Research Square

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Some Benefit More, Some Benefit Less: Trends in Smoking and Quitting by Sex, Race, Ethnicity, and Poverty Level Among California Adults With a History of Hypertension

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Abstract

Objective. To examine how current cigarette smoking and the percentage of ever smokers who had quit changed from 2019 to 2024 among California adults with a history of hypertension.

Methods. We analyzed annual weighted California Health Interview Survey estimates for 2019–2024. We compared Latino and non-Latino Black adults separately with non-Latino White adults, compared adults at or below 200% of the federal poverty level (FPL) with those above it, and examined trends among female adults. We examined current smoking among all adults with a history of hypertension and the percentage who had quit among ever smokers.

Results. Among adults with a history of hypertension, current smoking fell from 9.3% to 5.8% among non-Latino White adults, rose from 4.7% to 6.4% among Latino adults, and fell from 9.3% to 8.7% among non-Latino Black adults. Among ever smokers, the percentage who had quit rose from 80.9% to 86.5% among non-Latino White adults. It fell from 82.3% to 76.0% among Latino adults and from 74.2% to 72.0% among non-Latino Black adults. Current smoking fell from 9.9% to 8.9% at or below 200% FPL and rose from 5.4% to 5.6% above 200% FPL. Among female adults, current smoking fell from 7.1% to 5.2%, and the percentage who had quit rose from 78.6% to 80.7%.

Conclusions. Among California adults with a history of hypertension who had ever smoked, the percentage who had quit rose among non-Latino White adults and fell among Latino and non-Latino Black adults. Current smoking prevalence fell in the lower-income group and rose slightly in the higher-income group. The quit ratio declined less in the lower-income group. Among female adults, current smoking fell and the quit ratio rose. Direct male estimates were unavailable, so sex differences could not be tested.

Introduction

Improvements in population health can leave some groups behind. Even when people with fewer resources benefit from a public health program, a gap can widen if people with more resources benefit more. Ceci and Papierno described this pattern in their work on interventions intended to close social gaps [1]. Evaluating progress therefore requires examining which groups experienced a gain, how large it was, and whether any group lost ground.

In the United States, adult cigarette smoking fell from 19.0% in 2011 to 12.5% in 2020. Prevalence declined among non-Latino White, non-Latino Black, and Latino adults, although the size of the decline varied [2]. A national study covering 2002–2016 found that smoking declined more slowly in several socially disadvantaged groups, leaving some gaps wider at the end of the period [3]. Differences by education widened within racial and ethnic groups [4]. Studies of successive birth cohorts also found differences in both starting and quitting smoking by education [5]. These findings help explain why a decline in current smoking and an increase in the share of ever smokers who have quit may follow different paths.

Adult cigarette smoking in the state fell from 23.7% in 1988 to 11.6% in 2014 [6]. Yet local tobacco control protections varied across communities. A California study found that stronger local policies were associated with lower smoking prevalence, with variation across racial groups and neighborhood socioeconomic conditions [7]. Early evaluations of California's tobacco control program also documented declines in smoking [8]. A systematic review found that the relationship between tobacco control measures and income inequalities depended on the policy examined [9].

California has a long record of declining smoking prevalence. Between 1990 and 1994, adult smoking continued to decline in California during a period when the decline in the rest of the country was no longer statistically significant [10]. A later study found that half of California adults who had smoked had quit by age 44, compared with age 54 in tobacco-growing states [11]. State surveillance also documented declines among Latino and non-Latino White adults between 2016 and 2021 [12]. These statewide estimates leave open whether adults with hypertension experienced similar changes.

Nationally, the percentage of adults who had ever smoked and had since quit rose from 50.8% in 2005 to 59.0% in 2016 [13]. Adults with hypertension may have additional opportunities to receive help with quitting. Smoking adds to their risk of heart disease and stroke, and a visit to check blood pressure gives clinicians a reason to raise the subject in terms that matter to the patient [14]. A clinician can ask about smoking, explain how quitting could protect the patient's heart, offer counseling or medication, and ask at the next visit how the quit attempt went. Whether these opportunities reach patients across racial, ethnic, and income groups is an important question for hypertension care.

