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

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Abstract

Flavor is a multisensory experience shaped by gustatory, olfactory, and trigeminal inputs, further modulated by visual, auditory, and somatosensory cues. Neuroscience identifies the insula, orbitofrontal cortex, and limbic networks as central to both the sensory and hedonic dimensions of flavor. These mechanisms are highly relevant to tobacco use: flavored products such as menthol cigarettes and sweetened e-cigarettes exploit these neural integration pathways to heighten reward, mask aversive qualities, and strengthen conditioned responses. In doing so, they enhance appeal, particularly among youth and marginalized populations targeted by industry marketing. At the policy level, taxation and smoke-free laws remain proven strategies for reducing tobacco use, yet their impact is uneven across socioeconomic and racial groups because of structural inequities and inconsistent enforcement. Lower-income tobacco users are often more price-sensitive to tax increases, but disparities in cessation support and regulatory coverage limit long-term benefits. Similarly, while smoke-free protections are widespread, they are less consistently applied in minority and low-income communities, perpetuating inequities in exposure and harm. Complementary policies, such as minimum price laws and retail restrictions, offer promise but remain underutilized. Taken together, these patterns suggest that effective and equitable regulation must address both the neurobiological appeal of flavors and the structural dimensions of policy. Flavor restrictions, strong taxation, and comprehensive smoke-free protections are essential strategies to reduce tobacco disparities in populations that bear a disproportionate burden.

Keywords: Tobacco control policies; Tobacco taxation; Smoke-free laws; Health status disparities; Socioeconomic factors; Racial groups; Ethnic groups; Minority health; Health equity; Social determinants of health; Public policy; Smoking cessation; Smoking Prevention; Tobacco Smoke Pollution; Law Enforcement; Neurosciences

1. Introduction

Tobacco control has been described as one of the most important public health successes of the late twentieth and early twenty-first centuries. Tobacco use particularly conventional cigarette smoking rates have 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 stand out as particularly influential in reducing tobacco-related morbidity and mortality(Chaloupka et al., 2011; Culyer & Newhouse, 2000; Warner, 1987).

Yet the benefits of the decline in tobacco burden are not distributed evenly across populations. Socioeconomic status (SES)—including education, income, and employment—have become stronger social determinants 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)·(Health & Services, 2020). These increasing socioeconomic and racial/ethnic disparities raise an important 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, racialized communities behind?

In this paper 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 variation in reach, uptake, and effects of policies. We also consider both the direct effects of these policies on tobacco use behaviors and the indirect effects on exposure to secondhand smoke. The paper also discusses emerging complementary strategies, identifies policy gaps, and highlights implications for equity-focused tobacco control.

2. 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. Micro-economic theory predicts that individuals with fewer resources will be more sensitive to price changes because a larger share of their income would be 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. At least 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, relative advantage of low-income tobacco users in terms of higher responsiveness may not always translate into successful long-term quitting.

However, the literate is mixed. Some studies find the opposite pattern, suggesting that disadvantaged groups may not always respond more strongly to tobacco price increase (Higgins et al., 2019). Several mechanisms might explain this. First, low SES populations may have many more competing needs and lower bandwidth to quit. They may also face higher levels of stress and adversities, and have access to lower social support, all reducing the chance of successful quitting. Economic stress and unstable living conditions may also heighten nicotine dependence, making quitting harder 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 to them(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 same states also tend to have lower levels of education and income, more rural populations, and higher proportions of Black residents. Such variation in clustering of state policies and socioeconomic conditions means 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 where a person lives strongly influences their likelihood of being covered by progressive tobacco policies and their ability to benefit from them.

Smoke-free protections have also been historically rolled out 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, 2022; Lee et al., 2017; Mills et al., 2022). This undermines the uniformity of policy effects, making it harder to assess their equity impact(S. Assari & M. Bazargan, 2019c, 2019d). This means that structural inequities, including targeted marketing and weak enforcement, can blunt the intended benefits of tobacco control policies in minority communities.

