

## Review Paper

## Unequal Impact of Flavored Tobacco Across Populations: From Neuroscience to Policy

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## ABSTRACT

Flavored tobacco products engage neural reward and sensory integration pathways, increasing appeal and dependence, particularly among youth people. Although tobacco control policies such as taxation and adoption of smoke-free laws have reduced overall tobacco use, their benefits are unevenly distributed across socioeconomic and racial/ethnic groups. This study, by reviewing evidence from neuroscience, epidemiology, and public policy, aims to examine how flavored tobacco and major tobacco control strategies differentially affect population. We focus on tobacco taxation, smoke-free laws, and complementary policies, with attention to policy reach, enforcement, and structural inequities. Neuroscientific findings showed that flavor additives enhance reward and mask aversive properties of tobacco, amplifying vulnerability among targeted populations. While taxes and smoke-free laws reduce tobacco use at the population level, disadvantaged minority groups often experience weaker benefits due to uneven policy adoption, limited enforcement, targeted industry marketing, and reduced access to cessation resources. The Minorities' Diminished Returns framework helps explain why similar policy exposure yields smaller health gains in marginalized populations. Tobacco control policies are effective but not inherently equitable. Reducing tobacco-related inequalities requires integrating flavor restrictions with uniformly applied taxation, comprehensive smoke-free protections, strong enforcement, and accessible cessation support.

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## Highlights

- Tobacco taxation and smoke-free laws reduce overall tobacco use but produce unequal benefits across socioeconomic and racial/ethnic groups.
- Structural inequities, targeted industry marketing, and uneven policy enforcement limit the effectiveness of flavored tobacco control in disadvantaged communities.
- Flavor restrictions, strong enforcement, and accessible cessation support are essential to reduce tobacco-related health inequalities.

## Plain Language Summary

Flavored tobacco products, such as menthol cigarettes and sweetened e-cigarettes, make smoking more appealing by activating brain pathways involved in pleasure and reducing harsh sensations. These products are often used by youth and disadvantaged communities, increasing the risk of addiction. Public health policies, including higher tobacco taxes and smoke-free laws, are effective at reducing smoking, but their benefits are not shared equally. People with lower incomes and many racial and ethnic minority groups often live in areas with weaker tobacco policies, less law enforcement, and fewer resources to help them quit. As a result, these groups may receive less health benefit from the same policies. This study explores how brain sciences, social conditions, and public policy interact to produce unequal outcomes. It highlights the need for stronger and more fairly enforced policies and restrictions on flavored tobacco, and better access to cessation supports. Addressing these issues is essential to reducing tobacco-related health inequalities and protecting vulnerable populations.

## Introduction

Tobacco control has been described as one of the most crucial public health successes of the late twentieth and early twenty-first centuries. Tobacco use, particularly conventional cigarette smoking, has declined dramatically in many high-income countries, driven largely by a combination of public policies, such as anti-tobacco campaigns, smoke-free laws, excise taxes, advertising restrictions, warning labels, and cessation support (Mendez & Warner, 2004; Organization, 2018). Among these, smoke-free laws are particularly influential in reducing tobacco-related morbidity and mortality (Chaloupka et al., 2011; Culyer & Newhouse, 2000; Warner, 1987).

However, the benefits of the decline in tobacco burden are not distributed evenly across populations. Socioeconomic status (SES)—including education, income, and employment—has become a stronger social determinant of tobacco use, with larger gaps being observed in tobacco use of groups based on income and education (Garrett et al., 2014; Casetta et al., 2017). Similarly, in the United States, racial and ethnic disparities have persisted: Non-Hispanic Black adults and American Indian/Alaska Native adults often bear a disproportionate burden of tobacco-related harm compared to non-Hispanic

Whites (Fagan et al., 2007; Moolchan et al., 2007; US Department of Health and Human Services, 2020). These increasing socioeconomic and racial/ethnic disparities raise a crucial yet unanswered question: Do tobacco control policies, which are highly effective for the average population, work equally well for disadvantaged and advantaged population groups, or have they left historically marginalized, disfranchised, under-resourced, and racialized communities behind?