Minorities' Diminished Returns theory suggests that social and economic resources may translate into smaller health gains for groups exposed to structural racism. For example, a national study found a weaker association between education and lower smoking prevalence among Black adults than among non-Latino White adults [15]. Applied to tobacco control, this framework raises questions about who can use available resources. Insurance coverage may offer different practical benefits depending on whether patients receive cessation messages, can obtain medication, or can attend a program. Experiences of discrimination may also shape trust in the health system providing that support. National studies have documented differences by ethnicity in receipt of cessation advice and differences by insurance coverage in access to treatment [16, 17].

Among California adults with a history of hypertension, we asked how current smoking among all adults and the percentage who had quit among ever smokers changed from 2019 to 2024. We compared Latino and non-Latino Black adults separately with non-Latino White adults. We also examined differences by household income relative to the federal poverty level and by the survey's binary sex/gender measure.

Methods

Design and population. We used repeated cross-sectional estimates from the 2019–2024 California Health Interview Survey, obtained through AskCHIS [18]. We selected the category "Has/had high blood pressure." Respondents reporting borderline high blood pressure were tabulated separately and

excluded. Each annual estimate describes the population surveyed that year. Beginning in 2019, CHIS used address-based sampling and collected responses online and by telephone [19]. UCLA documents sampling, data collection, weighting, and variance estimation for each release cycle [20].

Outcomes. Current smoking prevalence was the percentage of all adults with a history of hypertension who currently smoked cigarettes. For the quit ratio, we restricted the denominator to adults with a history of hypertension who had ever smoked at least 100 cigarettes. We divided the weighted number of former smokers by the weighted number of current and former smokers combined [21]. A person counted as a former smoker could have quit years before the survey or before a hypertension diagnosis. Estimating recent cessation requires information on when someone quit and how long they remained abstinent [22].

Groups. The race and ethnicity filters identified Latino, non-Latino Black, and non-Latino White adults. We used non-Latino White adults as the reference for each comparison. The income comparison used ≤ 200% versus > 200% FPL. The lower-income category includes households both below and above the federal poverty line. The sex/gender measure was the imputed binary variable used for survey weighting.

Sources of subgroup estimates. We obtained estimates for non-Latino White, non-Latino Black, and Latino adults and for adults above 200% FPL from separate AskCHIS tabulations. Estimates for adults at or below 200% FPL and for female adults came from separate tabulations of the same survey data. Statewide estimates were tabulated separately. Male estimates were derived by subtracting female counts from statewide counts rather than tabulated directly. Because the filter labels on the statewide tabulation could not be fully verified, the statewide and derived male estimates are marked with an asterisk in Table 4 and interpreted cautiously.

Analysis. We report annual weighted percentages and describe differences between 2019 and 2024 in percentage points. We include published 95% confidence intervals for current smoking prevalence where available. Quit ratios are approximate because the published population counts were rounded. The aggregate tables lacked the covariance estimates or replicate weights needed to calculate design-based intervals for quit ratios or differences in change across groups [20]. We therefore describe the direction and size of these differences.

Results

In the provisional statewide estimates, the percentage of adults with a history of hypertension who had ever smoked fell from 37.4% in 2019 to 33.6% in 2024. Among those who had ever smoked, 81.2% were former smokers in 2019 and 80.0% in 2024. Current smoking among all adults with a history of hypertension was 7.0% in 2019, reached 5.8% in 2023, and was 6.7% in 2024.

Among adults with a history of hypertension, current smoking prevalence was 4.6 percentage points lower among Latino adults than among non-Latino White adults in 2019 and 0.6 points higher in 2024. Non-Latino Black adults had the same estimated prevalence as non-Latino White adults in 2019 and a

prevalence 2.9 points higher in 2024 (Table 1). Among ever smokers, the quit ratio for Latino adults went from 1.4 points above the non-Latino White estimate to 10.5 points below it. For non-Latino Black ever smokers, the gap below the non-Latino White estimate widened from 6.7 to 14.5 points (Table 2).

