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Tobacco Use Patterns among GED Recipients

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Abstract

US General Educational Diploma (GED)* recipients have the highest smoking prevalence of any education level. This paper describes demographic characteristics and tobacco use patterns and examines effect modification and confounding as potential explanations for higher crude prevalence of smoking.

Methods.—The study population included adults aged 25 and older in the 2013 National Health Interview Study. We estimated adjusted prevalence ratios and 95% CIs for smoking and quitting behaviors using weighted multivariable logistic regression.

Results.—Among females with a GED, adjusted prevalence of ever use (58.7%) and smoking (32.4%) was 1.50 and 1.52 times the prevalence than for high school dropouts (39.1%, 21.3%). Female GED recipients had a significantly higher prevalence of ever smoking compared to dropouts. We found no significant educational differences in smoking prevalence among males or quit behaviors for either sex.

Conclusions.—More research is needed to identify targeted interventions to prevent smoking in this disparate population.

*Diplomas in U.S. GED programs certify that the recipient has high-school-level academic skills. They are earned by passing four tests through a program of the American Council on Education. These diplomas function (loosely) as high school diplomas do.

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Keywords

Tobacco; health disparities; epidemiology; socioeconomic status

Despite major advances in knowledge related to the dangers of tobacco during the last 50 years, tobacco use remains the leading cause of preventable morbidity and mortality in the U.S.^{1–5} Although the overall smoking prevalence has decreased significantly in the past several decades, declines have not been equal across population subgroups, and individuals with low socioeconomic status bear a heavier burden of tobacco-related disease.^{1,2,6}

Many studies of educational attainment and health outcomes group those with a General Equivalency Diploma (GED) into a category that includes a high school diploma or an equivalent diploma.⁷ Studies grouping GED recipients with high school graduates have found that smoking is significantly and inversely associated with educational attainment, and the pattern holds true at nearly every level of education.⁸ However, recent studies separating adults with a GED from those with a high school diploma indicate GED recipients have the highest prevalence of tobacco use of any education level. The prevalence of cigarette smoking is over 40% among adult GED recipients compared to 24% among high school graduates.^{4,9–11} Moreover, those with a GED were even more likely than high school dropouts to smoke (32% prevalence of current smoking).¹¹ It is unclear why the GED credential does not follow the otherwise consistent education gradient for smoking prevalence.

Evidence suggests that GED recipients have significantly worse health outcomes than high school graduates and are often more similar to dropouts with respect to health indicators.^{12–15} Although differences are well documented, it is uncertain why the GED does not appear to be equivalent to a high school diploma in terms of health behaviors or status.^{13–15} Some have hypothesized that there are underlying differences between GED recipients and high school graduates in non-cognitive skills such as persistence, self-efficacy, ability to delay gratification, or behavioral health issues.¹⁴ Furthermore, few studies have been conducted to compare health behaviors and outcomes between GED recipients and high school dropouts.^{12,16,17} Although GED recipients have demonstrated higher cognitive abilities and higher incomes than high school dropouts,^{18,19} there are no strong hypotheses to explain why the smoking prevalence among GED recipients is higher than that of high school dropouts.

For this study, we explored demographic characteristics and tobacco use patterns among GED recipients, compared with high school dropouts, to identify potential explanations for the higher observed crude prevalence among this population subgroup, using a large, nationally representative sample. We examined potential effect modification and confounding of other demographic characteristics to determine whether GED recipients have a significantly higher smoking prevalence compared with high school dropouts after controlling for some observable differences. We also characterized the tobacco use patterns of GED recipients to determine whether a higher smoking prevalence might be explained by inequalities in initiation, tobacco use frequency and intensity, or quit attempts and success. As a secondary objective, we included high school graduates in all analyses in an effort to

confirm previously documented differences between GED recipients and high school graduates.

Methods

Data source.

We used data from the 2013 National Health Interview Survey (NHIS), an annual cross-sectional household survey representative of the resident civilian non-institutionalized U.S. population.^{20,21} Households were sampled using a stratified multistage design to gather sociodemographic and health data, via computer assisted face-to-face interviews conducted at each household.²¹ We limited our study population to those aged 25 or older to be consistent with the Census calculation of educational attainment, as many individuals complete any secondary education by this age.²² We also limited our study population to those who reported 9th grade through 12th grade, GED, or high school diploma as their highest level of education attained (N=10,922), and excluded individuals with less than a 9th grade education (N=1,968) or some college or more (N=18,226).

Measures.