In this study, we briefly review some evidence on the differential impact of tobacco control policies, such as tobacco taxation and smoke-free policies, across diverse socioeconomic and racial/ethnic groups (Dahne et al., 2017; Hill et al., 2014; Parks et al., 2021; Tauras, 2007). We move beyond overall total effects and discuss population-level variation in reach, uptake, and policy effects. We also considered both the direct effects of these policies on tobacco use behaviors and the indirect effects on exposure to secondhand smoke (SHS). This study also discusses emerging complementary strategies, identifies policy gaps, and highlights implications for equity-focused tobacco control.

## Theoretical Considerations

Several theoretical perspectives help explain why the effects of tobacco taxation and smoke-free laws may differ across socioeconomic, geographic, or racial/ethnic groups. These perspectives highlight how economic behavior, policy environments, and structural inequities interact to shape differential outcomes.

### Price responsiveness

Microeconomic theory predicts that individuals with fewer resources will be more sensitive to price changes because a larger share of their income is consumed by tobacco expenditures when the price of tobacco increases. This expectation has been central to the expectation that progressive excise tobacco taxes would potentially reduce disparities by pushing low-income tobacco users to quit or cut back more sharply than their wealthier peers. Some empirical studies support this prediction, showing greater price responsiveness among lower-income and less-educated populations (Smith et al., 2020; Tabuchi et al., 2018). Some reviews suggest that each incremental increase in cigarette prices is associated with larger reductions in tobacco use prevalence among poorer households compared to richer ones (Farrelly & Engelen, 2008). Even if lower-income smokers are generally more sensitive to tobacco price increases, they lack access to cessation services. Without adequate cessation support, the relative advantage of low-income tobacco users in terms of higher responsiveness may not always translate into successful long-term quitting.

However, the literature is mixed. Some studies have found the opposite pattern, suggesting that disadvantaged groups may not always respond more strongly to a tobacco price increase (Higgins et al., 2019). Several mechanisms may explain this finding. First, low-SES populations may have many more competing needs and less bandwidth to quit. They may also face higher levels of stress and adversities, and have access to lower social support, all of which reduce the chance of successful quitting. Economic stress and unstable living conditions may also heighten nicotine dependence, making quitting more difficult despite higher financial costs. Disadvantaged tobacco users often have less access to tobacco cessation resources, such as nicotine replacement therapies, counseling, or smoke-free clinical care, which limits their ability to translate the motivation from higher prices into successful quitting. In addition, addiction severity may be greater among disadvantaged populations. Finally, targeted marketing may reinforce heavy and persistent use of tobacco users with disadvantaged

backgrounds. These factors suggest that while taxes may create additional financial pressure on low-income tobacco users, the ability to act on such economic pressure is socially patterned. These mixed findings suggest that taxation alone may not reduce disparities unless paired with cessation support and protection against industry discounting.

### Policy reach

Even when taxes or smoke-free laws are effective on average, not all populations are equally exposed (Lopez-Quintero et al., 2006). Excise tax rates vary dramatically across states, counties, and countries, creating a patchwork of protections. For example, some U.S. states impose high taxes and maintain strong anti-discounting policies, while neighboring states have low taxes and weaker regulations (Henriksen et al., 2017). Unfortunately, most progressive tax policies are concentrated in the wealthier northern regions of the United States, while the southern and central states have adopted fewer progressive tobacco policies. These states also tend to have lower levels of education and income, more rural populations, and higher proportions of Black residents. Such variations in clustering of state policies and socioeconomic conditions mean that disadvantaged populations concentrated in certain jurisdictions do not benefit as much from tax-induced reductions in smoking (Henriksen et al., 2017). Overall, uneven policy adoption leaves disadvantaged groups less protected, demonstrating that a person's place of residence strongly influences their likelihood of being covered by progressive tobacco policies and their ability to benefit from them.

