

Where the U.S. tobacco epidemic still rages: Most remaining smokers have lower socioeconomic status

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Abstract: Objective. We estimated the proportion of U.S. smokers who have low socioeconomic status (SES). **Methods.** We used 2012 data from a national supplement to The Attitudes and Behaviors Survey on Health (TABs), a periodic population survey of Colorado adults. We estimated smoking prevalence and total smokers by education, poverty level, occupation, health insurance status, and combinations of these factors. **Results.** Smoking prevalence across low-SES categories ranged from 24.3% to 42.6%. Combining low-SES categories with the highest smoking prevalence accounted for 31.1% of U.S. adults but half (50.1%) of smokers. Combining all low-SES categories regardless of smoking prevalence accounted for roughly half (53.3%) of adults but nearly three-fourths (72.2%) of smokers. **Conclusions.** A majority of continuing U.S. smokers have low SES. Further progress against the U.S. cigarette epidemic depends on focusing tobacco research and program initiatives on reaching and engaging these smokers in cessation strategies that work for them.

Key words: Smoking, socioeconomic status, social justice, public health.

During the past half-century, U.S. smoking prevalence has steadily declined while socioeconomic disparities in smoking have steadily widened. From 1965 to 1991, the proportion of current smokers went from 42.4% of adults to 25.7% of adults—a 39.4% reduction—but among those without a high school diploma, the reduction was less than half as great as among those with at least four years of college (24.7% vs. 60.6% relative decline).¹

Smoking prevalence is now highly disparate across the social, economic, and occupational dimensions of socioeconomic status (SES).^{2,3,4} In 2012, current smokers numbered fewer than one in ten (9.1%) adults with a college degree, but one in four (24.7%) adults without a high school diploma,⁵ and one in six (17.0%) adults living at or above poverty, but more than one in four (27.9%) living in poverty.⁵ By occupation, pooled smoking prevalence during 1987–2004 was 39.7% among construction workers and miners, for example, compared with 11.3% among teachers, librarians, and counselors.⁶

Elevated smoking rates among lower SES (LSES) categories are not rooted in lack of motivation to quit: High school dropouts report levels of desire to quit and attempts to quit that are similar to those among college graduates.^{7,8,9,10,11,12,13,14} Rather, the dis-

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parities persist and are widening because LSES smokers who try to quit are less likely than other smokers to attain and maintain abstinence.^{8,15,16,17,18} Suspected causes include underuse of evidence-based cessation treatment,^{17,19,20,21,22} and chronic exposure to psychosocial stressors without adequate social support and effective, health-supporting coping resources.^{22,23,24}

A population with above average failure rates in efforts to attain a health objective deserves public health attention under the moral imperative of social justice to secure a sufficient level of health for all and to narrow unjust inequalities.²⁵ However, public health ethics also require balancing commitment to social justice against “the injunction to maximize good aggregate or collective health outcomes.”^{26(p. 2)} Indeed, public health impact depends less on serving unjustly burdened groups than on reaching the greatest number of people with effective interventions.²⁷ Social justice and greatest-good mandates compete for resources, except in cases where a specific population simultaneously bears an unjustly elevated health burden *and* comprises a majority of individuals who bear the burden. The current study examines the relationship of elevated smoking burdens with the size of socioeconomic populations that currently smoke.

To our knowledge, little if any research has focused on the socioeconomic composition of the U.S. smoker population. We analyzed data from a one-time national survey to estimate the proportion of remaining smokers who have low socioeconomic status (LSES).

Methods

The Attitudes and Behaviors Survey (TABS) on Health is a periodic, population-level study among Colorado adults (aged 18+). In 2012, TABS supplemented the state sample ($n = 14,998$) with a large, representative national sample of adults ($n = 3,230$) in order to compare state and national health attitudes and behaviors. The Attitudes and Behaviors Survey methods are reported in detail elsewhere.¹⁷ Briefly, both landline and cell phone telephone exchange banks were stratified and randomly sampled, with oversampling in exchanges with higher concentrations of Latino and African American households. Sampled households were enumerated, and up to two residents aged 18+ were selected to complete a computer-assisted telephone interview (CATI) in the respondent’s choice of English or Spanish. The instrument, protocol, and participant consent were approved by the Colorado Multiple Institutional Review Board (COMIRB). Survey topics in 2012 included four chronic conditions—diabetes, hypertension, hyperlipidemia, and overweight/obesity—and tobacco-related attitudes and behaviors. Response rates²⁸ were 55.2% nationally (58.4% in Colorado) at the landline household level and 51.7% nationally (55.8% in Colorado) at the landline respondent level, and 19.6% of sampled cell phones (24.7% in Colorado). Weights were constructed to account for individual selection probability and non-response, and to adjust the sample to match the U.S. population on sex, age, race/ethnicity, and education level.