Enforcement of policies also reflects structural inequities. 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 altogether, leaving low-income tenants more exposed to secondhand smoke despite broader declines in public spaces.

Finally, structural inequities may interact with both price responsiveness and policy reach. Communities that face 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). Minorities' Diminished Returns (MDRs)(Assari, 2018a, 2018b) also offers a useful 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(S. Assari, S. Boyce, 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; Shervin Assari & Mohsen Bazargan, 2019; Assari S, 2019; S. Assari, R. Mistry, 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 risk 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 secondhand smoke 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; S. Assari & M. Bazargan, 2019a, 2019b; Assari et al., 2019).

An analysis of data from the Adolescent Brain Cognitive Development (ABCD) 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. Efforts to reduce susceptibility may therefore strengthen the protective role of family income and contribute to reducing disparities in tobacco outcomes(Assari & Sheikhattari, 2024). Complementary evidence from the PATH study indicates that higher educational attainment decreases exposure to tobacco advertising, though this protective effect is less pronounced for Black individuals than for Whites(Assari, 2020a). In a similar fashion, 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(S. Assari, S. Boyce, 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 (Shervin Assari et al., 2020). Using data from the 2024 Monitoring the Future (MTF) study restricted to non-Latino White 12th graders, researchers examined whether parental education was linked to 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 follow a pattern of diminished returns. While tax increases generally 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). In this way, 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; Welwean et al., 2022). This means that while White communities may see large reductions in secondhand smoke 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 its benefits are disproportionately realized by advantaged groups. 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 such equity-oriented strategies, tobacco control risks reinforcing existing disparities, despite overall population gains.

3. Tobacco Taxes and Socioeconomic Inequalities

Price Responsiveness by Income and Education. A large body of research suggests that socioeconomic status 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 display greater price elasticity, possibly because their financial circumstances make it more difficult to absorb the cost of cigarettes when prices rise. This pattern suggests that excise taxes may have the potential to reduce socioeconomic disparities in smoking by creating stronger incentives to quit or cut back among disadvantaged groups.

Yet, 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 may 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, 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 some 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, 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(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 like menthol smoking and targeted marketing.

Other studies, however, 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 availability of discounting 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 more 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 actually 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.

4. 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 education levels, 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 early 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 secondhand smoke in restaurants and workplaces. Such inequities in adoption illustrate how policy diffusion can mirror 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 indicate that racial and ethnic minorities, particularly non-Hispanic Black populations, were 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 risks.

This unequal distribution of policy benefits had 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.

Secondhand Smoke Exposure

National survey data confirm the consequences of uneven adoption and enforcement. Between 1999 and 2012, secondhand smoke (SHS) exposure declined dramatically overall, reflecting the broad success of smoke-free laws. Yet declines were 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% CI: −0.38, −0.15) in low-income inequality areas, this

difference was smaller 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 did not change as a function of the level of income inequality among non-Hispanic Black children[79]. These complex patterns are described elsewhere(Assari et al., 2024; Assari & Caldwell, 2021; Assari & Zare, 2024a). The takeaway is that even as national secondhand smoke 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. The enforcement of 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 secondhand smoke, yet 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 a targeted enforcement, smoke-free protections risk reinforcing disparities rather than reducing them. Communities with the greatest 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 application of policy across diverse social contexts.

5. Other Related Policies

Minimum Price Laws. In addition to excise taxes, some jurisdictions have experimented with minimum price laws (Huang et al., 2016; Tynan et al., 2013)(MPLs), which set a legal floor for tobacco product prices. Unlike excise taxes, which can be offset by the tobacco industry through discounting 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 by 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 an important 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 gaps in coverage 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 show 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 by excise tax structures alone, but instead reflects industry practices and the density of tobacco outlets 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 same 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 crucial determinant of whether population-level policies reduce or reproduce disparities.

6. Policy Gaps and Challenges

Despite strong evidence that tobacco taxes and smoke-free laws reduce overall tobacco use and secondhand smoke 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 behind, 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 who are 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 major source of secondhand smoke exposure, disproportionately affecting low-income families and racial minorities who are more likely to live in such residences. Finally, industry interference continues to be 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.