Smoke-free protections have historically been implemented unevenly. Early adopters of such policies were often wealthier and predominantly White communities, while lower-income and minority communities were slower to implement comprehensive protections (Ceci & Papierno, 2005). This uneven adoption pattern reflects not only political will and local advocacy but also the influence of industry lobbying, which has often been strongest in areas with higher proportions of disadvantaged residents. As a result, even when smoke-free laws are proven effective, inequities in their geographic reach translate directly into inequities in health outcomes. This is one example of how our well-intended policies have widened, rather than narrowed, the existing gap between the haves and the have-nots.

## Structural inequities

Beyond economic and policy factors, structural inequities also shape the effectiveness of tobacco control policies. The tobacco industry has long targeted racial and ethnic minority communities through intensive marketing of menthol cigarettes, heavy placement of advertisements in low-income neighborhoods, and saturation of retail outlets. These practices alter the environment in which policies operate. For example, Black smokers may face higher retail prices not because of excise taxes, but because of differences in promotional strategies, product placement, and retailer density (Kong et al., 2021, Kong et al., 2022; Lee et al., 2017; Mills et al., 2022). This undermines the uniformity of policy effects, making it harder to assess their equity impact (Assari & Bazargan, 2019c; Assari & Bazargan, 2019d). This means that structural inequities, including targeted marketing and weak enforcement, can blunt the intended benefits of tobacco control policies in minority communities.

The enforcement of policies also reflects structural inequity. Smoke-free protection, for instance, may be less stringently enforced in marginalized communities, whether because of limited municipal resources, weaker political representation, or the perception that enforcement would disadvantage local businesses. In the context of multi-unit housing, enforcement is often absent, leaving low-income tenants more exposed to SHS despite broader declines in public spaces.

Finally, structural inequities may interact with both price responsiveness and policy scope (Farhoudian et al., 2025). Communities facing persistent economic hardship and racial discrimination may simultaneously be less able to act on financial disincentives, less likely to live in areas with strong protections, and more heavily targeted by industry practices. The combination of these factors means that well-intentioned policies, unless designed with equity in mind, may reinforce rather than reduce existing disparities.

## Minorities' diminished returns (MDRs)

MDRs (Assari, 2018a; Assari, 2018b) also offers a valuable framework for understanding how tobacco control policies may have weaker effects for racial and ethnic minority populations compared to non-Hispanic White populations, even when exposure to the same policy is present. MDRs suggest that social resources and assets, such as education, income, or occupational prestige, yield fewer health and behavioral benefits for marginalized groups due to structural racism, discrimination, and

other systemic barriers (Assari et al., 2020a). When applied to tobacco control, this framework highlights how policies themselves may act as a form of public health resource that is unevenly translated into health gains across populations (Assari, 2020b; Assari, 2021; US Department of Health and Human Services, 2020; Assari, 2019; Assari et al., 2020). Therefore, in line with the MDRs framework, the very same public health policy is likely to provide smaller health gains for minoritized groups, reinforcing disparities unless additional supports for marginalized groups are implemented.

Public health policies, such as excise taxes and smoke-free laws, can be conceptualized as collective assets. They represent societal investments in reducing risky behaviors and exposures. For non-Hispanic White and more advantaged populations, these policies often deliver strong returns, leading to lower smoking prevalence, higher cessation rates, and reduced SHS exposure. However, for minority and disadvantaged groups, the same policies may yield weaker returns due to structural barriers in the environments where minority groups live, work, and shop (Assari, 2019; Assari & Bazargan, 2019a, Assari & Bazargan, 2019b; Assari et al., 2019).

An analysis of data from the adolescent brain cognitive development study showed that higher family income offered weaker protection against tobacco initiation for Black adolescents compared with their White peers. In this sample of 10,653 youth, tobacco susceptibility emerged as a strong predictor of later initiation and served as a partial mediator of the association between family income and tobacco use. These findings suggest that differences in susceptibility to tobacco use account for part of the diminished protective effect of family income among Black adolescents. Therefore, efforts to reduce susceptibility may strengthen the protective role of family income and help reduce disparities in tobacco outcomes (Assari & Sheikhattari, 2024). Complementary evidence from the population assessment of tobacco and health study indicates that higher educational attainment decreases exposure to tobacco advertising. However, this protective effect is less pronounced for Black individuals than for Whites (Assari, 2020a). Similarly, being of a higher grade better enhanced tobacco knowledge of White than Black children (Assari & Bazargan, 2020), in part because Black children receive their education in schools with fewer resources (Assari et al., 2020b; Assari et al., 2021; Assari & Zare, 2024b; Okuyama et al., 2025).