For the current analyses, four measures were used to indicate SES: household income as a percentage of the federal poverty level (FPL; <100%, 100%–199%, 200%+); occupational status (employed for wages or salary, disabled or unable to work, unemployed, all other [homemaker, self-employed, student, retired]); education level (≤ 8 years, 9–12

years without a high school diploma, GED, high school diploma, some college or post-high school, college degree, postgraduate degree), and health insurance (private, Medicaid, Medicare, none). Item-missing values in each SES variable were multiply imputed (10 imputations, 100 iterations) using chained equations (*mi impute chained*; StataCorp. 2013. Stata: Release 13. College Station, TX) conditioned on demographic factors (age, sex, ethnicity, primary language); self-reported health factors (general health status, mental health diagnosis or limitation, physical limitation, hypertension, hyperlipidemia, diabetes, overweight/obesity); health care access and utilization (past-year medical and dental visits; past-year financial inability to obtain needed medical, dental, pharmaceutical, or mental health treatment); smoking status, and Internet access. Fifteen variables were used in imputation, and 7.5% of item-values were imputed.

Low socioeconomic status (LSES) was defined as FPL <200%, disability, less education than a high school or general education development (GED) diploma, or Medicaid or no health insurance. The proportion of smokers with LSES was estimated two ways. One strategy focused on the strongest claim for social justice treatment, i.e., smokers in LSES categories that have the highest smoking prevalence: partial high school education, FPL <100%, disability/inability to work, and Medicaid insurance; this estimate includes only a portion of LSES smokers but represents the groups where smoking is the most widespread and densely concentrated. The other estimation strategy included all LSES categories (LSES-inclusive). A third variable was constructed to represent low-income (<200% FPL) employed adults, i.e., the working poor and working near-poor.

Data were weighted to represent the U.S. adult population, and analyses estimated descriptive parameters (current smoking prevalence, total number of smokers, percentage of all smokers, and percentage of all adults) with 95% confidence intervals (CIs) for each SES variable and each LSES construct. All analyses used design-based methods to yield approximately unbiased parameter estimates and robust estimates of variance.

Results

An estimated 19.7% (CI, 17.6–21.9%) or 48.4 million (CI, 42.5 million to 54.2 million) adults were current smokers in 2012 (Table 1). The highest smoking prevalence by income, education, insurance status and occupational status ranged from 29.7% to 42.6%, with Medicaid beneficiaries and disabled adults exceeding 40% prevalence. Combining low-SES categories with the highest smoking prevalence accounted for 31.1% of U.S. adults but half (50.1%) of smokers. Combining all low-SES categories regardless of smoking prevalence accounted for roughly half (53.3%) of adults but nearly three-fourths (72.2%) of smokers. Low-income workers accounted for nearly one-fourth (23.5%) of smokers but less than one-seventh (14.1%) of adults.

Discussion

A majority of U.S. adult smokers lives in poverty, has partial high school education, is disabled, and/or is on Medicaid, and these socioeconomically defined populations have the highest rates of smoking. When the near-poor and the uninsured are also included,

Table 1.

ESTIMATED SMOKING PREVALENCE, NUMBER AND PERCENTAGE OF SMOKERS, AND PERCENTAGE OF POPULATION, BY SOCIOECONOMIC STATUS INDICATORS, UNITED STATES, 2012