Tobacco use characteristics.—The tobacco use characteristics included in this study were ever use of cigarettes, other smoked tobacco products, and smokeless tobacco; *current use* of cigarettes and smokeless tobacco; age of smoking initiation; smoking frequency; smoking intensity; and past year quit attempts. *Ever smokers* were defined as respondents who answered *yes* to, “Have you smoked at least 100 cigarettes in your entire life?” Respondents were then asked “Do you now smoke cigarettes every day, some days, or not at all?” *Current smokers* were defined as ever smokers who reported currently smoking some days or every day.²³ *Former smokers* were those who had smoked at least 100 cigarettes in their life but reported not smoking at the time of the interview. *Never smokers* were those who reported never smoking at least 100 cigarettes in their life.²³

Among ever smokers, *age of smoking initiation* was obtained by asking respondents, “How old were you when you first started to smoke fairly regularly?” We examined the frequency of smoking cigarettes by assessing some days or every day use, and *smoking intensity* was measured by the number of cigarettes per day among every day smokers. *Quit attempts* were defined as stopping smoking for one day or more during the past 12 months because a respondent was trying to quit smoking. *Quit Ratio* was estimated by calculating the proportion of ever smokers who were no longer smoking (former smokers) at the time of the interview.⁴

Use of other smoked tobacco products was assessed by NHIS similarly to cigarettes, with a series of two questions: “Have you ever smoked tobacco products other than cigarettes even one time?” and “Do you now smoke tobacco products other than cigarettes every day, some days, rarely, or not at all?” NHIS defined other smoked tobacco products as cigars, pipes, water pipes, hookah, small cigars, bidis, and cigarillos. We defined *ever use* of other tobacco products as smoking combustible tobacco products other than cigarettes even one time. We dichotomized *current use* of other tobacco products as *yes* (now using every day or some

days) or no (rarely or not at all). Smokeless tobacco was asked in two separate questions: “Have you ever used smokeless tobacco products even one time?” and “Do you now use smokeless tobacco products every day, some days, rarely, or not at all?” *Ever use* of smokeless tobacco included the use of chewing tobacco, snuff, dip, snus (form of smokeless tobacco), or dissolvable tobacco even one time (defined by NHIS), and *current use* of smokeless tobacco was dichotomized as yes (using every day or some days) or no (rarely or not at all). We did not examine smokeless tobacco use among females, due to low prevalence, and the NHIS did not ask respondents about electronic cigarettes or vaping products or nicotine replacement therapy.

Demographic characteristics.—Educational attainment was obtained using the question, “What is the highest level of school completed or the highest degree received?” Individuals selected their highest level of education from 21 different choices displayed on a card with each possible grade level or degree beginning with never attended/kindergarten only to doctoral degree. We categorized educational attainment into three levels: high school dropouts (9th to 12th grade, no diploma), GED or equivalent, or high school graduate, and we excluded those with less than 9th grade and those with some college or more.

To explore effect modification and confounding, we assessed the following demographic variables that have been demonstrated to be associated with smoking in previous studies^{2,4}: sex, race (White, Black, Asian, other); ethnicity (Hispanic, non-Hispanic); age (25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, 65 years and older); and geographic region of residence (Northeast, Midwest, South, West).²⁰ To explore differences in other socioeconomic status variables, we assessed total family income (\$0 to 34,999; \$35,00 to 49,999; \$50,000 to 74,999; \$75,000 to 99,999; \$100,000 or more), personal earnings (\$1 to 9,999; \$10,000 to 19,999; \$20,000 to 34,999; \$35,000 to 54,999; \$55,000 to 74,999; \$75,000 or more), and employment status, which was dichotomized into employed (working for pay at a job or business, with a job or business but not at work) and unemployed (looking for work; working, but not for pay, at a family-owned job or business; not working at a job or business, and not looking for work).

Statistical analyses.

We conducted all analyses using survey procedures in SAS version 9.4 (SAS Institute, Cary, NC) and SAS-Callable SUDAAN version 11 (Research Triangle Institute, Research Triangle Park, NC), to account for survey sample weighting, stratification, and clustering.^{24,25} We used sampling weights provided in the 2013 NHIS dataset to obtain population-level estimates and standard errors. Weighted smoking prevalence estimates and corresponding 95% confidence intervals (CIs) were computed for educational attainment levels, and Rao-Scott Pearson chi-square tests were used to determine statistically significant differences in demographic and tobacco use characteristics between educational attainment levels.

We used weighted multivariable logistic regression to estimate predicted marginal probabilities and obtain adjusted prevalences and 95% CIs for smoking within each educational attainment group. We combined parameter estimates and used an inverse transformation to estimate adjusted prevalence ratios (APRs) and 95% CIs to compare the

prevalence of tobacco characteristics between high school dropouts and GED recipients. We explored effect modification between educational attainment and sex by testing two-way interactions. After finding statistically significant interaction, sex-specific APRs were obtained. Significance was defined at an alpha of .05.

Results

Comparing GED recipients with high school dropouts.