Living in disadvantaged neighborhoods may weaken the protective effects of education, even among White populations (Assari et al., 2020). Using data from the 2024 Monitoring the future study, restricted to non-Latino White 12<sup>th</sup> graders, researchers examined whether parental education was associated with adolescents' use of nicotine pouches, gummies, and candies, while accounting for demographic characteristics. Place-based marginalization was defined by rural versus urban/suburban residence, and interaction models assessed whether the association between parental education and nicotine use differed by location. Findings indicated that higher levels of parental education were generally associated with lower use of nicotine products. However, this protective effect was substantially reduced for adolescents residing in rural areas (Assari et al., 2025).

Excise taxes may exhibit diminishing returns. While tax increases reduce smoking, evidence suggests that Black and Latino smokers may respond less strongly to price increases compared to White smokers (Aged, 1998; Farrelly et al., 2001; Golden et al., 2016; Myers et al., 2013; Wang et al., 2021). This does not imply that taxes are ineffective for these groups, but rather that structural barriers, such as greater dependence on menthol cigarettes, targeted marketing, reduced access to cessation resources, and higher stress burdens, interfere with translating the policy signal (higher prices) into the behavioral outcome (quitting). Thus, the tax acts as a resource that is more fully realized by some groups than others.

Smoke-free laws may also illustrate MDRs. Even when laws are passed at the state or municipal level, enforcement and compliance may be weaker in minority and low-income neighborhoods (Dai et al., 2021; Jacobson & Wasserman, 1999; Roberts et al., 2021; Rose et al., 2022; Welwain et al., 2022). This means that while White communities may see significant reductions in SHS exposure following passage of a law, Black or low-income communities may see smaller reductions, reflecting diminished returns of the same legal resource. Moreover, because minority populations are more likely to live in multi-unit housing, which is often exempt from smoke-free protection, the benefits of such laws are further diluted.

Importantly, MDRs highlight that disparities in tobacco control outcomes are not only about individual-level responsiveness but also about structural factors. Policies create opportunities for healthier behaviors, but marginalized populations face barriers to accessing or acting on those opportunities. For example, even when smoke-free laws protect workplaces, minority and low-income workers may concentrate in sectors (e.g. service,

hospitality, or informal employment) where compliance is lower. Similarly, price reductions from industry discounting disproportionately target disadvantaged communities, reducing the effectiveness of tax increases in those settings.

Viewing tobacco control policies through the lens of MDRs emphasizes that equity cannot be assumed. A policy that reduces overall prevalence may still perpetuate or widen disparities if advantaged groups disproportionately realized its benefits. In this sense, MDRs serve as a warning that policies, like other resources, may reproduce existing hierarchies of advantage unless implemented with explicit attention to marginalized populations. This perspective also underscores the importance of evaluating not only average effects of policies but also differential returns across racial, ethnic, and socioeconomic groups.

Ultimately, the MDRs framework calls for complementary measures to strengthen the impact of policies where returns are otherwise diminished. This may include tailoring cessation support for minority smokers, enforcing smoke-free protections more aggressively in disadvantaged areas, and restricting industry practices that undermine policies in minority communities. Without equity-oriented strategies, tobacco control risks reinforcing existing disparities, despite overall population gains.

