age, family income or education attainment of family head

OR odds ratio

* $p < 0.05$ (compared with the reference value, i.e. 1)

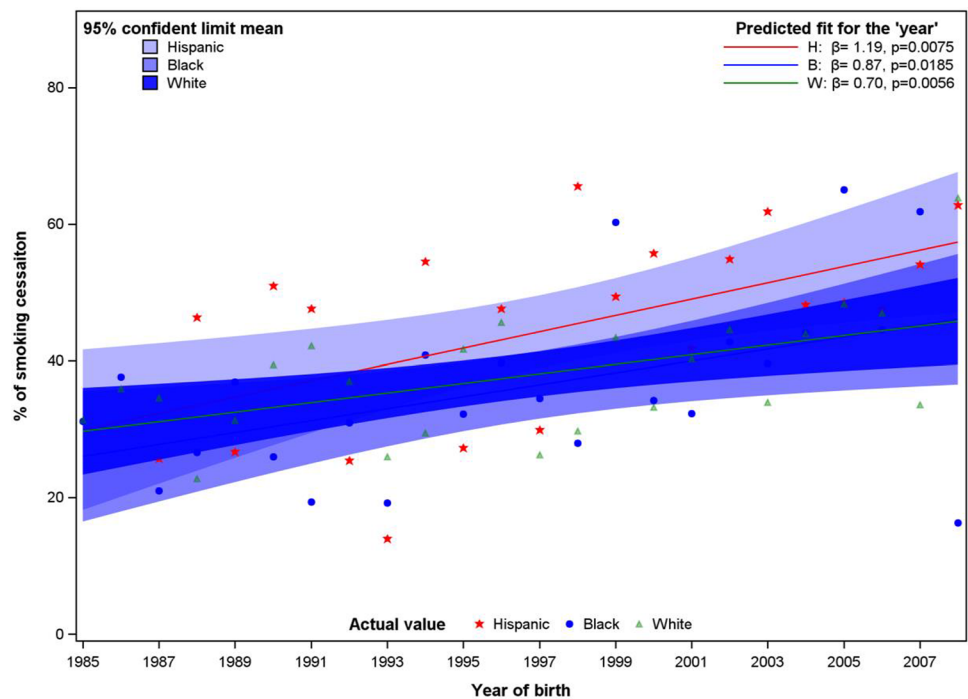
^aIncome was reported as a range for the previous calendar year. A poverty income ratio (PIR) was calculated by comparing the midpoint of the selected range value to the appropriate poverty threshold based on size and family composition. PIR values below 1.00 were categorized as below the official poverty threshold. For this study, four categories of PIR were considered; poor (PIR < 1.0), near poor ($1 \leq \text{PIR} < 2$), middle-income ($2 \leq \text{PIR} < 4$) and high-income (PIR ≥ 4)

smoking and the cultural norms regarding tobacco use may also contribute to the variations. Historically, tobacco was used as an appetite suppressant, and smoking cessation per se was associated with weight gain (Novello 1990). For decades, the tobacco industry has successfully connected slimness and smoking in their advertisements targeting women and related body image issues (American Lung Association 2004). Black women report less body dissatisfaction, and are less vulnerable to media-driven body dissatisfaction than

white women (Chithambo and Huey 2013; Debraganza and Hausenblas 2010), and white women with weight-related anxieties are particularly prone to initiate smoking, and are more likely to refrain from quitting due to a concern about post-cessation with gain (Berg et al. 2008; Health 2009; Pomerleau et al. 2000).

This study is subject to various limitations. The overall smoking prevalence may be underestimated since NHANES did not sample the children who may have been

Fig. 2 Trends in the percentage of smokers who quit smoking during pregnancy, sample of 3427 smoking mothers giving a birth between 1985 and 2008, United States. The questions about smoking habits of the mother while she was pregnant with the participant were asked in the home by trained interviewers using the computer-assisted personal interviewing (CAPI) system. The question “Did biological mother smoke at any time while she was pregnant with the survey participant” was asked in 1999–2012. However, the question “At any time during the pregnancy, did biological mother quit or refrain from smoking for the rest of the pregnancy” was asked in 1999–2008 only



institutionalized due to the severe medical consequences of maternal smoking. Women who experienced spontaneous abortions, ectopic pregnancies, or stillbirths were not included. Those women are generally at a high risk for substance abuse (Tong et al. 2011; National Institute on Drug Abuse 2009). Smoking history was assessed retrospectively via self-report or proxy interview, subject to social desirability bias (Dietz et al. 2011). There is also a possibility that the trends were resulted from inflated rates as efforts towards encouraging smoking abstinence among pregnant women increases (Chamberlain et al. 2013). However, retrospective information collected 8–10 years after the delivery event in a cohort of women from the University of Southern California Twin Study indicated that maternal recall of tobacco smoking and medical records were in a “near perfect” agreement ($\kappa=0.60\text{--}1.00$) although poor validity was found for alcohol use (Liu et al. 2013). Similar observation was also reported from early validation study (Pickett et al. 2009). The current study failed to exclude the proxies other than biological mothers. Roughly 90% of the proxies were mothers in the NHANES 1988–1994 (Zhang et al. 2005). We anticipated a similar percentage of biological mothers among proxies for NHANES 1999–2014 used in the current study. The socio-demographic status of the family head of the household where the sampled child was residing may not be a reliable indicator of the socioeconomic status of the woman when she was pregnant with the sampled child. The average age of the children was 7 years, in spite that child’s age was included to control the potential confounding from

remote memory, memory failure remains a concern. The category of Hispanic is overly broad that does not consider the heterogeneity of experiences and cultural backgrounds of people of Latin American descent. Combining Mexican Americans with other Hispanics might be problematic.

