

Racial/ethnic and socioeconomic variations in duration of smoking: results from 2003, 2006 and 2007 Tobacco Use Supplement of the Current Population Survey

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ABSTRACT

Background Little is known about racial/ethnic and socioeconomic variations in the duration of smoking. The goal of this research was to examine these variations.

Methods Data came from the 2003, 2006 and 2007 Tobacco Use Supplement of the Current Population Survey. The analysis was limited to ever-smokers ($n = 117,168$). The outcome was number of years of daily smoking. Survival analysis was employed to predict smoking duration.

Results American Indians with 32 years had the highest median duration of smoking, followed by Blacks and ‘other’ races with 30 years, Whites with 28 years and Hispanics with 24 years. The difference in the duration of smoking between Blacks and Whites disappeared after adjusting for poverty. Individuals in poverty had a median duration of smoking of 40 years, while those with a family income of at least three times that of the poverty threshold had a median duration of 22 years. Median duration of smoking was 40 years among individuals without a high-school diploma and 18 years among those with a bachelors or higher degree.

Conclusion This research revealed large variations in smoking duration between racial/ethnic and socioeconomic groups. Longer exposure to tobacco among groups that are already disadvantaged is likely to exacerbate existing health disparities.

Keywords duration of smoking, racial/ethnic, socioeconomic

Introduction

Each year, cigarette smoking causes about 438 000 deaths in the USA.¹ Of these deaths, about 153 000 are from lung, trachea and bronchus cancer.² Almost 90% of all lung cancer deaths are caused by smoking.³ There are marked racial/ethnic disparities in the burden of lung cancer.⁴ The age-adjusted lung cancer incidence rates in 2005 were 72.5 (95% confidence interval (CI): 70.3–74.8) and 62.4 (95% CI: 61.8–63.1) per 100 000 population, and the annual lung cancer death rates in 2005 were 58.8 (95% CI: 57.9–59.7) and 53.2 (95% CI: 53.0–53.5) per 100 000 population in African Americans and Whites, respectively. Lung cancer incidence and death rates were considerably lower in Hispanics and American Indians/Native Alaskans. Hispanics had an incidence rate of 32.2 (95% CI: 30.9–33.6) and a

death rate of 22.7 (95% CI: 22.0–23.4). American Indian/Native Alaskans had an incidence rate of 36.4 (95% CI: 31.5–41.7) and a death rate of 34.8 (95% CI: 32.1–37.6).^{5,6}

To date there are no clear explanations for the higher lung cancer rates among African Americans than Whites.^{4,7} While smoking causes most cases of lung cancer and African Americans suffer a disproportionate burden of lung cancer, most reports show that they start smoking later in life and are lighter smokers than Whites.⁴ Kandel *et al.*^{8–10}

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used data from the National Longitudinal Study of Adolescent Health and showed that, consistent with previous national and regional studies, African American youths have a lower rate of smoking initiation and progression to daily smoking than Whites. One study has shown that African Americans have higher initiation rates but lower rates of progression to daily smoking than Whites.¹¹ Data from Youth Risk Behavior Surveillance indicates that African American students smoke fewer cigarettes per day than White students.¹² Similarly, over 60% of African American adult smokers smoke less than 15 cigarettes per day which is fewer than Whites.¹³

While Hispanics start smoking earlier than African Americans, their smoking initiation age is similar to that of Whites. At least 65% of Hispanics smoke 15 cigarettes per day which is fewer than Whites and similar to African Americans.¹⁴ Available data suggest that American Indians start experimenting with smoking at a very young age and are at a greater risk for starting to smoke than Whites. However, their cigarette consumption per day is less than Whites.¹⁵

Although racial/ethnic differences in age of initiation and cigarette consumption have been examined widely, we know of no research that investigates the difference in the duration of smoking between several racial/ethnic groups. Examining the duration of smoking is important because of its strong association with lung cancer. In fact, its effect on lung cancer mortality is notably stronger than the effect of intensity of smoking. Flanders *et al.*¹⁶ used data from the Cancer Prevention Study II to examine the relative importance of duration and intensity of smoking in men and women aged 40–79.¹⁶ They concluded that lung cancer death rate increased far more strongly with each additional year of smoking than with each additional cigarette per day among men. A similar pattern was observed in women, but to a lesser extent.