The overall unadjusted prevalence of current smoking for US adults aged 25 or older in 2013 was 41.4% (95% CI: 36.8%, 46.0%) among GED recipients, which was significantly higher than current smoking among high school dropouts (29.7%; 95% CI: 27.5%, 31.9%) (Table 1). After stratifying by sex, the unadjusted prevalence of current smoking was not significantly higher among male GED recipients (42.9%; 95% CI: 36.4%, 49.3%) compared with male high school dropouts (35.9%; 95% CI: 32.5%, 39.2%). Among females, 39.7% (95% CI: 33.5%, 45.6%) of GED recipients currently smoked, which was significantly higher than the smoking prevalence of 23.6% (95% CI: 21.1%, 26.2%) among female high school dropouts.

Demographic variables, which included race, ethnicity, age, family income, employment status, personal earnings, and geographic region, were all significantly associated with smoking. Due a significant interaction found between sex and educational attainment, demographic and tobacco use characteristics were stratified by sex in bivariate analyses. Compared to male high school dropouts, males with a GED were significantly less likely to be Hispanic and were less likely to live in the Northeast region of the U.S. (Table 2). No significant differences were found between male GED recipients and male high school dropouts for race, age, employment status, family income, or personal earnings. Among females, GED recipients were significantly less likely to be Hispanic or over the age of 65, compared with high school dropouts (Table 3). Female GED recipients were also significantly more likely than dropouts to have a higher family income, and be currently employed. No significant differences were found for race, geographic region, or personal earnings.

In bivariate analyses for cigarette use, 72.9% (95% CI: 67.7–78.1%) of male GED recipients were ever smokers, compared with 66.7% (95% CI: 63.5–70.0%) of male high school dropouts (Table 4). No differences were observed for age of initiation, current smoking status or smoking frequency (every day versus some days). The overall difference for number of cigarettes smoked per day among every day smokers was significant; however, the confidence intervals around estimates for male high school dropouts and GED recipients overlapped. When looking at quit attempts in the past year among cigarette smokers, no significant differences were found between male GED recipients and male high school dropouts. Similarly, there was no difference in the quit ratio among ever smokers. Males with a GED were significantly more likely to be ever smokers of other tobacco products, but not current users. No differences were found either for *ever* or for *current* use of smokeless tobacco.

Educational attainment had a stronger association with tobacco use characteristics for females. Nearly 62% of females with a GED were ever smokers compared with only 41% of female high school dropouts (Table 5). No differences were found for age of initiation, frequency of smoking, or quit attempts among female smokers with a GED compared to dropouts. Females with a GED were significantly more likely to have ever smoked other tobacco products, but no more likely to currently smoke other tobacco products or currently use smokeless tobacco compared with female high school dropouts.

Based on unadjusted logistic regression models, the prevalence of ever smoking among male GED recipients was 1.09 (95% CI: 1.0004–1.19) times that of male high school dropouts (Table 6). After adjusting for race, ethnicity, age, family income, employment status, and region, the higher prevalence among GED recipients was not significantly different from that of high school dropouts (APR: 1.08, 95% CI: 0.99, 1.18). The adjusted prevalence of ever smoking among males was 71.1% (95% CI: 65.1–76.5%) for GED recipients and 65.9% (95% CI: 62.5–69.1%) among high school dropouts (Table 7). A similar pattern was observed for current smoking among males, with the unadjusted prevalence ratio of 1.20 (95% CI: 1.004–1.42) and an APR of 1.13 (95% CI: 0.94–1.37). The adjusted prevalence of current smoking was 36.9% (95% CI: 30.8–43.5%) among males with a GED, which was lower than the unadjusted prevalence of 42.9% (95% CI: 36.4–49.3%). No significant differences were found in unadjusted or adjusted models for past quit attempts among current smokers or quit ratio among ever smokers.

Among females, we observed a much stronger association between educational attainment and smoking. The unadjusted prevalence of ever smoking among female GED recipients was 1.49 (95% CI: 1.32–1.69) times that of female high school dropouts, and after adjusting for confounders, the association remained significant. The unadjusted prevalence of current smoking among female GED recipients was 1.68 (95% CI: 1.38–2.05) times that of female dropouts. In the adjusted model, the prevalence of smoking remained significant although the APR was slightly attenuated. No differences were found between female GED recipients and female high school dropouts for quit behaviors.

Comparing GED recipients with high school graduates.

As a secondary objective, we compared GED recipients to high school graduates and discussed here briefly (Tables 4–7). Both male and female GED recipients had significantly higher unadjusted smoking prevalence rates compared with high school graduates. Among males, 42.9% (95% CI: 36.4–49.3%) of GED recipients were current smokers compared with 26.7% (95% CI: 24.6–28.8%) of high school graduates. The unadjusted smoking prevalence among female GED recipients (39.7, 95% CI: 33.5–45.9) was more than double that of female high school graduates (17.6, 95% CI: 16.1–19.2). Among males, GED recipients were significantly less likely to live in the Northeast, more likely to have a family income below \$35,000, and less likely to be currently employed compared to high school graduates. No significant differences were found for race, ethnicity, age, or personal earnings. Compared with female high school graduates, female GED recipients were significantly more likely to be younger, less likely to live in the Northeast, and more likely to have a family income below \$35,000 or to be unemployed. Female GED recipients were

not significantly different from female high school graduates by race, ethnicity, or personal earnings.