	smoking prevalence		N*	smokers		adults	
	%	(CI)		%	(CI)	%	(CI)
Total	19.7	(17.6, 21.9)	48.37	100.0	—	100.0	—
LSES-HSP							
yes	31.7	(26.1, 37.4)	24.21	50.1	(43.2, 57.1)^a	31.1	(28.3, 34.0)
no	14.3	(12.1, 16.5)	24.16	49.9	(42.9, 56.8)	68.9	(66.0, 71.7)
LSES-Inclusive							
yes	26.7	(23.0, 30.5)	34.91	72.2	(60.8, 83.5)^a	53.3	(49.4, 57.1)
no	11.8	(9.4, 14.1)	13.46	27.8	(21.9, 33.7)	46.7	(44.1, 49.3)
Low-income employed							
yes	33.0	(24.4, 41.6)	11.38	23.5	(17.0, 30.0)^a	14.1	(11.9, 16.3)
no	17.6	(15.4, 19.7)	37.98	76.5	(70.0, 83.0)^a	85.9	(83.7, 88.1)
Income as % of federal poverty level (FPL)							
<100	29.7	(22.6, 36.8)	15.39	31.9	(24.0, 39.7)^a	21.1	(18.3, 23.9)
100–199	25.4	(19.3, 31.4)	14.36	29.7	(21.9, 37.5)	23.1	(20.5, 25.7)
200+	13.6	(11.1, 16.1)	18.62	38.4	(31.8, 45.0)^a	55.8	(52.8, 58.7)
Health insurance status							
Medicaid	42.6	(29.4, 55.8)	5.00	10.3	(6.1, 14.5)^a	4.8	(3.5, 6.1)
uninsured	29.0	(22.5, 35.5)	14.01	29.0	(22.8, 35.2)^a	19.7	(17.2, 22.2)
private	16.6	(14.1, 19.2)	25.35	52.4	(45.8, 59.0)^a	62.3	(59.5, 65.0)
Medicare	12.3	(8.5, 16.2)	4.01	8.3	(5.5, 11.1)^a	13.2	(11.7, 14.8)
Employment status							
disabled	40.1	(30.5, 49.6)	7.50	15.6	(10.8, 20.3)^a	7.7	(6.3, 9.0)
unemployed	24.7	(15.7, 33.7)	3.32	6.9	(4.2, 9.6)	5.5	(4.3, 6.7)
employee	20.4	(16.8, 24.1)	20.89	43.3	(37.0, 49.6)	41.9	(39.4, 44.4)
other	15.1	(12.4, 17.7)	16.52	34.3	(28.6, 39.9)^a	44.9	(42.4, 47.4)
Education							
<9 years	24.3	(12.6, 36.1)	3.08	6.4	(3.0, 9.8)	5.1	(3.7, 6.5)
9–12 years, no diploma	34.5	(24.3, 44.8)	8.31	17.2	(11.5, 22.9)	9.8	(8.0, 11.7)
GED	20.3	(8.8, 31.8)	1.66	3.4	(1.4, 5.5)	3.3	(2.3, 4.4)
HS diploma	25.4	(20.6, 30.3)	15.95	33.0	(27.0, 39.1)	25.6	(23.2, 27.9)
some college or post-HS	17.8	(14.4, 21.2)	13.20	27.3	(22.1, 32.4)	30.3	(28.0, 32.6)
college graduate	12.4	(9.1, 15.8)	5.21	10.8	(7.6, 13.9)^a	17.1	(15.6, 18.7)
postgraduate degree	4.5	(2.2, 6.7)	0.95	1.9	(0.9, 3.0)^a	8.7	(7.6, 9.8)

Notes: CI: 95% confidence interval

^aCategory has non-overlapping CIs between percent of smokers and percent of adults

LSES-HSP: low socioeconomic status by highest smoking prevalence category in each SES indicator

LSES-Inclusive: LSES-HSP categories plus 100–199% FPL or uninsured

nearly three-fourths of continuing U.S. smokers have low socioeconomic status. These new findings indicate that ethical principles that often conflict—social justice for the disadvantaged vs. greatest good for the greatest number—are perfectly aligned for U.S. tobacco control. A priority shift to LSES populations would be not only ethical but practical, since even complete eradication of smoking among other populations would leave nearly three-fourths of the continuing epidemic untouched. Efforts should include prevention of smoking initiation among LSES adolescents, but the emphasis should be on existing adult smokers, both because they outnumber new adult smokers roughly 100 to one, and because adult smoking models the behavior for adolescents.

Study limitations include the cross-sectional design, which supports only associative rather than directional analysis of the relationship between SES and smoking. The self-reported data may underrepresent smoking, especially among higher socioeconomic categories where antismoking norms predominate, in which case the findings may be overstated. At the same time, low SES respondents are underrepresented in the (unweighted) study sample; weights used in analyses adjusted for sample-to-population discrepancies in education but not other SES dimensions. If LSES smokers were also less likely than LSES nonsmokers to complete the survey, the findings would underestimate the extent of LSES among continuing smokers. These concerns are somewhat mitigated by the overlap of current smoking prevalence estimates with those from the National Health Interview Survey for the same year.²⁹ Nevertheless, further research is needed to address the study limitations and validate the findings.