7. Implications for Health Equity

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

To maximize equity, several strategies should be prioritized. First, policymakers need to 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, minimum price laws 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 secondhand smoke 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.

8. Conclusion

Tobacco control policies have contributed to major declines in smoking and secondhand smoke exposure, but their benefits have not been shared equally. Some evidence suggests that excise taxes may better reduce tobacco use among low-income groups, yet 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 minimum price laws 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.

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References

Aged, A. (1998). Response to increases in cigarette prices by race/ethnicity, income, and age groups—United States, 1976–1993.

Alpert, H. R., Carpenter, C. M., Travers, M. J., & Connolly, G. N. (2007). Environmental and economic evaluation of the Massachusetts smoke-free workplace law. *Journal of Community Health*, *32*(4), 269-281.

Assari, G., Zare, H., & Assari, S. (2024). Walking the Divide: A Public Health Journey from Manhattan to Harlem. *Journal of Social Mathematical & Human Engineering Sciences*, *3*(1), 7-15. https://www.scipublications.com/journal/index.php/jsmhes/article/view/1018

Assari, S. (2018a). Health disparities due to diminished return among black Americans: Public policy solutions. *Social Issues and Policy Review*, *12*(1), 112-145.

Assari, S. (2018b). Unequal gain of equal resources across racial groups. *International journal of health policy and management*, *7*(1), 1.

Assari, S. (2019). Diminished Returns of Income Against Cigarette Smoking Among Chinese Americans. *Journal of health economics and development*, *1*(2), 1.

Assari, S. (2020a). Association of Educational Attainment and Race/Ethnicity With Exposure to Tobacco Advertisement Among US Young Adults. *JAMA Netw Open*, *3*(1), e1919393. https://doi.org/10.1001/jamanetworkopen.2019.19393

Assari, S. (2020b). Socioeconomic Status and Current Cigarette Smoking Status: Immigrants' Diminished Returns. *Int J Travel Med Glob Health*, *8*(2), 66-72. https://doi.org/10.34172/IJTMGH.2020.11

Assari, S. (2021). Diminished Effect of Smoking Intensity on African American and Latino Smokers' Tobacco Risk Perception. *Journal of mental health & clinical psychology*, *5*(3).

Assari, S., Assari, G., & Zare, H. (2025). Weaker Effects of Parental Education on Oral Nicotine Use of High School Students in Rural Areas: Marginalization-Related Diminished Returns. *Open Journal of Educational Research*, *5*(2), 75-88. https://www.scipublications.com/journal/index.php/ojer/article/view/6042

Assari, S., & Bazargan, M. (2019). Education level and cigarette smoking: diminished returns of lesbian, gay and bisexual individuals. *Behavioral Sciences*, *9*(10), 103.

Assari, S., & Bazargan, M. (2019a). Education Level and Cigarette Smoking: Diminished Returns of Lesbian, Gay and Bisexual Individuals. *Behav Sci (Basel)*, *9*(10). https://doi.org/10.3390/bs9100103

Assari, S., & Bazargan, M. (2019b). Protective Effects of Educational Attainment Against Cigarette Smoking; Diminished Returns of American Indians and Alaska Natives in the National Health Interview Survey. *Int J Travel Med Glob Health*, *7*(3), 105-110. https://doi.org/10.15171/ijtmgh.2019.22

Assari, S., & Bazargan, M. (2019c). Second-Hand Smoke Exposure at Home in the United States; Minorities' Diminished Returns. *Int J Travel Med Glob Health*, *7*(4), 135-141. https://doi.org/10.15171/IJTMGH.2019.28

Assari, S., & Bazargan, M. (2019d). Unequal Effects of Educational Attainment on Workplace Exposure to Second-Hand Smoke by Race and Ethnicity; Minorities' Diminished Returns in the National Health Interview Survey (NHIS). *J Med Res Innov*, *3*(2). https://doi.org/10.32892/jmri.179

Assari, S., & Bazargan, M. (2020). Educational attainment and tobacco harm knowledge among American adults: Diminished returns of African Americans and Hispanics. *International journal of epidemiologic research*, *7*(1), 6-11.