Among males, GED recipients were significantly more likely to be ever and current smokers, have a younger mean age of initiation, smoke every day, and have ever tried smoking other tobacco products compared with male high school graduates. No significant differences were found between male GED recipients and male high school graduates for number of cigarettes smoked per day, quit attempts, quit ratio, or ever and current use of smokeless tobacco. For females, nearly all of the tobacco use characteristics explored were significantly different for GED recipients compared with graduates, with the exception of cigarettes smoked per day and quit attempts, neither of which was significantly different. Female GED recipients had a much lower quit ratio than female high school graduates.

Discussion

We observed strong differences in the association between educational attainment and smoking patterns when stratifying by sex. The current prevalence of smoking among male GED recipients was not significantly higher than the prevalence among male high school dropouts. For females, however, the current prevalence of smoking among GED recipients remained significantly higher than among high school dropouts even after adjusting for race, ethnicity, age, family income, employment status, and geographic region. A recent study by Gonzalez et al. reported that unadjusted analyses indicated U.S. adult GED recipients were significantly more likely than high school dropouts to smoke, but that the effects were attenuated and no longer significant in multivariable analyses controlling for sex, age, race, and age of initiation.¹⁷ Our study adds to the literature by examining the potential effect modification of sex. The results of our study demonstrate that after sex stratification, the effects among males were attenuated and no longer significant after adjusting for demographic confounders, but that the smoking prevalence remained significantly higher among female GED recipients than among female high school dropouts following adjustment.

We explored potential tobacco use behaviors that might drive this higher prevalence among females with a GED. Female GED recipients were 1.5 times more likely to become ever smokers compared with female high school dropouts, although their mean age of initiation was not significantly different. Among female current smokers, there were no significant differences between GED recipients and dropouts for smoking every day versus some days, number of cigarettes smoked per day, or past year quit attempts. Compared with female high school dropouts, female GED recipients had slightly lower quit ratio, but differences were not statistically significant. Therefore, it appears that the increased prevalence of current smoking among female GED recipients compared with female dropouts is driven by the higher prevalence of ever smoking. Consistent with our findings, Maralani examined national educational disparities in the prevalence of smoking from 1966 to 2010 and concluded that differences in initiation contributed to the majority of the gap in smoking prevalence.²⁶ Differences in the probability of quitting played a lesser role in the overall educational disparity.²⁶ It is unclear why females with a GED were more likely to become ever smokers, but we also found that these women were more likely to try smoking other

tobacco products and drink alcohol during their lifetime compared with dropouts. Perhaps underlying differences in risk taking behaviors or a greater tendency to experiment among the female GED recipients contributes to a higher smoking prevalence.

The results of this study also indicate GED recipients should not be combined with high school graduates, because those with the credential are not equivalent in terms of demographic characteristics or health factors, especially smoking behaviors. Although—at 3%—the proportion of U.S. adults with a GED as the highest level of educational attainment remains small, the extremely high smoking prevalence (over 40%) warrants the separate collection of GED as a separate category that can later be combined with high school graduates if the sample is determined to be too small in a particular study. Without capturing GED as a separate category, we may be missing an important disparate group, which is one that the CDC has recently highlighted as a group with one of the highest smoking prevalences.²⁷

As a result of this study, we were able to rule out several simple explanations of the higher smoking prevalence among female GED recipients. We found that the higher prevalence was not completely confounded or explained by age or other demographic factors, and that higher prevalence is not explained by heaviness of smoking based on self-reported tobacco use behaviors [author: **did you consider whether the woman had children and, if so, how many?**]. However, we are left without a clear hypothesis, due in part to the limitations of this study. We explored other potential confounding factors, such as the family size and number of children in the home, and did not find significant differences between groups. Using secondary data, we were limited to the questions available in the NHIS survey, and we were unable to ascertain the reasons or timing for earning the GED or dropping out of high school relative to smoking. Smoking is often initiated between the ages of 16 to 18 years, which could occur prior to or after receiving educational credentials, such as the GED or high school diploma. Therefore, the cross-sectional nature of these data precludes speculating that GED receipt leads to becoming a smoker. Although these results were nationally representative of the non-institutionalized adult population, we were not able to obtain information about respondents' history of incarceration, which has also been described as a potential explanation for higher smoking rates among those with a GED [author: **hard to see why that would result in a higher rate for women than for men, though.**].^{17,28} However, it is unlikely that incarceration would differentially affect females compared to males.