With these limitations, the smoking prevalence estimated from the current analysis is comparable with those from other sources. For the year 2009–2010, the observed smoking prevalence among white, black, and Hispanic pregnant women were 14.9%, 10.0% and 4.8% respectively in the current report. The corresponding numbers from PRAMS were 14.3%, 8.9% and 3.4% (Tong et al. 2011). The modeled percentage of smoking women who quit smoking anytime during pregnancy is also highly comparable with others, 46.8% for 2008 in the current report, which is close to 44.5% from PRAM for the same year (Tong et al. 2009). Race-specifically, similar to Tong et al.’s observation that Hispanic women were more likely to quit smoking compared with women from other races/ethnicities (Tong et al. 2009), the current study found that smoking Hispanic pregnant women experienced the largest increase of the smoking cessation during pregnancy. As a sub-national survey, the reports from PRAMS are generalizable only to the PRAMS sites (Tong et al. 2011, 2009). The current study is the first population-based study using nationally representative data with high response rates (National Center for Health Statistics 2013). A long study period across almost three decades makes it possible to examine a long-term trend with robust estimates.

Table 2 Adjusted prevalence ratio of quitting smoking during pregnancy by race/ethnicity, sample of 2623 smoking mothers giving a birth between 1985 and 2008, United States

Characteristics	Category	Hispanic–American	Non-Hispanic Black	Non-Hispanic white
One calendar year increase		1.09 (1.02–1.16)*	1.03 (0.95–1.12)	1.01 (0.96–1.06)
Mom's age when giving birth				
	35+ years	1.00 (reference)	1.00 (reference)	1.00 (reference)
	26–35 years	0.77 (0.40–1.49)	1.42 (0.78–2.57)	1.73 (1.07–2.78)*
	20–25 years	2.22 (0.97–5.10)	1.59 (0.81–3.11)	1.71 (1.03–2.85)*
	<20 years	2.42 (1.21–4.83)*	1.67 (0.77–3.63)	2.60 (1.56–4.32)*
Child's age				
	<2 years	1.00 (reference)	1.00 (reference)	1.00 (reference)
	2–5 years	1.23 (0.57–2.66)	0.84 (0.46–1.54)	0.84 (0.55–1.31)
	6–11 years	1.14 (0.49–2.66)	0.76 (0.36–1.61)	0.55 (0.31–0.97)*
	12+ years	1.77 (0.60–5.20)	0.77 (0.21–2.89)	0.65 (0.30–1.42)
Child's gender				
	Boys	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Girls	1.10 (0.74–1.63)	1.32 (0.91–1.91)	1.08 (0.87–1.34)
Family income ^a				
	Poor	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Near poor	1.25 (0.65–2.43)	1.23 (0.64–2.34)	0.63 (0.42–0.95)*
	Middle income	0.71 (0.36–1.42)	1.27 (0.63–2.59)	0.88 (0.55–1.40)
	High income	0.35 (0.07–1.63)	2.20 (1.15–4.21)	1.57 (0.92–2.69)
Education (family head)				
	Below high school	1.00 (reference)	1.00 (reference)	1.00 (reference)
	High School	1.35 (0.70–2.60)	1.53 (0.91–2.55)	1.76 (1.17–2.64)*
	Some college years	4.22 (2.46–7.24)	1.80 (1.09–2.95)	1.48 (1.00–2.19)*
	College or above	2.91 (0.96–8.80)	1.36 (0.49–3.78)	2.37 (1.31–4.31)*
Marital status (family head)				
	Current	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Never	2.93 (1.66–5.16)*	1.05 (0.61–1.80)	0.50 (0.30–0.85)*
	Previous	1.16 (0.63–2.13)	0.62 (0.33–1.14)	1.26 (0.87–1.83)

The question “At any time during the pregnancy, did biological mother quit or refrain from smoking for the rest of the pregnancy” was asked in 1999–2008 only

The total sample size used for this table is different from the total number used for the Fig. 2 due to missing information on covariates, including mom's age, family income or education attainment of family head

OR odds ratio

* $p < 0.05$ (compared with the reference value, i.e. 1)

^aIncome was reported as a range for the previous calendar year. A poverty income ratio (PIR) was calculated by comparing the midpoint of the selected range value to the appropriate poverty threshold based on size and family composition. PIR values below 1.00 were categorized as below the official poverty threshold. For this study, four categories of PIR were considered; poor (PIR < 1.0), near poor ($1 \leq \text{PIR} < 2$), middle-income ($2 \leq \text{PIR} < 4$) and high-income (PIR ≥ 4)

Conclusion

Interventions targeting pregnant women have met some success as smoking rates have been declining continuously for pregnant women in all three major racial/ethnic groups. The disparity between races and ethnicities remains significant. Culturally, and racially appropriate health promotion and

education should be developed to integrate smoking cessation, reproductive health, and body weight control effectively. The proven comprehensive tobacco-control strategies can be developed into a platform to synchronously prevent obesity and smoking, two leading causes of premature death and illness in modern societies.

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Compliance with Ethical Standards

Conflict of interest There is no conflict of interest to be declared, and no honorarium, grant, or other form of payment was given to anyone to produce the manuscript.

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