## Tobacco Taxes and Socioeconomic Inequalities

### Price responsiveness by income and education

A large body of research suggests that SES plays a critical role in shaping how smokers respond to higher tobacco prices. Many studies indicate that low-income smokers reduce consumption more sharply in response to tax increases compared to their higher-income counterparts. A systematic review concluded that this pattern is relatively consistent, with lower-SES groups showing greater price responsiveness than more advantaged groups (Bader et al., 2011). For example, among U.S. adults, smokers in the lowest income quartile might be nearly twice as responsive to cigarette price increases as those in the highest quartile (Hill et al., 2014). This evidence implies that taxes may help reduce smoking disparities by triggering stronger behavioral responses in disadvantaged groups.



Education often mirrors this trend. Individuals with less formal education tend to exhibit greater price elasticity, possibly because their financial circumstances make it more difficult to afford cigarettes when prices rise. This pattern suggests that excise taxes may reduce socioeconomic disparities in smoking by creating stronger incentives to quit or cut back among disadvantaged groups.

However, this responsiveness does not always translate into sustained cessation. Stress related to economic insecurity, exposure to discrimination, and a higher prevalence of comorbid health conditions may increase vulnerability to relapse. In addition, disadvantaged smokers may lack access to cessation aids, such as nicotine replacement therapies or evidence-based counseling, limiting the durability of price-induced quit attempts. In this sense, excise taxes alone generate immediate reductions in consumption but may not guarantee lasting equity gains without supportive infrastructure.

### Mixed evidence on low-income effects

Although many studies highlight greater responsiveness among low-income smokers, other analyses have challenged the assumption that taxes are uniformly equity-enhancing. For example, in the 1990s and 2000s, higher-income adults were more likely to reduce smoking when pack prices rose, while low-income adults showed less consistent declines (Brown et al., 2014; Franks et al., 2007; Le & Jaffri, 2022; Siahpush et al., 2009; Vijayaraghavan et al., 2013). This may raise concerns that the financial burden of higher taxes may fall disproportionately on poorer households without producing commensurate health benefits (Kleiman, 2021; Newman & O'Brien, 2011). Therefore, without additional safeguards, higher taxes risk disproportionately burdening poor households without equivalent health benefits. One explanation for these findings is that disadvantaged smokers often rely on price-minimizing strategies, such as switching to discount brands, buying in bulk, or purchasing from low-tax jurisdictions. These strategies can undermine the intended impact of excise taxes by keeping cigarettes affordable even as official prices rise. The widespread availability of cheaper products in disadvantaged neighborhoods further facilitates this behavior. Without restrictions on price promotions or strong enforcement of minimum price laws (MPLs), the ability of excise taxes to drive cessation may be weaker in these contexts.

### Racial and ethnic differences in price elasticity

The evidence on racial and ethnic differences in responsiveness to cigarette taxes is mixed. Some studies find that demand for cigarettes is more elastic among White smokers compared to Black, Hispanic, and Asian smokers (Assari et al., 2025; Aged, 1998; Golden et al., 2016; Myers et al., 2013; Yao et al., 2018). This suggests that tax increases may reduce smoking prevalence more among Whites, potentially widening disparities in tobacco use and related health outcomes. One possible explanation is that minority smokers, particularly Black smokers, have historically been targeted by the tobacco industry with menthol products, which are associated with greater addiction severity and lower quit success. Such factors may reduce the effectiveness of tax-induced price signals among these populations. In short, racial and ethnic differences in tax responsiveness highlight that policy design must consider product use patterns, such as menthol smoking and targeted marketing.

However, other studies provide a more optimistic picture. Research has shown that Black and Latino smokers can be equally or even more responsive to consistent tax increases when structural barriers, such as the availability of discounts or weak enforcement, are minimized. This highlights the importance of local policy implementation and the interaction between tax policy and the retail environment. In areas where strong excise taxes are combined with restrictions on industry discounting, the potential for equity gains appears promising.

### Progressive benefits over the life course

Taxes are often criticized as regressive because they take up a larger share of income for poor households in the short term. However, some modeling work suggests that tobacco taxes may be progressive when considered across the life course (Baum et al., 2020; Colman & Remler, 2008; DeCicca & McLeod, 2008; Remler, 2004). If lower-income smokers are more likely to quit in response to higher taxes, they stand to gain disproportionately in terms of reduced tobacco-related disease and financial strain in the long run. The avoided medical costs and productivity losses associated with quitting may outweigh the immediate financial burden, turning taxes into a policy that promotes equity over time. These models suggest that taxes can ultimately be progressive if they successfully prompt quitting among disadvantaged groups, but only when supported by cessation resources.