Assari, S., Boyce, S., Bazargan, M., Caldwell, C. H., & Zimmerman, M. A. (2020). Place-Based Diminished Returns of Parental Educational Attainment on School Performance of Non-Hispanic White Youth [Original Research]. *Frontiers in Education*, *5*(30). https://doi.org/10.3389/feduc.2020.00030

Assari, S., Boyce, S., Caldwell, C. H., & Bazargan, M. (2020a). Parent Education and Future Transition to Cigarette Smoking: Latinos' Diminished Returns. *Front Pediatr*, *8*, 457. https://doi.org/10.3389/fped.2020.00457

Assari, S., Boyce, S., Caldwell, C. H., & Bazargan, M. (2020b). Parental Educational Attainment and Black-White Adolescents' Achievement Gap: Blacks' Diminished Returns. *Open J Soc Sci*, *8*(3), 282-297. https://doi.org/10.4236/jss.2020.83026

Assari, S., & Caldwell, C. H. (2021). Racism, Diminished Returns of Socioeconomic Resources, and Black Middle-Income Children's Health Paradox. *JAMA pediatrics*, *175*(12), 1287-1288. https://doi.org/10.1001/jamapediatrics.2021.3277

Assari S, C. H., Bazargan M. (2019). Educational Attainment Unequally Delays Smoking Initiation for Non-Hispanic Black and Non-Hispanic White Americans. *International Journal of Biomedical Engineering and Clinical Science*. https://doi.org/10.11648/j.XXXX.2019XXXX.XX

Assari, S., Mardani, A., Maleki, M., Boyce, S., & Bazargan, M. (2021). Black-White Achievement Gap: Role of Race, School Urbanity, and Parental Education. *Pediatric Health Med Ther*, *12*, 1-11. https://doi.org/10.2147/PHMT.S238877

Assari, S., Mistry, R., Caldwell, C. H., & Bazargan, M. (2020). Protective Effects of Parental Education Against Youth Cigarette Smoking: Diminished Returns of Blacks and Hispanics. *Adolesc Health Med Ther*, *11*, 63-71. https://doi.org/10.2147/ahmt.S238441

Assari, S., & Sheikhattari, P. (2024). Tobacco Susceptibility Explains Diminished Returns of Family Income on Black Adolescents' Tobacco Initiation. *Open J Psychol*, *4*(1), 30-41. https://doi.org/10.31586/ojp.2024.1037

Assari, S., Smith, J. L., Zimmerman, M. A., & Bazargan, M. (2019). Cigarette Smoking among Economically Disadvantaged African-American Older Adults in South Los Angeles: Gender Differences. *Int J Environ Res Public Health*, *16*(7). https://doi.org/10.3390/ijerph16071208

Assari, S., & Zare, H. (2024a). Paradoxical Effects of Income and Income Inequality on Racial Health Disparities. *Journal of Social Mathematical & Human Engineering Sciences*, *3*(1), 1-6. https://www.scipublications.com/journal/index.php/jsmhes/article/view/998

Assari, S., & Zare, H. (2024b). Racial Gap in Household Income Explains Black-White Disparities in the Intergenerational Transmission of Educational Attainment. *Open Journal of Educational Research*, *4*(3), 137-148. https://www.scipublications.com/journal/index.php/ojer/article/view/962

Bader, P., Boisclair, D., & Ferrence, R. (2011). Effects of tobacco taxation and pricing on smoking behavior in high risk populations: a knowledge synthesis. *Int J Environ Res Public Health*, *8*(11), 4118-4139. https://doi.org/10.3390/ijerph8114118

Bartosch, W. J., & Pope, G. (1999). The economic effect of smoke-free restaurant policies on restaurant business in Massachusetts. *Journal of public health management and practice*, 53-62.