The marked lung cancer disparities between African Americans and Whites, the hitherto lack of a clear explanation for this phenomenon, and the strong association between the lung cancer and the duration of smoking leads to the hypothesis that African Americans have a longer duration of smoking than Whites. Because Hispanics start smoking at a similar age than Whites and their lung cancer incidence and mortality rates are lower than Whites, we hypothesize that they smoke for a shorter duration than Whites. Given that, compared with Whites, American Indians start smoking earlier, yet their lung cancer incidence and mortality rates are lower, we hypothesize that they smoke for a shorter duration than Whites.

Lung cancer disparities exist not only between racial/ethnic groups but also between socioeconomic groups. A

recent systematic review and meta-analysis revealed that lung cancer incidence was associated with low education, occupational position and low income.¹⁷ Compared with the highest socioeconomic position, the study reported an increased risk in the lung cancer incidence among people with low education (61%), low occupational position (48%) and low income (37%). A recent US prospective study showed substantial socioeconomic gradients in the lung cancer incidence; males and females with lowest education and family income levels had two to three times higher incidence rates than those with highest education and income levels.¹⁸ Lung cancer mortality has also been shown to vary by various indicators of socioeconomic position.^{19–22} Given the strong association of lung cancer with smoking duration and the fact that socioeconomic variations in the duration of smoking has never been examined in the US, we hypothesize that lower socioeconomic position is associated with longer duration of smoking.

Historically, there have been marked socioeconomic disparities among racial/ethnic groups in the USA. According to the 2000 census in the USA, in the population of adults over 24 years old, Whites had the lowest percentage without a high-school diploma (16.4%), followed by African Americans (27.7%), American Indians/Native Alaskans (29.1%) and Hispanics (47.6%). An annual household income of less than \$20 000 was least prevalent among Whites (19.73%), followed by Hispanics (28.2%), American Indians/Native Alaskans (33.6%) and African Americans (35.7%).²³ Because of the association of socioeconomic position and race/ethnicity, we hypothesize that the magnitude of the relationship between race/ethnicity and the duration of smoking diminishes after controlling for socioeconomic position.

Methods

Data

The data were from the 2003, 2006 and 2007 Tobacco Use Supplement of the Current Population Survey (TUS-CPS), administered by the US Bureau of the Census and sponsored by the National Cancer Institute (NCI).²⁴ TUS-CPS is administered as part of the US Census Bureau's Current Population Survey (CPS), which is a continuing monthly survey conducted by the Bureau of Labor Statistics. The CPS involves a multistage stratified sample of approximately 56 000 housing units from 792 primary sampling units, most of which comprise a metropolitan area, a large county or a group of smaller counties. All household members aged 15 years and above are interviewed. The current

research used the subsample of all respondents ages 18 and older who reported to have ever been a daily smoker ($n = 117\ 168$).

Measurement of duration of smoking

The outcome was the duration of smoking defined as number of years of daily smoking. Respondents who reported to have never smoked at least 100 cigarettes in their entire life were excluded. Those who reported to have smoked more than 100 cigarettes were asked the question ‘Do you now smoke cigarettes every day, some days or not at all’, which identified daily, occasional and former smokers, respectively. Daily smokers were asked the following question that determines their duration of smoking: ‘What is the total number of years you have smoked every day? Do not include any time you stayed off cigarettes for 6 months or longer.’ Those who said they smoked everyday ‘zero’ number of years were excluded from the analysis. Occasional and former smokers were first asked ‘Have you ever smoked cigarettes everyday for at least 6 months?’ Those who replied affirmatively were asked the following question that determined their duration of smoking: ‘What is the total number of years you smoked every day? Do not include any time you stayed off cigarettes for 6 months or longer’.

Previous research has shown that questionnaire-based surveys of the general population provide a reliable estimate of smoking status when validated with cotinine, without systematic differentials in underreporting by socio-economic groups.^{25,26} The validity of self-reported smoking status appears to be similar across racial/ethnic groups when compared with levels of expired carbon monoxide.²⁷ The amount of misclassification (proportion of self-reported non-smokers with increased cotinine levels indicative of active smoking) is very low (for example, 0.9²⁸ and 1.4%²⁹) in most community-based studies,³⁰ but much higher in clinical trials and intervention studies,³⁰ especially among young adults.³¹

Measurement of covariates

Based on two separate questions about the race and Hispanic origin of the respondent, race/ethnicity was categorized as: Non-Hispanic white, Non-Hispanic black, Hispanic, Non-Hispanic American Indian/Aleut/Eskimo and other.

