

RESEARCH PAPER

The California Tobacco Control Program's effect on adult smokers: (3) Similar effects for African Americans across states

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Objective: To compare trends in African-American (AA) and non-Hispanic white (NHW) smoking between states categorised as having three different levels of tobacco control practice in the 1990s.

Setting and participants: Analysis of 1992–3 to 2001–2 Tobacco Use Supplements to the Current Population Survey for differences in adult (20–64 years) daily smoking prevalence for AAs and NHWs across states: California (CA; high cigarette price/comprehensive programme), New York (NY) and New Jersey (NJ; high cigarette price/no comprehensive programme), and tobacco growing states (TGS; low cigarette price/no comprehensive programme).

Results: From 1992–3 to 2001–2, there were large declines in AA smoking across states (2.7–3.8% decrease/year, adjusted for age, income, education, gender; $p < 0.05$). Adjusted NHW smoking prevalence declined significantly only in CA. AA prevalence declined significantly and did not differ across state groups. In all years, in all state groups, adjusted prevalence was either not significantly different or was lower for AAs than for NHWs. More recent cohorts of AAs appeared to have taken up smoking at lower rates than older cohorts.

Conclusion: There were uniformly large declines in AA smoking from 1992–3 to 2001–2 across states, independent of type of tobacco control strategy. Further research is needed into factors associated with smoking declines among AAs.

Historically, smoking prevalence and smoking-related diseases have been higher in the US African-American (AA) adult population compared with the non-Hispanic white (NHW) population.^{1,2} However, in recent years the prevalence gap between AAs and NHWs has closed.³ Apparently, lower initiation rates among AAs have persisted resulting in lower adult prevalence rates.^{4,5} These changes in AA smoking behaviour may be due to an increased response to tobacco control measures, including higher cigarette prices. An important question is how the smoking rates have changed for AAs and for NHWs across states with different tobacco control strategies.

The first comprehensive state-wide tobacco control programme designed to increase social norms against smoking in the US began in California (CA) in 1989.⁶ This programme was unique in spending an average of US\$3 per person per year on a public health programme to discourage smoking through the 1990s.⁷ It is the largest and the longest running programme in the US and its components include mass-media programmes, clean indoor air laws, community and school programmes, and increased excise taxes. Thus, it might be expected that CA would have shown a greater reduction in smoking than states without such a tobacco control programme.

New York (NY) and New Jersey (NJ) are adjacent states with a combined population size similar to CA. Neither state supported a major tobacco control programme in the 1990s, but both were similar to CA in the amount of excise tax levied on cigarettes⁸ and had similar high cigarette prices during the 1990s. It might be expected that these states would also have greater reductions in smoking than states with lower excise taxes during the study period.

There are six US states that had significant economic activity (>US\$100 million/year) from tobacco-related agriculture

during the study period.⁹ These tobacco-growing states (TGS) were Kentucky, Tennessee, North Carolina, South Carolina, Virginia and Georgia, which together had a population slightly larger than either CA or NY and NJ. The TGS have consistently had some of the lowest excise taxes in the nation,⁸ and none had a major state-specific tobacco control programme in the 1990s. There is also evidence that social norms are more supportive of tobacco use in these tobacco-growing regions.¹⁰

We used data from the Tobacco Use Supplements (TUS) to the Current Population Survey (TUS-CPS) from 1992–3 to 2001–2 to examine age-specific smoking rates and particularly, how reductions in AA initiation previously reported for the 1980s and 1990s might be impacting prevalence rates compared to those among the NHW population. We compared trends for CA, a state with a comprehensive programme designed to increase social norms against smoking, with NY and NJ, states that markedly increased the price of cigarettes during this time period but limited tobacco control activity, and with the TGS, serving as a control group of states with low prices and limited state-wide tobacco control activities.