These findings shed light on the importance of addressing tobacco use among GED recipients, especially among females, who have 1.5 times the smoking prevalence of high school dropouts, even after controlling for other demographic characteristics. Although reasons for higher smoking rates are unclear, the GED recipient population is at some point an easily reached population, specifically during testing preparation courses, at testing centers, and during the distribution of testing results. These could provide opportunities to intervene using evidence-based interventions, such as distributing health messages and promoting tobacco cessation quitlines. More research is needed to understand fully the pathways and mechanisms driving this higher prevalence in order to develop more targeted interventions for this disparate population.

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Table 1.

Unadjusted Prevalence of Current Smoking by Education Level (N=10,922)

	Males		Females		Total	
	Weighted %	95% CI	Weighted %	95% CI	Weighted %	95% CI
Education Level						
HS dropouts *	35.9	(32.5–39.2)	23.6	(21.1–26.2)	29.7	(27.5–31.9)
GED recipients	42.9	(36.4–49.3)	39.7	(33.5–45.9)	41.4	(36.8–46.0)
HS graduates	26.7	(24.6–28.8)	17.6	(16.1–19.2)	22.0	(20.7–23.3)

Abbreviations: CI= confidence interval; HS = high school; GED = General Educational Development diploma

* HS dropouts: 9th to 12th grade, no diploma

Data source: CDC/NCHS, National Health Interview Survey, 2013

Table 2.

Demographic characteristics by educational attainment level among males

	HS Dropouts (n=1,326)			GED Recipients (n=456)			HS Graduates (n=3,139)			P-value GED vs HS dropout
Race	Weighted %	95% CI	Weighted %	95% CI	Weighted %	95% CI	Weighted %	95% CI		
White	82.2	(79.7–84.6)	85.2	(81.5–88.9)	80.6	(78.7–82.5)	0.17			
Black	12.3	(10.5–14.2)	10.6	(7.6–13.7)	13.7	(12.1–15.4)				
Asian	2.7	(1.6–3.9)	1.1	(0.1–2.0)	3.5	(2.7–4.3)				
Other	2.8	(1.9–3.7)	3.1	(1.3–5.0)	2.2	(1.5–2.9)				
Ethnicity										<0.0001
Hispanic	31.5	(28.2–34.9)	18.9	(14.5–23.3)	13.4	(11.9–14.9)				
Non-Hispanic	68.5	(65.2–71.8)	81.1	(76.7–85.5)	86.6	(85.2–88.1)				
Age										0.23
25 to 34	18.4	(15.7–21.0)	25.5	(19.4–31.5)	21.2	(19.2–23.2)				
35 to 44	20.7	(18.0–23.4)	20.5	(15.1–25.9)	18.5	(16.8–20.3)				
45 to 54	21.9	(18.8–23.4)	23.8	(18.6–29.1)	22.3	(20.6–23.9)				
55 to 64	17.4	(14.5–20.3)	14.1	(10.1–18.1)	17.9	(16.2–19.6)				
65+	21.6	(18.7–24.6)	16.2	(11.8–20.6)	20.1	(18.3–21.9)				
Region										0.03
Northeast	16.0	(13.6–18.4)	10.2	(7.3–13.1)	19.7	(17.9–21.5)				
Midwest	20.9	(18.0–23.9)	26.9	(20.9–32.9)	26.5	(24.2–28.8)				
South	41.3	(38.1–44.6)	43.6	(37.2–50.0)	37.0	(34.6–39.3)				
West	21.8	(19.0–24.5)	19.3	(14.3–24.3)	16.8	(15.1–18.6)				
Family Income										0.06
\$0 to 34,999	57.2	(53.6–60.8)	49.6	(43.0–56.2)	33.6	(31.5–35.6)				
\$35,000 to 49,999	16.8	(14.0–19.5)	14.0	(10.3–17.8)	17.9	(16.1–19.6)				
\$50,000 to 74,999	12.8	(10.2–15.4)	20.7	(13.8–27.5)	22.6	(20.5–24.7)				
\$75,000 to 99,999	7.1	(5.1–9.0)	8.5	(4.2–12.8)	12.6	(10.9–14.2)				
\$100,000+	6.1	(4.0–8.3)	7.2	(3.3–11.1)	13.4	(11.6–15.2)				
Personal Earnings										0.83