Nevertheless, these long-term benefits depend on whether disadvantaged smokers succeed in quitting rather than continuing to pay higher prices. Without adequate cessation resources and targeted interventions, the risk remains that taxes can widen short-term financial inequities even if they hold the potential for longer-term equity gains. Thus, excise taxes may be best viewed not as stand-alone measures but as components of a broader equity-oriented strategy that includes cessation support, retail regulation, and protections against targeted industry practices.

## Smoke-free Laws and Equity

### Adoption patterns

Smoke-free workplace, restaurant, and bar laws began spreading across the United States in the 1990s, reflecting a shift in public health priorities and changing social norms around tobacco use. However, the adoption of these protections was far from uniform. Early adopters were often municipalities with higher levels of education, stronger civic engagement, and greater economic resources. As a result, low-income and minority communities were less likely to benefit from these early policy changes, even though they carried a disproportionate burden of tobacco-related disease (Hafez et al., 2019; Hill et al., 2014; Murray et al., 2009; Vijayaraghavan et al., 2018; Vijayaraghavan et al., 2013). This shows that communities with fewer resources were left behind in the early stages of smoke-free policy adoption, reinforcing health inequities.

For example, research in Massachusetts showed that towns with higher proportions of college-educated residents were significantly more likely to adopt smoke-free restaurant laws (Alpert et al., 2007; Bartosch & Pope, 1999; Buettner-Schmidt et al., 2018). This pattern suggests that political capacity, social capital, and community advocacy were important drivers of early adoption. Communities with fewer resources, often poorer towns and those with larger minority populations, were slower to secure smoke-free protections, leaving residents more exposed to SHS in restaurants and workplaces. Such inequities in adoption illustrate how policy diffusion mirrors broader social inequalities.

### Racial and ethnic coverage gaps

Even as smoke-free laws spread nationally in the 2000s and 2010s, disparities in coverage persisted. Studies have indicated that racial and ethnic minorities, particularly non-Hispanic Black populations, are less likely to

live or work in places with comprehensive smoke-free protections (Hafez et al., 2019). The reasons for these disparities are multifaceted. Political resistance, industry lobbying, and lower prioritization of tobacco control in under-resourced communities all contributed. Thus, smoke-free laws have not fully closed exposure gaps, with racial minorities and low-income workers continuing to face higher risk.

This unequal distribution of policy benefits has tangible consequences. Workers in service industries, who are disproportionately people of color and low-income earners, were more likely to be employed in establishments not covered by early smoke-free protections. Thus, groups already facing elevated risks of chronic disease also remained more exposed to harmful environments. Over time, national adoption helped to close some gaps, but disparities in timing and enforcement meant that many minority and low-income populations received protection later and less comprehensively.

### SHS exposure

National survey data confirm the consequences of uneven adoption and enforcement. Between 1999 and 2012, SHS exposure declined dramatically, reflecting the broad success of smoke-free laws. However, the decline was slower among non-Hispanic Black nonsmokers and individuals living in poverty (Homa et al., 2015; Shenassa et al., 2017). By 2012, over 40% of Black nonsmokers were still exposed to SHS, compared to about 25% of White nonsmokers.

In a study, although non-Hispanic Black children had significantly lower serum cotinine than non-Hispanic White children ( $-0.26$ ; 95% confidence interval [CI]:  $-0.38\%$ ,  $-0.15\%$ ) in low-income inequality areas, this difference was more minor in areas with high income inequality ( $0.01$ ; 95% CI,  $-0.16\%$ ,  $0.18\%$ ). Serum cotinine declined for non-Hispanic White children with increasing income inequality. However, in line with minorities' diminished returns, serum cotinine levels did not change as a function of income inequality among non-Hispanic Black children. These complex patterns are described elsewhere (Assari et al., 2024; Assari & Caldwell, 2021; Assari & Zare, 2024a). The takeaway is that even as national SHS exposure declines, Black and low-income populations remain disproportionately exposed due to housing and enforcement gaps.