METHODS

Data sources

TUS are periodically added to the national CPS, which was the source of the data for this analysis. The CPS is a continuous survey (over 56 000 households/month) conducted by the US Bureau of the Census, primarily to monitor labour force indicators for the civilian non-institutionalised US population

Abbreviations: AA, African-American; CPS, Current Population Survey; NHW, non-Hispanic white; TGS, tobacco-growing states; TUS, Tobacco Use Supplements; TUS-CPS, Tobacco Use Supplements to the Current Population Survey

aged ≥ 15 . The complete CPS method is published elsewhere.¹¹ Briefly, the CPS includes a probability sample, based on a stratified sampling scheme of clusters of four neighbouring households identified from the most recent decennial census, updated from building permits and other sources. The TUS-CPS was included for the months of September, January and May in 1992–3, 1995–6, 1998–9, and June, November and February of 2001–2. The TUS was developed by the staff of the National Cancer Institute and pretested by trained interviewers of the Bureau of the Census prior to implementation. In this study, we use data from in-person interviews from all respondents aged 20–64 years identified as either AA or NHW.

Smoking

The respondents of TUS survey were asked, “Have you ever smoked 100 cigarettes?” and respondents were considered ever smokers if they answered yes to this question. Ever smokers were further asked, “Do you now smoke every day, some days, or not at all?” Those who reported smoking every day were considered current daily smokers, whereas those who reported smoking on some days were considered current occasional smokers.

Statistical methods

We examined trends in the prevalence of daily smoking over time from 1992–3 to 2001–2 for AAs and NHWs aged 20–64 years for CA, NY and NJ combined and the combined TGS of Georgia, Kentucky, North Carolina, South Carolina, Tennessee and Virginia. We also compared trends in the prevalence of daily smoking by age (20–64 years) for 1992–3 and 2001–2 to see how this distribution changed over time.

All estimates were weighted by TUS-CPS survey weights which account for selection probabilities from the sampling design and adjust for survey non-response.^{11–12} All estimates were computed in SAS-callable SUDAAN V.9.0.1, and variance estimates were computed using the published TUS-CPS replicate weights with Fay’s balanced repeated replication.^{11–13} We combined the unequally sized sets of replicate weights from the different surveys by appending full sample weights as necessary (details available from the authors on request). Unadjusted smoking prevalence was computed as a weighted proportion using PROC CROSSTABS. Trends in adjusted smoking prevalence were assessed using weighted logistic regression, computed using PROC RLOGIST. Time trends in prevalence were compared between state groups using a weighted logistic regression model containing separate time slopes and intercepts for each state group, fit separately for AAs and for NHWs (table 2). The relative odds of daily smoking for AAs versus NHWs was compared between state groups in 1992–3 and in 2001–2, using a weighted logistic regression model containing a state group by race by time interaction term (table 3). All logistic regression models adjusted for age (20–34, 35–49 and 50–64 years), education (less than high school, high school graduate, some college, college graduate), gender, family income in constant 2001 dollars, and a binary variable for household income above twice the Census Bureau poverty threshold (by size of family and number of children)¹⁴ using standard demographics collected on the CPS.

RESULTS

Table 1 presents the demographic characteristics of the study population from each CPS. The AA population in each CPS year increased slightly from 17.0% ($\pm 95\%$ CI 0.5%) in 1992–3 to 18.8% (0.8%) in 2001–2, whereas the proportion of NHWs decreased slightly from 83.1% (0.5%) to 81.2% (0.8%). The average age of AA respondents in each CPS year was slightly less than that of NHWs. Although the gender distribution

among NHWs was fairly equal in each CPS year, there were significantly fewer male respondents among the AA population in each year.

Trends in current smoking prevalence

Overall unadjusted current smoking prevalence rates (daily and occasional smoking combined) for AAs and for NHWs are included in table 1. During 1992–3, in CA, the unadjusted current smoking rate for AAs was significantly higher than for NHWs (28.4% (2.4%) vs 23.7% (0.9%)) but not in subsequent survey years as rates declined (2002 prevalence 20.7% (4.1%) vs 18.7% (1.5%)). In NY and NJ, unadjusted smoking rates also declined over time, and there were no significant differences between AAs and NHWs in any year, as indicated by overlapping CIs (2002 prevalence 21.1% (3.2%) vs 23.2% (1.2%)). Although unadjusted smoking rates in TGS were not significantly different between AAs and NHWs in 1992–3 (29.7% (1.4%) vs 31.0% (1.0%)), as rates declined in subsequent years, they became significantly lower for AAs as compared with NHWs (2002 prevalence 21.9% (1.9%) vs 28.5% (1.0%)).