Conclusion. Further progress against the U.S. cigarette epidemic depends on focusing a majority of tobacco research and program initiatives to reach, engage, and support smokers with lower socioeconomic status in their cessation attempts, treatment uptake and adherence, and adjustment to life without cigarettes. Little smoking cessation intervention research has focused on challenges specific to lower SES, such as stressful environments and chronically stressful lives, which seem highly likely to undermine LSES smokers in quit-attempts. Many smokers use cigarettes as a moment-to-moment coping strategy, and LSES life brings more than its share of momentary needs for coping and resilience. Yet, little is known about the feasibility, efficacy, or sustainability of interventions designed to help low SES quit-attempters develop and strengthen coping skills and resources for managing nicotine withdrawal and sustaining abstinence after cigarettes are gone but living remains stressful. The challenges of LSES smoking cessation must become targets for concerted research and programmatic initiatives.

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Competing Interests

The author has no competing interests.

References

1. Giovino GA, Schooley MW, Zhu B-P, et al. Surveillance for Selected Tobacco-Use Behaviors—United States, 1900–1994. *MMWR CDC Surveill Summ.* 1994 Nov 18;43(3):1–43.
2. Adler NE, Boyce T, Chesney MA, et al. Socioeconomic Status and Health: The challenge of the gradient. *Amer Psychol* 1994 Jan;49(1):15–24.
<https://doi.org/10.1037/0003-066X.49.1.15>
PMid:8122813
3. Winkleby MA, Jatulis DE, Frank E, et al. Socioeconomic status and health: how education, income, and occupation contribute to risk factors for cardiovascular disease. *Am J Public Health.* 1992 Jun; 82(6):816–20.
<https://doi.org/10.2105/AJPH.82.6.816>
PMid:1585961 PMCID:PMC1694190
4. Cowan CD, Hauser RM, Kominski RA, et al. Improving the measurement of socioeconomic status for the national assessment of educational progress: a theoretical foundation. Washington, DC: National Center for Educational Statistics, 2012.
5. Centers for Disease Control and Prevention. Adult cigarette smoking in the United States: current estimates. Atlanta, GA: Centers for Disease Control and Prevention. Available at: http://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/.
6. Lee DJ, Fleming LE, Arheart KL, et al. Smoking rate trends in U.S. occupational groups: the 1987 to 2004 National Health Interview Survey. *J Occup Environ Med.* 2007 Jan;49(1):75–81.
<https://doi.org/10.1097/JOM.0b013e31802ec68c>
PMid:17215716
7. Kotz D, West R. Explaining the social gradient in smoking cessation: It's not in the trying, but in the succeeding. *Tob Control.* 2009 Feb;18(1):43–6. Epub 2008 Oct 20.
<https://doi.org/10.1136/tc.2008.025981>
PMid:18936053
8. Reid JL, Hammond D, Boudreau C, et al. Socioeconomic disparities in quit intentions, quit attempts, and smoking abstinence among smokers in four western countries: findings from the International Tobacco Control Four Country Survey. *Nicotine Tob Res.* 2010 Oct;12 Suppl:S20–33.
<https://doi.org/10.1093/ntr/ntq051>
PMid:20889477 PMCID:PMC2948137
9. Liu F. Quit attempts and intention to quit cigarette smoking among Medicaid recipients in the USA. *Public Health.* 2010 Oct;124(10):553–8. Epub 2010 Sep 15.
<https://doi.org/10.1016/j.puhe.2010.05.015>
PMid:20832833
10. Caleyachetty A, Lewis S, McNeill A, et al. Struggling to make ends meet: exploring pathways to understand why smokers in financial difficulties are less likely to quit successfully. *Eur J Public Health.* 2012 Feb;22 Suppl 1:41–8.
<https://doi.org/10.1093/eurpub/ckr199>
PMid:22294784 PMCID:PMC3269295
11. Carlini BH, McDaniel AM, Weaver MT, et al. Reaching out, inviting back: using Interactive voice response (IVR) technology to recycle relapsed smokers back to Quitline treatment—a randomized controlled trial. *BMC Public Health.* 2012 Jul 6;12:507
<https://doi.org/10.1186/1471-2458-12-507>