Age of smoking initiation for daily smokers was computed by subtracting the duration of smoking from age. In the case of occasional and former smokers, if they responded affirmatively to the question ‘Have you ever

smoked cigarettes everyday for at least 6 months?’, they were then asked ‘About how long has it been since you last smoked cigarettes every day?’ The answer (expressed in years) to the latter question was added to the duration of smoking, as defined above, and the sum was subtracted from the age of the respondent to compute age of smoking initiation.

Other covariates were: education (less than high school, high-school diploma and some college, bachelors or higher degree), occupation (professional, service, sales, farming, construction, production, unemployed, not in the labor force), poverty status defined as a ratio of family income to poverty threshold for a given family size for each survey year, sex, age and region of residence.

Statistical analysis

Analysis time was number of years of daily smoking (i.e. time from initiation to cessation) and current smokers were right censored. We first attempted to use Cox proportional hazards regression to examine the association of covariates and smoking cessation. This regression model is based on the proportional hazards assumption, which indicates that the shape of the hazard function (which describes the probability of cessation at each time point in the study) is the same for all individuals. Violation of the assumption gives incorrect estimates of the effect of covariates. We used adjusted log–log survival curves and tests based on scaled Schoenfeld residuals³² and ‘concluded that in the present analysis the assumption was violated with regards to sex, age, age of smoking initiation and education. This indicates that the effect of the covariates on cessation varied across time. We fitted three parametric models that were not based on the proportional hazards assumption: lognormal, log-logistic and generalized gamma regressions.³³ We compared the models using the Wald test and Akaike information criterion. Consistent with the previous research,³⁴ generalized gamma regression provided the best fit to the data. It is an accelerated failure time model with the form.

$$\ln(t_j) = \mathbf{x}_j \boldsymbol{\beta}_x + \ln(\tau_j)$$

where t_j is analysis time, \mathbf{x}_j is a vector of covariates, $\boldsymbol{\beta}_x$ is a vector of regression coefficients and τ_j has the generalized gamma distribution. All regression analyses used weighted data and robust standard errors to account for the complex sampling design. Stata Version 10 was used to perform the analyses.

Table 1 Sample characteristics and log-rank tests for the bivariate relationship between covariates and smoking ($n = 117\,168$)

Covariates	% In sample	% Who have quit	Median duration of smoking in years (95% CI)	Log-rank test χ^2
Race/ethnicity				
Non-Hispanic white	84.97	55.50	28 (28–29)	228.01 ($P < 0.001$)
Non-Hispanic black	6.06	44.70	30 (30–32)	
Hispanic	4.53	50.40	24 (23–25)	
Non-Hispanic American Indian	1.01	39.83	32 (30–36)	
Other	3.43	49.69	30 (27–30)	
Education				
Less than high school	15.01	42.49	40 (40–40)	6005.41 ($P < 0.001$)
High-school diploma and some college	66.08	51.05	30 (30–30)	
Bachelors or higher degree	18.91	74.05	18 (17–18)	
Occupation				
Professional	18.91	65.02	18 (18–19)	5032.91 ($P < 0.001$)
Service	9.65	40.73	30 (30–30)	
Sales	15.67	51.11	25 (24–25)	
Farming	0.42	36.91	33 (29–40)	
Construction	7.01	39.71	30 (30–30)	
Production	8.78	42.34	30 (30–31)	
Unemployed	4.32	33.88	33 (30–35)	
Not in labor force	35.23	62.96	32 (31–32)	
Poverty status (ratio of family income to poverty threshold)				
≤100%	12.68	33.93	40 (40–41)	3798.03 ($P < 0.001$)
>100% and ≤200%	20.03	46.22	35 (35–35)	
>200% and ≤300%	18.72	52.42	30 (30–30)	
≥300%	48.57	62.70	22 (22–22)	
Sex				
Male	50.09	55.01	29 (28–30)	5.81 ($P = 0.0159$)
Female	49.91	52.80	28 (27–29)	
Age				
18–24	6.08	27.69	12 (11–12)	5414.37 ($P < 0.001$)
25–39	21.89	41.01	20 (20–20)	
40–54	32.16	48.89	30 (30–30)	
55+	39.88	73.97	30 (30–30)	
Age of smoking initiation				
<16	29.23	48.82	35 (34–35)	1976.97 ($P < 0.001$)
16–18	41.63	55.44	25 (25–26)	
19+	29.13	57.04	25 (25–25)	
Region				
Northeast	21.33	58.22	25 (25–26)	460.90 ($P < 0.001$)
Midwest	26.74	51.35	30 (29–30)	
South	29.37	50.64	30 (30–30)	
West	22.55	59.42	25 (25–25)	