Trends in current daily smoking prevalence

The top panel of figure 1 shows that the unadjusted daily smoking rates for AAs did not differ significantly, determined by overlapping CIs, across the groups of states during the study period. Further, in all state groups AA daily smoking showed similar strong declines over the study period. This is confirmed from logistic regression results presented in table 2, where the adjusted estimated rates of decrease in the odds of daily smoking were similar for the three groups of states (2.7–3.8% per year; combined estimate 3.3% per year, 95% CI 2.3% to 4.4%), showing no statistically significant differences ($p > 0.50$ from the logistic regression model).

By contrast, the bottom panel of figure 1 shows that unadjusted daily smoking prevalence for NHWs differed between the groups of states in all survey years, with rates in the TGS higher than in NY and NJ, and in NY and NJ higher than in CA. Table 2 shows that for NHWs, only CA showed a significant decline in the adjusted odds of daily smoking (2.2% per year, 95% CI 0.8 to 3.4), and the size of the trend was similar to that seen for AAs. Neither NY and NJ nor the TGS showed a decrease in the adjusted odds of daily smoking during the study period.

These differences between the state groups in time trends for the two ethnic groups are reflected in the changing adjusted odds of daily smoking for AAs relative to NHWs, as shown in table 3. In CA, the odds of daily smoking for AAs were about 70–80% of those of similar NHWs, adjusting for income, education, gender and age; and this odds ratio did not change significantly from 1992–3 to 2001–2 ($p > 0.50$). In NY and NJ, the adjusted odds of daily smoking for AAs was 60% that of similar NHWs, and this dropped to $< 50\%$ by the end of the study period ($p < 0.05$). In the TGS, the adjusted odds changed from about 55% in 1992–3, to nearly 40% by 2001–2 ($p < 0.01$). In each of these models, the risk for daily smoking increased as the level of education and income decreased, and males were at greater risk for daily smoking.

Daily smoking prevalence by age

Figure 2 shows the unadjusted prevalence of daily smoking by age for AAs (top panel) and NHWs (bottom panel), for the 1992–3 survey (dotted line) and the 2001–2 survey (solid line). For AAs, in 1992–3, the peak age range of daily smoking was between 35 and 40 years, with a prevalence of about 28%. However, by 2001–2, as the earlier cohort aged, the peak age range of daily smoking shifted to between 45 and 50 years, with a prevalence of about 22%. Also, in 2001–2 the prevalence

Table 1 Characteristics of study population in the Tobacco Use Supplement of the Current Population Survey

	1992-3		1995-6		1998-9		2001-2	
	AA (±95% CI)	NHW (±95% CI)	AA (±95% CI)	NHW (±95% CI)	AA (±95% CI)	NHW (±95% CI)	AA (±95% CI)	NHW (±95% CI)
n (unweighted)	6255	37 100	4931	27 931	4511	24 302	4338	21 781
% study population (weighted)	17.0 (0.5)	83.1 (0.5)	17.5 (0.6)	82.5 (0.6)	18.3 (0.6)	81.7 (0.6)	18.8 (0.8)	81.2 (0.8)
Average age (years)	38.3 (0.2)	40.1 (0.1)	38.4 (0.3)	40.7 (0.2)	39.1 (0.4)	41.4 (0.2)	39.4 (0.4)	41.6 (0.2)
Gender								
Male	44.6 (0.8)	49.1 (0.3)	44.7 (1.0)	49.5 (0.4)	44.3 (1.3)	49.3 (0.5)	46.1 (1.1)	49.2 (0.5)
Female	55.5 (0.8)	50.9 (0.3)	55.3 (1.0)	50.5 (0.4)	55.7 (1.3)	50.7 (0.5)	53.9 (1.1)	50.8 (0.5)
Smoking prevalence*								
CA	28.4 (2.4)	23.7 (0.9)	25.2 (4.1)	22.1 (1.3)	24.0 (3.8)	21.4 (1.6)	20.7 (4.1)	18.7 (1.5)
NY and NJ	26.3 (1.4)	25.4 (0.8)	26.1 (2.1)	24.9 (1.2)	23.2 (3.0)	25.7 (1.1)	21.1 (3.2)	23.2 (1.2)
TGS	29.7 (1.4)	31.0 (1.0)	24.1 (1.9)	30.3 (1.0)	21.6 (2.1)	27.9 (0.9)	21.9 (1.9)	28.5 (1.0)