Table 1
Current smoking prevalence by race and ethnicity, with published 95% confidence intervals

Group	2019	2020	2021	2022	2023	2024
Non-Latino White	9.3 (7.7–10.9)	8.8 (7.3–10.3)	7.2 (5.9–8.5)	6.4 (5.1–7.8)	5.6 (4.4–6.8)	5.8 (4.5–7.0)
Latino	4.7 (2.7–6.8)	5.7 (3.2–8.2)	6.3 (4.3–8.3)	7.5 (5.3–9.7)	6.3 (5.0–7.6)	6.4 (4.4–8.4)
Non-Latino Black	9.3 (6.8–11.9)	10.7 (5.8–15.7)	11.4 (7.6–15.1)	12.0 (8.0–15.9)	8.3 (4.6–12.0)	8.7 (5.7–11.8)

Note. Cells show the percentage of adults with a history of hypertension who currently smoked, followed by the 95% confidence interval in parentheses. Non-Latino White adults are the reference group.

Table 2
Quit ratios and weighted counts by race and ethnicity, without reported confidence intervals

Group	2019	2020	2021	2022	2023	2024
Had quit among ever smokers						
Non-Latino White	80.9	80.7	84.1	85.9	86.5	86.5
Latino	82.3	79.2	78.3	75.7	76.3	76.0
Non-Latino Black	74.2	68.6	71.3	70.9	78.1	72.0
Estimated population who currently smoked (thousands)						
Non-Latino White	310	284	250	231	181	179
Latino	129	142	170	196	180	163
Non-Latino Black	60	66	74	71	52	53

Note. Among adults with a history of hypertension who had ever smoked, the quit ratio is the percentage who were former smokers. Counts estimate the number of adults with a history of hypertension who currently smoked, in thousands. Non-Latino White adults are the reference group.

Among adults with a history of hypertension and incomes at or below 200% FPL, current smoking fell from 9.9% (95% CI 7.6–12.2) to 8.9% (7.0–10.7). Above 200% FPL, it rose from 5.4% (4.3–6.4) to 5.6% (4.6–6.7). The gap between the income groups narrowed from 4.5 to 3.3 percentage points. Among

female adults, prevalence fell from 7.1% (5.7–8.5) to 5.2% (4.3–6.1). Table 3 shows the available confidence intervals by income and sex/gender.

Annual estimates

Table 3
Current smoking prevalence by income and sex/gender, with published 95% confidence intervals

Population and measure	2019	2020	2021	2022	2023	2024
Female	7.1 (5.7–8.5)	—	—	—	—	5.2 (4.3–6.1)
≤ 200% FPL	9.9 (7.6–12.2)	—	—	—	—	8.9 (7.0–10.7)
> 200% FPL	5.4 (4.3–6.4)	6.2 (5.0–7.5)	6.1 (5.0–7.1)	5.2 (4.1–6.2)	4.2 (3.3–5.0)	5.6 (4.6–6.7)

Note. Cells show current smoking prevalence (%) among adults with a history of hypertension and its 95% confidence interval. A dash marks an estimate reported in Table 4 because its interval was unavailable. FPL = federal poverty level.

Table 4
Statewide, income, and sex/gender estimates without reported confidence intervals

Population and measure	2019	2020	2021	2022	2023	2024
Current smoking						
Overall*	7.0	7.5	7.2	7.1	5.8	6.7
Female	—	6.7	6.2	5.1	4.2	—
Male*	7.0	8.4	8.3	9.1	7.3	8.2
≤ 200% FPL	—	10.1	9.5	10.9	8.6	—
Had quit among ever smokers						
Overall*	81.2	79.4	80.5	81.1	82.3	80.0
Female	78.6	77.2	80.3	83.2	83.6	80.7
Male*	83.2	81.0	80.6	79.7	81.5	79.5
≤ 200% FPL	73.7	70.3	72.0	70.6	75.1	72.8
> 200% FPL	85.7	83.5	84.3	86.5	86.9	83.5
Estimated population who currently smoked (thousands)						
> 200% FPL	265	311	319	271	210	290

Note. Current smoking is the percentage of all adults with a history of hypertension who currently smoked. Quit ratios use ever smokers with a history of hypertension as the denominator. Counts are weighted population estimates in thousands. A dash points to an estimate with a published interval in Table 3. An asterisk marks provisional statewide and derived male estimates. FPL = federal poverty level.