Results

Sample characteristics, median duration of smoking and log-rank tests are given in Table 1. Among racial/ethnic groups, American Indians with 32 years (95% CI: 30–36) had the highest median duration of smoking, followed by

Blacks and ‘other’ races with 30 years (95% CI: 30–32), Whites with 28 years (95% CI: 28–29) and Hispanics with 24 years (95% CI: 23–25). A sharp gradient in median smoking duration was observed for all indicators of socioeconomic position showing that individuals from lower strata

Table 2 Distribution (%) of socioeconomic variables by race/ethnicity

	<i>Non-Hispanic White</i>	<i>Non-Hispanic Black</i>	<i>Hispanic</i>	<i>Non-Hispanic American Indian</i>	<i>Other</i>
Education					
Less than high school	13.29	25.43	37.08	23.86	13.86
High-school diploma and some college	66.84	64.13	52.61	67.21	56.74
Bachelors or higher degree	19.87	10.44	10.31	8.93	29.40
Occupation					
Professional	19.68	12.18	13.47	13.15	22.60
Service	8.93	13.98	13.32	14.34	10.23
Sales	16.24	11.56	13.54	12.32	15.13
Farming	0.32	0.23	1.42	0.63	0.38
Construction	7.89	4.62	12.36	7.60	6.11
Production	9.00	11.43	12.18	8.59	9.33
Unemployed	4.42	9.27	6.58	8.44	6.17
Not in labor force	33.53	36.73	27.13	34.94	30.05
Poverty status (ratio of family income to poverty threshold)					
≤100%	10.42	29.45	23.99	26.27	15.32
>100% and ≤200%	18.40	25.17	28.02	26.00	19.76
>200% and ≤300%	18.56	16.48	18.52	16.84	17.62
≥300%	52.63	28.89	29.47	30.89	47.30

smoked for longer durations. Median duration of smoking was 40 years (95% CI: 40–40) among individuals without a high-school diploma and 18 years (95% CI: 17–18) among those with a bachelors or higher degree. Median duration was 33 years among individuals who were unemployed (95% CI: 30–35) or had a farming occupation (95% CI: 29–40), 30 years among those who had a construction (95% CI: 30–30) or production (95% CI: 30–31) occupation, and 18 years (95% CI: 18–19) among those with a professional occupation. Individuals at or below the poverty threshold had a median duration of smoking of 40 years (95% CI: 40–41), while those with a family income of at least three times that of the poverty threshold had a median duration of 22 years (95% CI: 22–22). Individuals in the South and Midwest regions had a median duration of smoking of 30 years (95% CI: 30–30 and 29–30, respectively) and those in the Northeast and West had a median duration of 25 years (95% CI: 25–26 and 25–25, respectively).

Table 2 shows the association of socioeconomic variables with race/ethnicity. Whites were consistently and markedly more privileged. For example, they had the lowest percentage at or below the poverty threshold (10.4%), followed by Hispanics (24.0%), American Indians (26.3%) and Blacks (29.4%).

Table 3 shows both crude and adjusted time ratios that are the exponentiated gamma regression coefficients. Time ratios can be interpreted as the factor by which smoking

duration is different in one category compared with the reference category of a covariate. The crude results closely reflect the descriptive results reported in Table 1. As hypothesized, the adjusted results reveal some attenuation in the effect of race/ethnicity and socioeconomic position on smoking duration. Of note is the fact that no difference between the adjusted smoking duration was observed between Blacks and Whites (TR: 1.00; 95% CI: 0.97–1.03), which was primarily due to controlling for poverty. As hypothesized, compared with Whites, smoking duration was 17% shorter in Hispanics. However, contrary to expectation, American Indians smoked for 11% longer than Whites. Respondents without a high-school diploma had a smoking duration that was 49% longer than those with a bachelors or higher degree. Smoking duration was highest among construction and farm workers as well as unemployed persons and lowest among professional and sales workers. Respondents below the poverty line had a smoking duration that was 43% longer than those with a family income at least three times higher than the poverty threshold.