- PMid:22768793 PMCID:PMC3438078
12. Partos TR, Borland R, Siahpush M. Socio-economic disadvantage at the area level poses few direct barriers to smoking cessation for Australian smokers: findings from the International Tobacco Control Australian cohort survey. *Drug Alcohol Rev.* 2012 Jul;31(5):653–63. Epub 2012 Mar 4.
<https://doi.org/10.1111/j.1465-3362.2012.00427.x>
PMid:22385265 PMCID:PMC4594828
 13. Rafful C, Garcia-Rodriguez O, Wang S, et al. Predictors of quit attempts and successful quit attempts in a nationally representative sample of smokers. *Addict Behav.* 2013 Apr;38(4):1920–3. Epub 2013 Jan 4.
<https://doi.org/10.1016/j.addbeh.2012.12.019>
PMid:23380497 PMCID:PMC3578080
 14. Solberg LI, Asche SE, Boyle R, et al. Smoking and cessation behaviors among young adults of various educational backgrounds. *Am J Public Health.* 2007 Aug;97(8):1421–6. Epub 2007 Jun 28.
<https://doi.org/10.2105/AJPH.2006.098491>
PMid:17600256 PMCID:PMC1931464
 15. Barbeau EM, Krieger N, Soobader MJ. Working class matters: Socioeconomic disadvantage, race/ethnicity, gender, and smoking in NHIS 2000. *Am J Public Health.* 2004 Feb;94(2):269–78.
<https://doi.org/10.2105/AJPH.94.2.269>
PMid:14759942 PMCID:PMC1448243
 16. Agrawal A, Sartor C, Pergadia ML, et al. Correlates of smoking cessation in a nationally representative sample of U.S. adults. *Addict Behav.* 2008 Sep;33(9):1223–6. Epub 2008 Apr 8.
<https://doi.org/10.1016/j.addbeh.2008.04.003>
PMid:18501526 PMCID:PMC2516971
 17. Levinson A, Perez-Stable E, Espinoza P, et al. Latinos report less use of pharmaceutical aids when trying to quit smoking. *Am J Prev Med.* 2004;26(2):105–11.
<https://doi.org/10.1016/j.amepre.2003.10.012>
PMid:14751320
 18. Foulds J, Gandhi KK, Steinberg MB, et al. Factors associated with quitting smoking at a tobacco dependence treatment clinic. *Am J Health Behav.* 2006 Jul–Aug;30(4):400–12.
<https://doi.org/10.5993/AJHB.30.4.6>
PMid:16787130
 19. Shiffman S, Brockwell SE, Pillitteri JL, et al. Individual differences in adoption of treatment for smoking cessation: Demographic and smoking history characteristics. *Drug Alcohol Depend.* 2008 Jan 11;93(1–2):121–31. Epub 2007 Nov 8.
<https://doi.org/10.1016/j.drugalcdep.2007.09.005>
PMid:17996399
 20. Cokkinides VE, Halpern MT, Barbeau EM, et al. Racial and ethnic disparities in smoking-cessation interventions: Analysis of the 2005 National Health Interview Survey. *Am J Prev Med.* 2008 May; 34(5):404–12.
<https://doi.org/10.1016/j.amepre.2008.02.003>
PMid:18407007
 21. Burns EK, Deaton EA, Levinson AH. Rates and reasons: Disparities in low intentions to use a state smoking cessation quitline. *Am J Health Promot.* 2011 May–Jun; 25(5S):S59–65.

- <https://doi.org/10.4278/ajhp.100611-QUAN-183>
PMid:21510788
22. Hiscock R, Bauld L, Amos A, et al. Socioeconomic status and smoking: a review. *Ann NY Acad Sci.* 2012;1248(1):107–23.
<https://doi.org/10.1111/j.1749-6632.2011.06202.x>
PMid:22092035
 23. Businelle MS, Kendzor DE, Reitzel LR, et al. Mechanisms linking socioeconomic status to smoking cessation: a structural equation modeling approach. *Health Psychol.* 2010 May;29(3):262–73.
<https://doi.org/10.1037/a0019285>
PMid:20496980 PMCID:PMC2922845
 24. Kendzor DE, Businelle MS, Costello TJ, et al. Financial strain and smoking cessation among racially/ethnically diverse smokers. *Am J Public Health.* 2010;100(4):702–6.
<https://doi.org/10.2105/AJPH.2009.172676>
PMid:20167886 PMCID:PMC2836332
 25. Powers M, Faden RR. *Social justice.* New York, NY: Oxford University Press, 2006.
 26. Faden R, Shebaya S. *Public Health Ethics.* Stanford, CA: Stanford Encyclopedia of Philosophy, 2010. Available at: <http://plato.stanford.edu/archives/sum2010/entries/publichealth-ethics/>.
 27. Abrams DB, Orleans CT, Niaura RS, et al. Integrating individual and public health perspectives for treatment of tobacco dependence under managed health care: a combined stepped care and matching model. *Ann Behav Med.* 1996 Fall;18(4):290–304.
<https://doi.org/10.1007/BF02895291>
PMid:18425675
 28. American Association for Public Opinion Research. *Response Rate—an Overview.* Oakbrook Terrace, IL: American Association for Public Opinion Research, 2014.
 29. Centers for Disease Control and Prevention. Current cigarette smoking among adults—United States, 2005–2012. *Morbidity and Mortality Weekly Report.* 2014;63(02):29–34.