Among female adults with a history of hypertension who had ever smoked, the percentage who had quit rose from 78.6% in 2019 to 80.7% in 2024. Among ever smokers with a history of hypertension, the quit ratio fell from 73.7% to 72.8% at or below 200% FPL and from 85.7% to 83.5% above 200% FPL (Table 4).

Smoking trends

Figure 1 shows current smoking among all adults with a history of hypertension. From 2019 to 2024, prevalence fell from 9.3% to 5.8% among non-Latino White adults and from 9.3% to 8.7% among non-Latino Black adults. Figure 2 focuses on those who had ever smoked. The percentage who had quit rose from 80.9% to 86.5% among non-Latino White adults and fell from 74.2% to 72.0% among non-Latino Black adults.

Discussion

Among California adults with a history of hypertension who had ever smoked, a larger share of non-Latino White adults reported being former smokers in 2024 than in 2019. Over the same period, that share declined among Latino adults and among non-Latino Black adults. The pattern for current smoking among all adults with a history of hypertension also differed by group. Prevalence rose among Latino adults, whereas it fell among non-Latino Black adults, although by less than among non-Latino White adults.

A longer CHIS series places the Black–White comparison in context. From 2003 to 2023, smoking among California adults fell from 19.9% to 9.0% among non-Latino Black adults and from 17.2% to 5.2% among non-Latino White adults [23]. Thus, smoking became less common in both groups while the absolute gap widened. In our shorter series among adults with hypertension, the two groups began at the same estimated prevalence in 2019. By 2024, prevalence was 2.9 percentage points higher among non-Latino Black adults. The studies share survey years and a data source, so their agreement should be understood in light of that overlap.

In the Health and Retirement Study, Bandiera and colleagues followed older US adults who smoked in 1992 [24]. Latino adults were more likely than White adults to report quitting over both 10 and 20 years. Black adults were also more likely than White adults to report quitting over 20 years. The authors suggested that differences in daily cigarette consumption may partly explain these findings. The California surveys addressed a different question. The decline in the quit ratio among Latino adults with a history of hypertension describes a change in the share of ever smokers who had quit by each survey year. It does not tell us how likely Latino adults who smoked in 2019 were to quit by 2024.

National evidence suggests a concrete question about that divergence: did patients who wanted to quit have comparable opportunities to obtain help? Babb and colleagues found that past-year quit attempts increased among both Hispanic and non-Hispanic White adults from 2000 to 2015. Yet in 2015, Hispanic adults who smoked and had seen a provider had lower odds of receiving advice to quit [16]. The distinction between attempting to quit and receiving support matters here. The California data contain no measure of motivation, treatment use, or relapse. Interpreting the lower quit ratio as evidence of less interest in quitting would therefore go beyond the findings.

Hypertension care offers several occasions to support the same quit attempt. A patient may first hear advice to quit during a blood pressure check, discuss medication at a later visit, and receive follow-up after trying to stop. Nationally, in 2022, about half of adults who smoked and saw a health professional received advice to quit, and fewer than four in ten who tried to quit used counseling or medication [22]. Both forms of support are effective [25]. Our California estimates do not establish when people quit relative to their hypertension diagnosis or what help they received. A next step would be to follow adults who smoke after a hypertension diagnosis, record who receives advice, counseling, or medication, and examine whether the association between that support and subsequent quitting varies by race and ethnicity, sex/gender, or income.

Health insurance can shape access even after a clinician recommends treatment. A national review of Medicaid benefits documented limits on treatment duration, restrictions on the number of covered quit attempts, and prior authorization requirements in some states [17]. A patient who needs a second course of treatment may therefore face a different set of barriers from one making a first attempt. Trust also deserves attention. Research on medical mistrust emphasizes patients' experiences with institutions, including discrimination [26]. Asking patients whether they received an understandable offer of help, felt respected, and could obtain follow-up care would be more informative than assigning a level of trust to an ethnic group.