These persistent disparities reflect multiple sociological factors. First, Black adults and low-income individuals are more likely to live in multi-unit housing, where

smoke-free policies are less common, and exposure risk is higher. Second, disparities in workplace protections mean that some occupations employing a higher share of minority and low-wage workers, such as service, hospitality, or blue-collar jobs, have historically had weaker enforcement of smoke-free protections. Third, community-level enforcement of smoke-free laws is often weaker in disadvantaged neighborhoods, leading to greater variability in exposure even within jurisdictions that have passed strong laws.

### Enforcement challenges

Enforcing smoke-free laws adds another layer of inequity. While state-level laws establish broad protections, local enforcement determines their effectiveness. Workplaces in disadvantaged areas may be less compliant, whether due to weaker oversight, fear of business loss, or limited enforcement resources. Multi-unit housing presents challenges. In many urban centers, residents of low-income housing are disproportionately minorities and face the highest exposure to SHS. However, policies governing smoke-free multi-unit residences are inconsistent and often poorly enforced. In practice, this means that policies on paper often fail to deliver protections in disadvantaged neighborhoods, where enforcement is weakest. Without targeted enforcement, smoke-free protections risk reinforcing disparities rather than reducing them. Communities with the most significant burden of tobacco-related illness often receive the weakest protections, not because laws are absent, but because they are applied inconsistently. This highlights the need for equity-oriented enforcement strategies that prioritize protecting vulnerable groups rather than assuming uniform policy application across diverse social contexts.

### Other Related Policies

#### MPLs

In addition to excise taxes, some jurisdictions have experimented with MPLs (Huang et al., 2016; Tynan et al., 2013), which set a legal floor for tobacco product prices. Unlike excise taxes, which the tobacco industry can offset through discounts and promotions, MPLs prevent retailers from selling tobacco below a certain price point. Modeling studies suggest that MPLs could reduce socioeconomic disparities more effectively than excise taxes, precisely because they eliminate the industry's ability to shield disadvantaged consumers from price increases.

However, MPLs are rare and unevenly enforced. Where they do exist, the tobacco industry often seeks loopholes, for example, using coupons or multi-pack deals to bring effective prices back down. This suggests that MPLs may be most effective when combined with strong monitoring and restrictions on promotions. The potential of MPLs as equity-promoting policies remains underexplored, but they represent a crucial area for further policy innovation.

#### Tobacco 21 (age-of-sale laws)

Another recent development has been the spread of "Tobacco 21" laws (Colston et al., 2022; Friedman et al., 2019; Hansen et al., 2023), which raise the minimum age of sale to 21. Before the federal government adopted Tobacco 21 in 2019, local adoption was uneven and patterned by community socio-demographics. Advantaged communities with greater resources and stronger local advocacy were more likely to pass these laws, leaving coverage gaps for minority and low-income populations (Leas et al., 2020).

This uneven adoption is significant because early Tobacco 21 laws were associated with reductions in youth initiation. Communities that lacked these protections, many of which were disadvantaged and disproportionately minority, therefore missed out on early benefits. The eventual national adoption closed these gaps, but the unequal diffusion process illustrates once again how incremental policy adoption can exacerbate disparities before full coverage is achieved.

#### Retail pricing and targeting

Even beyond formal tax or regulatory policy, disparities persist in the retail environment. Studies have shown that non-White smokers often report paying more per pack than White smokers, even after adjusting for income, geography, and other covariates (Pesko et al., 2013). This difference cannot be explained solely by excise tax structures, but instead reflects industry practices and the density of tobacco outlet in disadvantaged communities. Overall, geographic and place-based inequities in the retail environment may counteract tax benefits, compounding both financial and health disparities.