	HS Dropouts (n=1,326)	GED Recipients (n=456)	HS Graduates (n=3,139)	P-value GED vs HS dropout
\$1 to 9,999	12.4	11.85	6.7	(5.1–8.2)
\$10,000 to 19,999	21.1	16.8	11.6	(9.7–13.5)
\$20,000 to 34,999	33.9	33.7	24.5	(23.1–27.9)
\$35,000 to 54,999	20.4	22.7	31.2	(28.5–33.9)
\$55,000 to 74,999	7.4	8.3	13.5	(11.0–15.9)
\$75,000+	4.9	6.9	11.6	(9.4–13.8)
Employment				0.38
Employed	51.7	55.0	64.8	(62.5–67.0)
Unemployed	48.3	45.1	35.2	(36.0–37.5)

Abbreviations: CI= confidence interval; HS = high school; GED = General Educational Development diploma;

* HS dropouts: 9th to 12th grade no diploma;

Percentages are weighted; P-values obtained through Rao-Scott Pearson chi-square tests

Data source: CDC/NCHS, National Health Interview Survey, 2013

Table 3.

Demographic characteristics by educational attainment level among females

	HS Dropouts (n=1,636)			GED Recipients (n=490)			HS Graduates (n=3,872)			P-value GED vs HS dropout
Race	Weighted %	95% CI	Weighted %	95% CI	Weighted %	95% CI	Weighted %	95% CI		0.10
White	74.8	(71.9–77.6)	79.2	(74.7–83.6)	79.8	(78.1–81.5)				
Black	20.0	(17.3–22.6)	14.7	(11.3–18.1)	14.0	(12.6–15.3)				
Asian	2.9	(2.0–3.7)	2.3	(0.5–4.0)	4.0	(3.2–4.9)				
Other	2.4	(1.4–3.4)	3.9	(1.4–6.3)	2.2	(1.7–2.8)				
Ethnicity										<0.0001
Hispanic	26.7	(23.8–29.6)	14.7	(11.1–18.3)	12.9	(11.6–14.2)				
Non-Hispanic	73.3	(70.4–76.2)	85.3	(81.7–88.9)	87.1	(85.8–88.4)				
Age										<0.0001
25 to 34	20.0	(17.3–22.6)	21.7	(17.1–26.3)	13.6	(12.3–15.0)				
35 to 44	17.0	(14.7–19.2)	18.4	(14.2–22.6)	13.4	(12.0–14.8)				
45 to 54	16.8	(14.3–19.3)	22.6	(17.8–27.5)	20.6	(18.8–22.5)				
55 to 64	15.0	(12.9–17.2)	21.2	(16.6–25.8)	20.1	(18.4–21.8)				
65+	31.2	(28.5–34.0)	16.1	(12.0–20.2)	32.2	(30.3–34.2)				
Region										0.34
Northeast	13.7	(11.3–16.0)	14.3	(10.1–18.6)	20.3	(18.6–22.0)				
Midwest	21.6	(18.7–24.4)	20.8	(16.1–25.6)	23.8	(21.9–25.7)				
South	44.2	(41.0–47.4)	48.8	(42.6–54.9)	37.3	(35.3–39.4)				
West	20.5	(18.0–23.1)	16.2	(12.2–20.1)	18.6	(16.9–20.3)				
Family Income										0.03
\$0 to 34,999	64.2	(61.0–67.4)	54.7	(48.4–61.1)	42.8	(40.7–44.9)				
\$35,000 to 49,999	14.4	(12.2–16.6)	19.7	(14.5–24.8)	15.3	(13.6–17.0)				
\$50,000 to 74,999	14.0	(11.3–16.6)	13.5	(9.2–17.8)	19.6	(17.8–21.3)				
\$75,000 to 99,999	4.0	(2.7–5.3)	7.1	(3.4–10.7)	10.0	(8.7–11.4)				
\$100,000+	3.5	(2.2–4.8)	5.1	(2.1–8.1)	12.3	(10.8–13.9)				
Personal Earnings										0.27
\$1 to 9,999	29.4	(24.1–34.7)	26.0	(18.8–33.1)	15.3	(12.9–17.6)				

	HS Dropouts (n=1,636)	GED Recipients (n=490)	HS Graduates (n=3,872)	P-value GED vs HS dropout
\$10,000 to 19,999	35.0 (29.2–40.7)	28.4 (20.8–36.0)	22.6 (20.0–25.3)	
\$20,000 to 34,999	25.0 (19.6–30.3)	31.6 (23.6–39.6)	32.9 (29.7–36.1)	
\$35,000 to 54,999	7.8 (4.5–11.0)	11.6 (5.8–17.4)	19.5 (16.9–22.2)	
\$55,000 to 74,999	1.5 (0.0–3.1)	0.3 (0.0–0.8)	5.9 (4.2–7.6)	
\$75,000+	1.4 (0.1–2.8)	2.1 (0.0–5.1)	3.8 (2.6–5.0)	
Employment				<0.0001
Employed	32.3 (29.2–35.3)	47.8 (42.2–53.3)	44.1 (42.0–46.1)	
Unemployed	67.7 (64.7–70.8)	52.2 (53.9–58.0)	55.9 (53.9–58.0)	

Abbreviations: CI= confidence interval; HS = high school; GED = General Educational Development diploma;

* HS dropouts: 9th to 12th grade no diploma

Percentages are weighted; P-values obtained through Rao-Scott Pearson chi-square tests

Data source: CDC/NCHS, National Health Interview Survey, 2013

Table 4.