Among adults with a history of hypertension, the lower-income group had a decline in current smoking prevalence while the higher-income group had a small increase. Among ever smokers, both income groups had lower quit ratios in 2024 than in 2019, with a smaller decline in the lower-income group. These descriptive patterns did not suggest diminished returns by poverty level. The survey did not measure which cessation resources each group received. Previous reviews suggest that income differences vary with the tobacco control policy examined [9].

The more favorable income trend in our sample is worth considering alongside national evidence. US adults facing several economic and health disadvantages had higher odds of starting smoking and lower odds of quitting, and these gaps widened from 2008 to 2017 [27]. The 2024 Surgeon General's report also documented a persistent smoking gap by poverty status [28]. In their 2018 commentary, The Smoking Gap, Stein and Galea noted that national declines in smoking had left a marked educational divide. They also pointed out that smoke-free workplace policies may have limited reach for people who work outdoors or are unemployed [29]. Our California findings show why both the size of an income gap and its change over time matter. Among adults with a history of hypertension, the gap in current smoking between the lower- and higher-income groups narrowed from 4.5 to 3.3 percentage points. Yet in 2024, smoking remained more common at or below 200% of the federal poverty level (8.9%) than above it (5.6%). An open question is whether patients in these income groups had comparable access to cessation support during hypertension care.

Price is one possible reason a tobacco policy could yield larger gains for lower-income households. Using Serbian household budget surveys from 2006 to 2017, Vladisavljević and colleagues estimated that a 10% increase in cigarette prices would reduce cigarette demand by about 10.8% among low-income households and 2.6% among high-income households. Their model incorporated changes in both cigarette purchasing and the quantity purchased [30]. Earlier US and British studies also found greater price sensitivity among economically disadvantaged groups [31, 32]. Our surveys did not measure prices paid or changes in individual purchases, so the role of price in this pattern remains open.

Among adults with a history of hypertension classified as female, current smoking prevalence fell by 1.9 percentage points from 2019 to 2024, and the percentage of ever smokers who had quit rose by 2.1 points. The decline in prevalence was uneven, with a lower estimate in 2023 than in 2024. A review of sex and gender differences in cessation found that results varied across population surveys, treatment

studies, and the outcomes examined [33]. A direct male-specific tabulation and a survey-weighted comparison of change would help establish how much confidence to place in the apparent difference by sex.

These findings extend the question posed by Ceci and Papierno to a setting where the estimated changes among ever smokers went in opposite directions [1]. Minorities' Diminished Returns theory offers a way to ask whether comparable resources, such as insurance or education, are associated with comparable opportunities to quit across racial and ethnic groups [15]. The present study cannot estimate those returns from separate subgroup tables. A direct test would examine whether the association between a measured resource and cessation differs across groups, while accounting for age and smoking history. Examining whether differences narrow after accounting for receipt of treatment would further help distinguish access to care from the support patients actually receive.

Our conceptual model assumes that most adults in this study who had ever smoked began smoking before their hypertension diagnosis. Nearly nine in ten US adults who smoke daily first tried cigarettes by age 18 [34]. Hypertension, in turn, is much more common later in life: in 2021–2023, US prevalence was 23.4% at ages 18–39 and 71.6% at age 60 or older [35]. Smoking may itself contribute to the development of hypertension. In a prospective study of women initially free of hypertension, those who smoked at least 15 cigarettes per day had a higher risk of developing hypertension than those who had never smoked [36]. A diagnosis may also provide an occasion to quit. In an English survey, people aware of their hypertension had higher odds of receiving advice to stop smoking and of having quit than those unaware of it [37]. Trials have also found that brief physician advice modestly increases quitting [38]. We therefore hypothesize that some participants quit after diagnosis with help from a provider, while others may have quit earlier. Testing this sequence would require following individuals and recording when they began smoking, when hypertension was diagnosed, when support was offered, and when they quit.