Discussion

Main findings of this study

This was the first study to examine racial/ethnic and socioeconomic variations in smoking duration in a large national sample in the USA. The study showed that, on the average,

Blacks smoked 2 years longer and American Indians smoked 4 years longer than Whites, while Hispanics smoked 4 years shorter than Whites. In multivariate analyses, the difference in smoking duration between Whites and Blacks disappeared. This was primarily because of longer duration of smoking among persons in poverty and the fact that a larger proportion of Blacks than Whites live in poverty.

About 24% of Hispanics are undocumented immigrants,³⁵ who are not likely to participate in most national surveys. They are from lower socioeconomic segments of the population of their country of origin, where smoking prevalence is often negatively associated with socioeconomic position.^{36,37} Thus, it is likely that the smoking prevalence and the duration of smoking in Hispanics are underestimated in the survey studies as in our study.

An extremely large difference in smoking duration was found among socioeconomic groups. For example, unemployed persons and those in farming occupations smoked 15 years longer and production/construction workers smoked 12 years longer than professionals. Similarly, persons at or below the poverty line smoked 18 years longer than those whose family income was at least three times that of the poverty threshold. After controlling for study covariates, a gradient persisted in the association of the indicators of socioeconomic position and smoking duration.

What is known on this topic and what this study adds

The findings were consistent with the previous research on socioeconomic disparities in smoking cessation.^{4,38–40} However, the findings contradicted Burns *et al.*'s study³⁸ which reported that Hispanics smoke 3 years longer than Whites. This is likely due to the fact that Hispanics in their sample were 'highly acculturated'. Nationally, Hispanics have a lower prevalence of smoking than Whites.^{41,42} It is possible that the smoking habits of Hispanics who reside in the USA for a long-time converges with that of Whites³⁸ and at the same time their persistent low socioeconomic position contributes to their lower cessation rates and longer smoking duration.

The observed longer smoking duration among Blacks than Whites, along with the strong association of smoking duration and lung cancer, can help to explain why Blacks suffer from higher lung cancer incidence and mortality rates. Racial variations in the following factors have also been implicated in explaining Black–White differences in lung cancer: nicotine metabolism, depth and frequency of inhalation;⁴³ intake of fruit and vegetables;^{44,45} use of mentholated cigarettes and constitutional susceptibility to the effects of tobacco carcinogens.⁴⁵ However, some studies have ruled

out fruit and vegetable intake⁴⁶ and use of mentholated cigarettes⁴⁷ as an explanation for the observed differences in lung cancer burden.

The findings were consistent with previous reports that there are marked socioeconomic disparities between racial/ethnic groups, with Whites being consistently in a position of advantage with respect to many indicators of socioeconomic position.^{23,48,49} We found that poverty, low education and blue-collar work were more prevalent in Blacks, American Indians and Hispanics than Whites. In multivariate analyses, there was overwhelming evidence that both race/ethnicity and socioeconomic position were associated with the duration of smoking. Thus, minority and socioeconomically disadvantaged groups need to be targeted by tobacco control policies and interventions, which include culturally appropriate cessation programs;⁵⁰ providing equitable access to cessation services; curtailing tobacco advertising, which is more widespread in minority and lower socioeconomic neighborhoods,⁵¹ and which can delay quit attempts and be a barrier to cessation success; and increasing cigarette prices through taxation, which has been shown to result in a higher reduction in prevalence among lower income groups.^{52–54}

The findings add to the existing literature on social inequalities in smoking. In addition to lower smoking cessation rates and higher smoking prevalence, individuals from lower socioeconomic and most minority groups smoke for longer durations than others. Previous research has shown that smokers who do not quit are more likely to experience financial stress than those smokers who quit and are less likely to report material well-being.^{55,56} Thus, given the present findings, smokers from disadvantaged groups, many of whom experience financial hardship, experience a deterioration of standards of living for longer periods of time. This will likely exacerbate existing health inequalities. Encouraging and assisting these smokers to quit is likely to bring about a long-term improvement in their material conditions of life and reduce health inequalities.