Retail targeting interacts with other policies in important ways. When excise taxes rise, tobacco companies often concentrate price-discounting strategies in low-income and minority neighborhoods, thereby undermining the intended equity benefits of tax policy. Conversely, these communities may also face higher baseline retail



prices, compounding financial strain without delivering health benefits. The intersection of targeted marketing, retail saturation, and uneven policy enforcement makes the retail environment a crucial determinant of whether population-level policies reduce or reproduce disparities.

## Policy Gaps and Challenges

Despite strong evidence that tobacco taxes and smoke-free laws reduce overall tobacco use and SHS exposure, important policy gaps remain. One challenge is that coverage is not uniform. Some states and municipalities have adopted high excise taxes and comprehensive smoke-free protections, while others lag, often leaving disadvantaged communities with weaker policies. A second challenge is enforcement. Even where laws exist on paper, enforcement is uneven, and workplaces or housing in low-income areas are less likely to comply, reducing the effectiveness of protection for those already at higher risk. A third issue is the potentially regressive burden of taxation. Without adequate cessation support, disadvantaged smokers may continue to smoke while paying more of their limited income in tobacco taxes, a situation that compounds financial strain without delivering health benefits. A fourth gap lies in housing policy. Multi-unit housing remains a significant source of SHS exposure, disproportionately affecting low-income families and racial minorities who are more likely to live in such residences. Finally, industry interference remains a barrier. The tobacco industry has long targeted vulnerable communities through menthol marketing, retail saturation, and discounting practices, strategies that undermine the equity potential of population-level policies. These persistent gaps emphasize the need for uniform coverage, strong enforcement, and targeted cessation support to achieve equity.

## Implications for Health Equity

Evidence suggests that tobacco taxes and smoke-free laws can help reduce disparities, but their effects depend heavily on implementation. Taxes may enhance equity when exposure is universal and cessation support is available; however, they may also exacerbate inequities when disadvantaged smokers lack resources to quit. Smoke-free laws clearly reduce SHS exposure overall; however, they leave persistent gaps for racial minorities and poor households, especially in multi-unit housing.

Several strategies should be prioritized to maximize equity. First, policymakers must ensure that excise taxes and smoke-free protections are applied uniformly across all communities so that disadvantaged groups are

not left with weaker coverage. Second, MPLs should be expanded, and industry price-discounting strategies curtailed, since these marketing tactics disproportionately target vulnerable populations. Third, enforcement should be strengthened in disadvantaged neighborhoods and in multi-unit housing complexes, where SHS exposure remains high. Fourth, cessation support must be tailored and made accessible for low-income and minority smokers so that higher taxes do not simply add financial strain without offering realistic pathways to quit. Finally, equity metrics should be integrated into the evaluation of tobacco control policies to allow continuous monitoring of whether disparities are narrowing or widening.

## Conclusion

Tobacco control policies have contributed to significant declines in smoking and SHS exposure; however, their benefits have not been shared equally. Some evidence suggests that excise taxes may better reduce tobacco use among low-income groups; however, disparities in coverage and cessation support may limit their impact. Smoke-free laws protect many, but adoption and enforcement have historically favored advantaged communities, leaving Black and low-income populations behind. Other strategies, such as MPLs and retail restrictions, may help, but they remain underutilized. Ultimately, taxes and smoke-free laws are powerful population-level tools, but equity is not automatic. Their ability to reduce disparities depends on universal adoption, robust enforcement, and complementary measures designed to reach disadvantaged populations. Without an explicit focus on equity, these well-intentioned tobacco control policies risk perpetuating inequalities in tobacco use and harm.

## Ethical Considerations

### Compliance with ethical guidelines

This article is a narrative review based on previously published studies and publicly available data. It did not involve new data collection from human participants or animals. Therefore, ethical approval and informed consent were not required.

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## Authors' contributions

Theoretical framework and interpretation of disparities and policy implications: Shervin Assari; Original draft preparation: Ali Farhoudian; Conceptualization, study design and investigation, review and editing: All authors.

## Conflict of interest

The authors declared no conflict of interest.

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