Figure 3 proposes that the association of tobacco policies, opportunities to quit, and provider recommendations with quitting may vary by both social circumstances and health conditions. For example, is advice to quit more strongly associated with subsequent quitting among adults with hypertension who also have diabetes or heart disease? A study that includes adults with and without hypertension could ask a similar question about hypertension itself. All adults in the present analysis had a history of hypertension, and we did not examine differences by coexisting conditions.

Limitations

Smoking and hypertension were self-reported. These unadjusted, repeated cross-sectional estimates cannot identify individual transitions or the timing of quitting relative to hypertension diagnosis. Rounded counts and the absence of replicate weights or covariance estimates limit inference for differences in quit ratios and changes across groups. The separate subgroup exports do not support race-by-income analyses. The income cutoff combines households below the poverty line with those up to twice that level. The statewide and derived male estimates could not be fully verified against the source tabulations

and should be interpreted cautiously. The imputed binary sex/gender measure limits interpretation by gender identity.

Conclusion

From 2019 to 2024, among California adults with a history of hypertension who had ever smoked cigarettes, the percentage who had quit rose from 80.9% to 86.5% among non-Latino White adults. Over the same period, it fell from 82.3% to 76.0% among Latino adults and from 74.2% to 72.0% among non-Latino Black adults. Among all adults with a history of hypertension, current smoking prevalence fell at or below 200% of the federal poverty level and rose slightly above that income threshold. Among ever smokers, the lower-income group had a smaller decline in the quit ratio than the higher-income group. Among female adults, current smoking prevalence fell from 7.1% to 5.2% and the quit ratio rose from 78.6% to 80.7%. Because male estimates were derived rather than tabulated directly, differences by sex remain to be tested.

Declarations

Conflict of Interest

The authors declare no conflict of interest.

Use of Artificial Intelligence

Artificial intelligence (AI) was used for the presentation of the results, figures and tables. Shervin Assari supervised the use of AI. Both authors approved the final version.

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Ethics approval. The research team conducted the analysis online using fully deidentified data and had no direct access to individual-level records. The study did not constitute human subjects research and therefore did not require institutional review board (IRB) approval. Consent to participate. The California Health Interview Survey (CHIS) used an implied consent process. Respondents were informed of the survey's purpose, that participation was voluntary, and that they could skip questions or stop at any time. They indicated consent by choosing to continue.