AA, African-American; CA, California; NHW, non-Hispanic white; NJ, New Jersey; NY, New York; TGS, tobacco-growing states (Georgia, Kentucky, North Carolina, South Carolina, Tennessee and Virginia).
*Daily and occasional smoking.

of daily smoking for AAs aged 20–30 years was stable at approximately 10% before beginning to climb at the age of 35 years. By contrast, in 1992–3, the prevalence rose strongly from age 20 to 30 years, a rise that is mirrored in 2001–2 from age 30 to 40 years. These changing patterns of prevalence with age show that recent, younger AA cohorts have daily smoking rates much lower than those of earlier cohorts. By contrast, there was no such shift in the age distribution of daily smoking

for NHWs, although daily smoking prevalence rates by age were generally slightly lower in 2001–2 than a decade earlier.

DISCUSSION

There was a strong, sustained and uniform decline in the adjusted odds of AA adult daily smoking, by 3% per year in the decade from 1992–3 to 2001–2, across state groups with very different approaches to tobacco control. In each of these disparate state groups, rates of daily smoking among AAs are now substantially less than those for NHWs of similar age, education and income status. Further, in these states, daily smoking rates for AAs have been less than or equal to rates for NHWs since at least 1992–3.

When we compared the age-specific rates of daily smoking, there seems to be a strong birth cohort effect that extends through the age 40 years in 2002. Importantly, there was no significant difference in occasional smoking behaviour between either group. Thus, the most likely explanation for this very large effect is that AAs aged <40 years in 2002 never became smokers in the first place. Many studies have noted that cohorts of AAs since the 1970s have had much lower initiation rates than NHWs^{1 5 15} and our analysis demonstrates the time that it takes for this lower initiation rate to affect prevalence. Indeed, it is only recently that the Centers for Disease Control and Prevention has documented the elimination of a long-term higher smoking prevalence among AA and NHW adults.³

Our goal was to compare the effectiveness of a comprehensive tobacco control programme (CA) versus price-centred

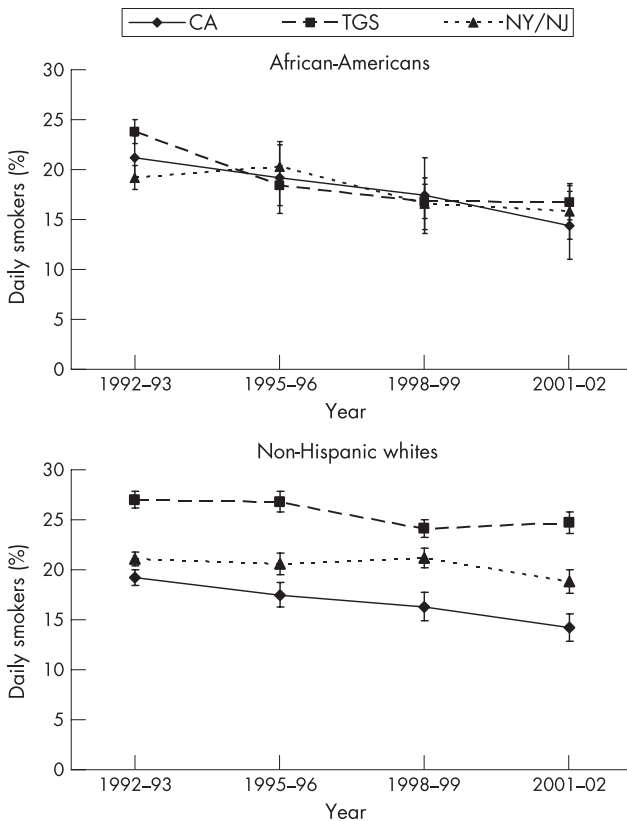


Figure 1 Unadjusted prevalence of daily smoking for African-American and non-Hispanic white adults (20–64 years) across states with differing tobacco control strategies, 1992–3 to 2001–2. CA, California; NJ, New Jersey; NY, New York; TGS, tobacco-growing states.