Smoking characteristics by educational attainment level among males

	HS Dropouts n=1,326 Weighted % (95% CI)	GED Recipients n=456 Weighted % (95% CI)	HS Graduates n=3,139 Weighted % (95% CI)	P-value GED vs HS dropout
CIGARETTES				
Ever smoker	66.8 (63.5–70.0)	72.9 (67.7–78.13)	55.3 (52.8–57.8)	0.04
Age of initiation (mean age)	16.4 (16.1–16.8)	16.2 (15.6–16.9)	17.7 (17.4–17.9)	0.58
Smoking Status				
Current Smoker	35.9 (32.5–39.2)	42.9 (36.4–49.3)	26.7 (24.6–28.8)	0.08
Former Smoker	30.9 (27.5–34.3)	30.1 (24.3–35.1)	28.6 (26.5–30.8)	
Never Smoker	33.2 (30.0–36.5)	27.1 (21.9–32.3)	44.7 (42.2–47.2)	
Smoking Frequency^a				
Every day	83.1 (78.8–87.4)	87.2 (81.9–92.5)	79.8 (76.3–83.2)	0.26
Some days	16.9 (12.6–21.3)	12.8 (7.5–18.1)	20.2 (16.8–23.7)	
Cigarettes per day^b				
1 to 10	38.4 (32.3–44.6)	30.3 (20.9–39.6)	39.3 (34.3–44.3)	0.04
11 to 20	48.1 (40.8–55.4)	61.3 (51.1–71.5)	46.8 (41.6–52.0)	
21 to 39	10.8 (5.2–16.4)	4.1 (0.6–7.5)	9.1 (5.8–12.4)	
40+	2.7 (0.8–4.6)	4.2 (1.0–7.5)	4.8 (2.3–7.3)	
Quit attempt in past year ^a	40.5 (34.6–46.3)	45.9 (35.4–56.4)	43.0 (38.3–47.8)	0.37
Quit ratio among ever smokers ^c	46.3 (41.8–50.8)	41.2 (33.7–48.8)	51.8 (48.6–54.9)	0.24
OTHER TOBACCO PRODUCTS				
Ever smoked other tobacco products	26.0 (22.7–29.1)	37.8 (32.2–43.4)	29.9 (27.8–32.0)	0.0002
Currently smoke other tobacco products	21.8 (15.0–28.6)	13.6 (6.3–20.8)	10.6 (8.2–12.9)	0.13
Ever used smokeless tobacco	19.7 (16.9–22.4)	22.8 (17.4–28.3)	20.0 (17.9–22.1)	0.29
Currently use smokeless tobacco	4.9 (3.3–6.5)	2.6 (0.3–4.9)	4.8 (3.7–5.9)	0.15

Abbreviations: CI= confidence interval; HS = high school; GED = General Educational Development certificate

* HS dropouts: 9th to 12th grade no diploma

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^a Among current smokers;

^b Among current every day smokers;

^c Quit ratio = % former smokers among ever smokers

Percentages are weighted; P-values obtained through Rao-Scott Pearson chi-square tests

Data source: CDC/NCHS, National Health Interview Survey, 2013

Table 5.