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Figures

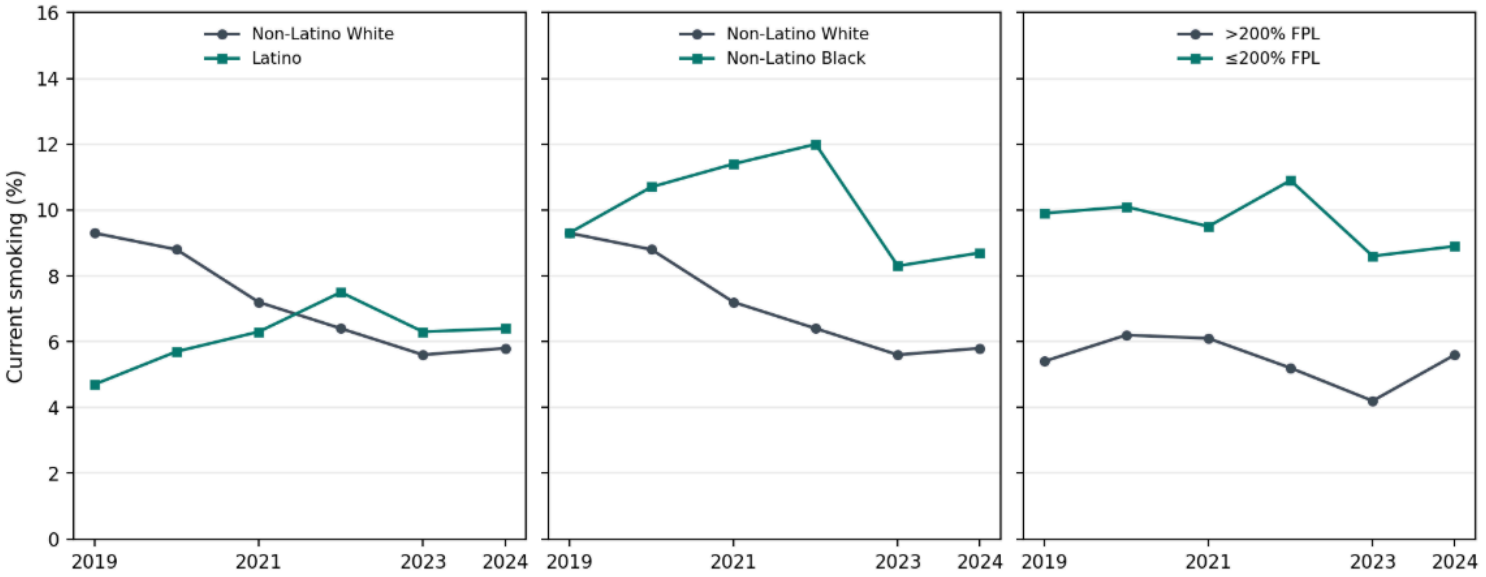


Figure 1

Annual current smoking prevalence among California adults with a history of hypertension. Each race or ethnicity panel uses non-Latino White adults as the reference. The income panel compares groups at the 200% FPL cutoff.

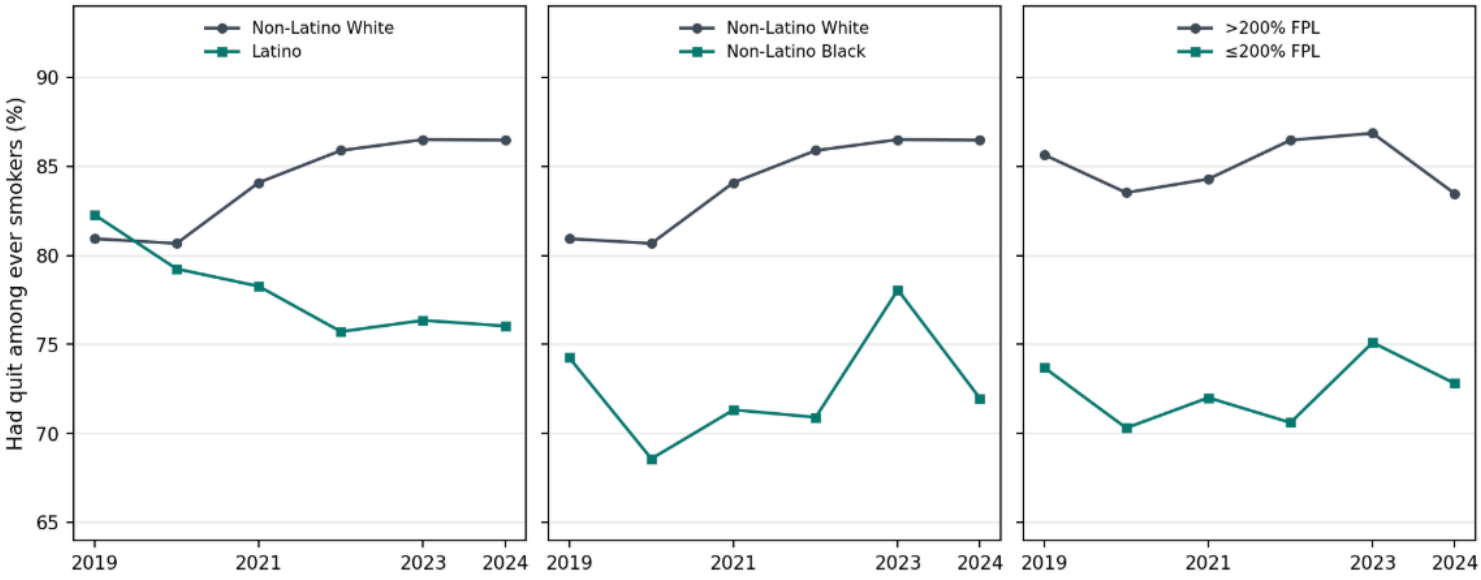


Figure 2

Annual percentage of ever smokers who had quit among California adults with a history of hypertension. Each point represents a separate survey year.