Table 2 Estimated annual trends in odds of daily smoking for African-Americans and non-Hispanic whites, 1992–3 to 2001–2, comparing California, New York and New Jersey and tobacco-growing states.

	Change % /year in odds of daily smoking (95% CI)	
	AAs	NHWs
CA	-3.8 (-0.7 to -6.8)	-2.2 (-0.8 to -3.4)
NY and NJ	-3.5 (-2.2 to -4.9)	+0.7 (0 to +1.3)
TGS	-2.7 (-0.6 to -4.7)	+0.4 (-0.5 to +1.3)

AA, African-American; CA, California; NHW, non-Hispanic white; NJ, New Jersey; NY, New York; TGS: tobacco-growing states (Kentucky, Tennessee, North Carolina, South Carolina, Virginia and Georgia).
Estimated trends from weighted logistic regression adjusting for age, gender, education and income.
Models fit separately for AAs and for NHWs.

Table 3 Relative odds of daily smoking for African Americans and non-Hispanic whites, 1992–3 and 2001–2, comparing California, New York and New Jersey and tobacco-growing states

		Adjusted odds of daily smoking (95% CI)	
		1992–3	2001–2
CA	NHW	1.00	1.00
	AA	0.81 (0.70 to 0.95)	0.74 (0.60 to 0.92)
NY and NJ	NHW	1.00	1.00
	AA	0.60 (0.54 to 0.66)	0.47 (0.40 to 0.56)
TGS	NHW	1.00	1.00
	AA	0.56 (0.51 to 0.62)	0.41 (0.37 to 0.46)

AA, African-American; CA, California; NHW, non-Hispanic white; NJ, New Jersey; NY, New York; TGS, tobacco-growing states (Kentucky, Tennessee, North Carolina, South Carolina, Virginia and Georgia). Relative odds from weighted logistic regression adjusting for age, gender, education and income.

programmes (NY and NJ) with the TGS as control states in reducing adult AA and NHW smoking prevalence rates over time. Given the differences in the emphasis of state tobacco control programme, we expected that the reduction in daily smoking rates would differ by state group. Indeed, for NHWs, the decreases in daily smoking rates varied by state group depending on the tobacco control strategies, with CA showing the greatest reductions even after controlling for potentially confounding demographic differences. This finding supports previous research showing the effectiveness of the California Tobacco Control Program in changing social norms and reducing both initiation and prevalence of smoking.^{16 17} However, we found that among AAs, there have been large and fairly uniform declines in daily smoking prevalence across the state groups we examined, regardless of the type of tobacco control strategies.

Our analysis of the age-specific data in 1992 compared with 2002 has demonstrated that the decline in AA smoking may be coming mainly from a cohort effect of a major reduction in smoking among people born after 1960. Such a decline in AA initiation has previously been reported for CA.⁴ In addition, it has been observed that, throughout the 1990s, AA adult smokers were less likely to successfully quit than NHWs.⁴ Therefore, it is unlikely that the observed age-specific changes could have resulted from increased rates of quitting.

As the window of initiation has been documented to be closed by the mid-20s,¹⁸ this large initiation effect occurred prior to the study period under consideration (ie, started in the 1970s–1980s). Further, the effect has been so large that it probably would overpower any effect of a tobacco-control programme or price on quitting behaviours. To address whether there was a difference in quitting among AAs requires a different analysis and will be the subject of a future study. However, the time that it has taken for this initiation effect to change the overall prevalence rate among AAs suggests that the prevalence rates among NHWs in CA will continue to decline rapidly in future years, as the programme has been shown to have had a major effect on initiation.¹⁷ Whether or not the tobacco control programme influenced AA initiation in a similar manner would also need to await future surveys.