Limitations of this study

Two possible limitations of the study are worth noting. First, because we retrospectively calculated smoking duration, the experiences of individuals who died before they could participate in the study could not be taken into account. The fact that smokers have a higher mortality rate than former smokers may have led to an underestimation of smoking duration. The underestimation is likely to be larger among sociodemographic groups that have a higher prevalence of daily smoking and a lower prevalence of former smoking.

Table 3 Gamma regression results for the effect of covariates on duration of smoking ($n = 117\,168$)

Covariates	Crude time ratio ^a (95% CI)	P	Adjusted time ratio ^b (95% CI)	P
Race/ethnicity				
Non-Hispanic white	1.00	<0.001	1.00	<0.001
Non-Hispanic black	1.15 (1.11–1.19)		1.00 (0.97–1.03)	
Hispanic	0.88 (0.85–0.91)		0.83 (0.80–0.86)	
Non-Hispanic American Indian	1.20 (1.09–1.32)		1.11 (1.02–1.21)	
Other	0.95 (0.91–0.99)		1.06 (1.01–1.10)	
Education				
Less than high school	2.02 (1.96–2.07)	<0.001	1.49 (1.45–1.53)	<0.001
High-school diploma and some college	1.51 (1.48–1.54)		1.31 (1.29–1.34)	
Bachelors or higher degree	1.00		1.00	
Occupation				
Professional	1.00	<0.001	1.00	<0.001
Service	1.45 (1.40–1.49)		1.20 (1.16–1.23)	
Sales	1.26 (1.23–1.29)		1.12 (1.09–1.15)	
Farming	1.76 (1.53–2.03)		1.32 (1.15–1.50)	
Construction	1.60 (1.54–1.65)		1.34 (1.29–1.39)	
Production	1.60 (1.55–1.65)		1.27 (1.23–1.31)	
Unemployed	1.60 (1.53–1.67)		1.32 (1.27–1.38)	
Not in labor force	1.62 (1.59–1.66)		1.18 (1.15–1.20)	
Poverty status (ratio of family income to poverty threshold)				
≤100%	1.69 (1.64–1.74)	<0.001	1.43 (1.39–1.47)	<0.001
>100% and ≤200%	1.42 (1.39–1.45)		1.23 (1.21–1.26)	
>200% and ≤300%	1.24 (1.21–1.26)		1.12 (1.10–1.14)	
≥300%	1.00		1.00	
Sex				
Male	1.02 (1.00–1.03)	0.008	0.99 (0.98–1.00)	0.124
Female	1.00		1.00	
Age				
18–24	1.00	<0.001	1.00	<0.001
25–39	1.74 (1.67–1.82)		2.07 (1.98–2.16)	
40–54	2.72 (2.61–2.84)		3.42 (3.27–3.58)	
55+	2.89 (2.77–3.01)		3.64 (3.48–3.81)	
Age of smoking initiation				
<16	1.37 (1.35–1.40)	<0.001	1.36 (1.34–1.39)	<0.001
16–18	1.06 (1.04–1.08)		1.10 (1.08–1.12)	
19+	1.00		1.00	
Region				
Northeast	1.00	<0.001	1.00	<0.001
Midwest	1.09 (1.07–1.11)		1.06 (1.03–1.08)	
South	1.13 (1.11–1.15)		1.07 (1.05–1.09)	
West	0.94 (0.92–0.96)		0.95 (0.93–0.97)	

^aTime ratios are computed by exponentiating the gamma regression coefficients.

^bAdjusted for all covariates in the table.

Among ever smokers in the current study, daily smoking was most prevalent in American Indians (49.7%), followed by Blacks (45.0%), Whites (38.5%) and Hispanics (34.6%). Higher socioeconomic position was associated with a lower

percentage of daily smokers and a higher percentage of former smokers. For example, the prevalence of daily smoking was highest in persons with less than high-school education (48.1%) and lowest in persons with bachelors or

higher degree (20.6%). Thus, underestimation in smoking duration was likely to be greater among American Indians and Blacks compared with Whites, and among smokers from lower socioeconomic backgrounds than others.

Furthermore, the fact that lower socioeconomic groups and Blacks have a higher lung cancer mortality rate^{4,19–21} may have led to an underestimation of some of the reported differences in the duration of smoking. A second limitation relates to bias in recall of age of smoking initiation or cessation. However, previous studies have found a reasonable level of agreement between contemporaneous and retrospective reports of smoking.^{57,58}

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