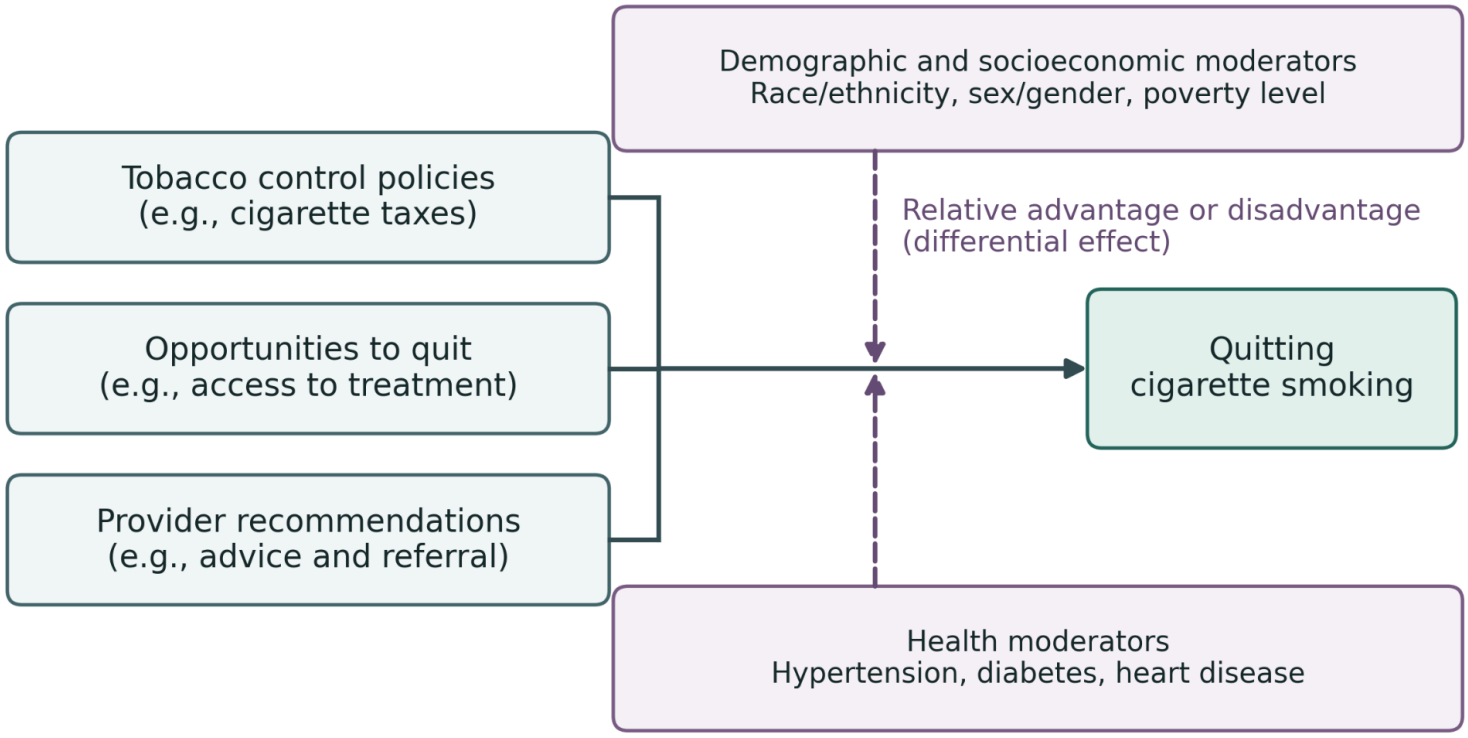


Figure 3

Conceptual model of cigarette smoking cessation. The solid arrow links policies, opportunities to quit, and provider recommendations to quitting. The two dashed arrows indicate where demographic and socioeconomic factors (above) and health conditions (below) may modify these associations. Relative advantage or disadvantage refers to a possible difference across groups in the benefit associated with the same opportunity to quit. These relationships are hypotheses for future study.