It is also possible that the lack of difference in AA smoking trends across the states resulted from the fact that AA smoking patterns were not sensitive to price. It is possible that the effect of differences in cigarette prices between the states was muted because of the more efficient way that AAs seem to smoke their cigarettes (eg, lower daily cigarette consumption yet higher blood levels of nicotine).¹⁹ However, differences in the efficiency of smoking for AAs in various US regions have not

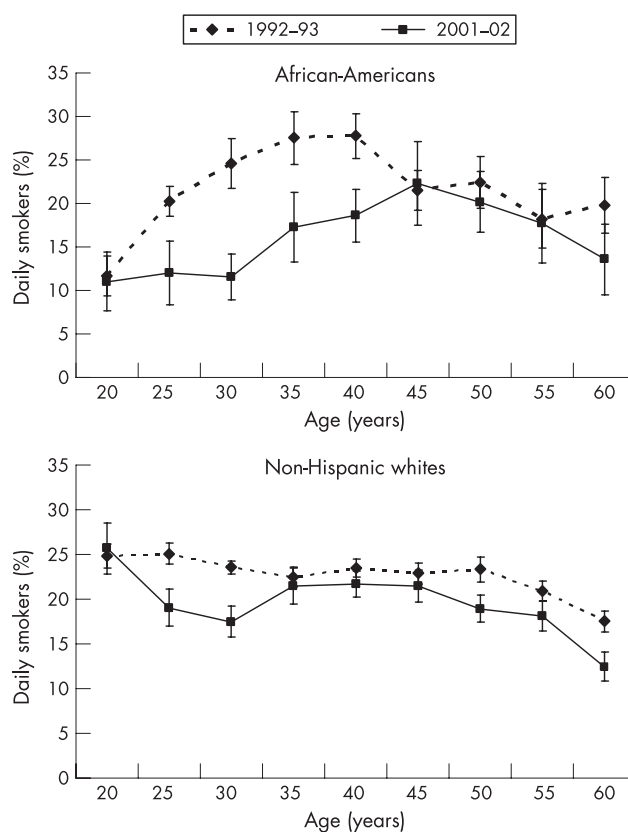


Figure 2 Unadjusted prevalence of daily smoking by age for African Americans and non-Hispanic whites for California, New York and New Jersey and tobacco-growing states combined.

been reported. Another possibility is that the AA community has become somewhat immune to the promotional efforts of the tobacco industry. A community-wide AA reaction was observed before the CA campaign in response to the use of cultural images in the marketing of Uptown cigarettes.^{20–22} Additional research into tobacco industry marketing receptivity over time among AAs is necessary.

Limitations

It has been noted that young adult males (aged 20–29 years) have, for many years, had a relatively lower coverage rate in the CPS than other demographic groups, particularly among minority populations.¹¹ This may account for the observed gender difference in the AA sample that is not present among NHWs. However, there is no evidence that relative coverage rates have changed over time,²³ and the trends in smoking behaviour presented here did not differ significantly by gender. Thus, any difference in response rates by gender would have minimal effect on these results. Additionally, the CPS data that we use are from self-reported surveys, and as such, may be affected by trends in social desirability bias. If respondents are increasingly reluctant to report smoking then this may exaggerate the actual decline in smoking prevalence. However, there was no decline in reported occasional smoking among AAs, and it is unlikely that such biases could account for the magnitude of the trends presented here.

Conclusion

This is the first study to examine the disparity in AA and NHW smoking prevalence across groups of states with varying tobacco control strategies and efforts. There were uniformly

What this paper adds

- Historically, smoking prevalence rates have been higher in the US African-American (AA) adult population compared to the non-Hispanic white (NHW) population. However, in recent years, the prevalence gap between AAs and NHWs has closed.
- We examined how smoking rates have changed for AAs and for NHWs across states with differing tobacco control strategies: California (CA; high cigarette price/comprehensive programme), New York (NY) and New Jersey (NJ; high cigarette price/no comprehensive programme), and tobacco-growing states (TGS; low cigarette price/no comprehensive programme).
- There were uniformly large declines in AA smoking from 1992–3 to 2001–2 across states, independent of type of tobacco control strategy, whereas adjusted NHW smoking prevalence declined significantly only in CA.
- Findings suggest that more recent cohorts of AAs appeared to have taken up smoking at lower rates than older cohorts. Further research is needed to look into factors associated with smoking declines among AAs and may be of benefit to the other population groups.

large annual rates of decline in AA adult daily smoking from 1992–3 to 2001–2 across states, regardless of the type of state-wide tobacco control strategy. Further, the more recent cohort of AAs does not seem to take up daily smoking at the same rate as did earlier groups. Future research on factors that may have contributed to these declines is warranted. Because of these declines, we could expect that tobacco-related disease rates for AAs will decrease more rapidly than for NHWs in the medium-term future.

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