Smoking characteristics by educational attainment level among females

	HS Dropouts n=1,636 Weighted % (95% CI)	GED Recipients n=490 Weighted % (95% CI)	HS Graduates n=3,872 Weighted % (95% CI)	P-value GED vs HS dropout
CIGARETTES				
Ever smoker	41.4 (38.2–44.5)	61.8 (55.8–67.8)	40.6 (38.5–42.6)	<0.0001
Age of initiation (mean age)	17.9 (17.4–18.5)	17.1 (16.4–17.9)	18.5 (18.2–18.9)	0.09
Smoking Status				
Current Smoker	23.6 (21.1–26.2)	39.7 (33.5–45.9)	17.6 (16.1–19.2)	<0.0001
Former Smoker	17.8 (15.4–20.1)	22.1 (17.1–27.1)	22.9 (21.0–24.8)	
Never Smoker	58.6 (55.5–61.8)	38.2 (32.2–44.2)	59.5 (57.4–61.6)	
Smoking Frequency^a				
Every day	84.0 (79.6–88.5)	84.0 (78.0–90.1)	82.4 (78.5–86.2)	0.99
Some days	16.0 (11.6–20.4)	16.0 (9.9–22.0)	17.7 (13.8–21.5)	
Cigarettes per day^b				
1 to 10	50.2 (42.8–57.7)	45.0 (34.4–55.7)	51.6 (46.4–56.8)	0.40
11 to 20	39.1 (31.7–46.4)	45.0 (34.3–55.7)	44.3 (39.1–49.5)	
21 to 39	8.0 (3.4–12.7)	4.7 (0.3–9.1)	3.1 (1.4–4.8)	
40+	2.7 (0.3–5.0)	5.3 (0.8–9.9)	1.1 (0.0–2.2)	
Quit attempt in past year ^a	51.9 (45.8–57.8)	43.0 (33.0–53.0)	41.5 (36.4–46.6)	0.13
Quit ratio among ever smokers ^c	42.9 (38.4–47.4)	35.7 (28.2–43.3)	56.5 (53.2–59.8)	0.11
OTHER TOBACCO PRODUCTS				
Ever smoked other tobacco products	7.7 (5.8–9.5)	15.44 (10.8–20.1)	6.25 (5.4–7.2)	0.0004
Currently smoke other tobacco products	24.2 (13.4–35.0)	26.44 (11.7–41.2)	9.54 (4.6–14.5)	0.81
Ever used smokeless tobacco	3.8 (2.5–5.1)	6.79 (3.5–10.1)	2.39 (1.8–3.0)	0.08
Currently use smokeless tobacco	1.1 (0.3–2.0)	0.94 (0.0–2.4)	0.18 (0.0–0.4)	0.84

Abbreviations: CI= confidence interval; HS = high school; GED = General Educational Development certificate

^a HS dropouts: 9th to 12th grade no diploma

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^a Among current smokers;

^b Among current every day smokers;

^c Quit ratio = % former smokers among ever smokers

Percentages are weighted; P-values obtained through Rao-Scott Pearson chi-square tests

Data source: CDC/NCHS, National Health Interview Survey, 2013

Table 6.

Prevalence Ratios (PRs) and 95% confidence intervals of smoking behaviors by sex comparing GED recipients to high school dropouts (reference)

	Unadjusted Models				Adjusted Models*			
	Males		Females		Males		Females	
	PR	95% CI	PR	95% CI	APR	95% CI	APR	95% CI
Ever smoking	1.09	(1.004–1.19)	1.49	(1.32–1.69)	1.08	(0.99–1.18)	1.50	(1.33–1.70)
Current smoking	1.20	(1.004–1.42)	1.68	(1.38–2.05)	1.13	(0.94–1.37)	1.52	(1.24–1.85)
Quit attempt in past year ^a	1.00	(0.97–1.03)	0.98	(0.96–1.01)	1.01	(0.97–1.04)	0.99	(0.97–1.02)
Quit ratio among ever smokers ^b	0.89	(0.73–1.09)	0.83	(0.66–1.06)	0.92	(0.77–1.09)	0.95	(0.79–1.14)

Abbreviations: CI= confidence interval; HS = high school; GED = General Educational Development diploma; PR=prevalence ratio; APR=adjusted prevalence ratio

^a Among current every day smokers;

^b Quit ratio = % former smokers among ever smokers

* Adjusted for race, ethnicity, age, family income, employment status, and region

Boldface denotes significance at p<.05

Data source: CDC/NCHS, National Health Interview Survey, 2013

Table 7.Adjusted Prevalences^{*} and 95% confidence intervals of smoking behaviors by sex and educational attainment

	Males						Females					
	HS Dropouts			GED Recipients			HS Graduates			HS Dropouts		
	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)	AP (95% CI)
Ever smoking	65.9 (62.5–69.1)	71.1 (65.1–76.5)	54.2 (51.7–56.7)	39.1 (35.9–42.4)	58.7 (52.7–64.4)	37.5 (35.4–39.7)						
Current smoking	32.6 (29.4–36.0)	36.9 (30.8–43.5)	25.0 (23.0–27.1)	21.3 (18.9–24.0)	32.4 (27.3–37.9)	17.3 (15.8–19.0)						
Quit attempt in past year ^a	39.0 (33.3–45.0)	46.0 (36.1–56.3)	43.5 (38.7–48.4)	49.6 (43.2–56.0)	40.1 (31.0–49.9)	43.1 (38.1–48.3)						
Quit ratio among ever smokers ^b	50.7 (46.5–55.0)	46.6 (39.3–54.1)	53.0 (49.9–56.1)	48.0 (43.4–52.7)	45.7 (38.3–53.3)	55.6 (52.2–58.8)						

Abbreviations: CI= confidence interval; HS = high school; GED = General Educational Development diploma; AP=adjusted prevalence

^a Among current every day smokers;^b Quit ratio = % former smokers among ever smokers^{*} Adjusted for race, ethnicity, age, family income, employment status, and region

Data source: CDC/NCHS, National Health Interview Survey, 2013