Baum, A., Aguilar-Gomez, S., Lightwood, J., Bruzelius, E., Glantz, S. A., & Basu, S. (2020). Estimating the long-run relationship between state cigarette taxes and county life expectancy. *Tobacco Control*, *29*(1), 81-88.

Brown, T., Platt, S., & Amos, A. (2014). Equity impact of population-level interventions and policies to reduce smoking in adults: a systematic review. *Drug and Alcohol Dependence*, *138*, 7-16.

Buettner-Schmidt, K., Boursaw, B., & Lobo, M. L. (2018). Place and policy: Secondhand smoke exposure in bars and restaurants. *Nursing Research*, *67*(4), 324-330.

Casetta, B., Videla, A. J., Bardach, A., Morello, P., Soto, N., Lee, K., Camacho, P. A., Hermoza Moquillaza, R. V., & Ciapponi, A. (2017). Association between cigarette smoking prevalence and income level: a systematic review and meta-analysis. *Nicotine & Tobacco Research*, *19*(12), 1401-1407.

Ceci, S. J., & Papierno, P. B. (2005). The rhetoric and reality of gap closing: when the" have-nots" gain but the" haves" gain even more. *American Psychologist*, *60*(2), 149.

Chaloupka, F. J., Levy, D., & Huang, J. (2011). The impact of tax and smoke-free air policy changes. *Princeton, NJ: Robert Wood Johnson Foundation Tobacco Retrospective Series*, *201*(1).

Colman, G. J., & Remler, D. K. (2008). Vertical equity consequences of very high cigarette tax increases: if the poor are the ones smoking, how could cigarette tax increases be progressive? *Journal of Policy Analysis and Management: The Journal of the Association for Public Policy Analysis and Management*, *27*(2), 376-400.

Colston, D. C., Xie, Y., Patrick, M. E., Thrasher, J. F., Titus, A. R., Elliott, M. R., Levy, D. T., & Fleischer, N. L. (2022). Tobacco 21 laws may reduce smoking and tobacco-related health disparities among youth in the U.S. *Prev Med Rep*, *27*, 101762. https://doi.org/10.1016/j.pmedr.2022.101762

Culyer, A. J., & Newhouse, J. P. (2000). *Handbook of health economics*. Elsevier.

Dahne, J., Wahlquist, A. E., Garrett-Mayer, E., Heckman, B. W., Cummings, K. M., & Carpenter, M. J. (2017). The differential impact of state tobacco control policies on cessation treatment utilization across established tobacco disparities groups. *Preventive medicine*, *105*, 319-325.

Dai, H., Tamrakar, N., Rathnayake, N., & Samson, K. (2021). Geographical distribution and social determinants of Tobacco 21 policy adoption and retail inspections in the United States, 2015–2019. *Tobacco induced diseases*, *19*, 55.

DeCicca, P., & McLeod, L. (2008). Cigarette taxes and older adult smoking: Evidence from recent large tax increases. *Journal of health Economics*, *27*(4), 918-929.

Fagan, P., Moolchan, E. T., Lawrence, D., Fernander, A., & Ponder, P. K. (2007). Identifying health disparities across the tobacco continuum. *Addiction*, *102*, 5-29.

Farrelly, M. C., Bray, J. W., Pechacek, T., & Woollery, T. (2001). Response by adults to increases in cigarette prices by sociodemographic characteristics. *Southern Economic Journal*, *68*(1), 156-165.

Farrelly, M. C., & Engelen, M. (2008). Cigarette prices, smoking, and the poor, revisited. *Am J Public Health*, *98*(4), 582-583; author reply 583-584. https://doi.org/10.2105/ajph.2007.132647

Franks, P., Jerant, A. F., Leigh, J. P., Lee, D., Chiem, A., Lewis, I., & Lee, S. (2007). Cigarette prices, smoking, and the poor: implications of recent trends. *American Journal of Public Health*, *97*(10), 1873-1877.

Friedman, A. S., Buckell, J., & Sindelar, J. L. (2019). Tobacco-21 laws and young adult smoking: quasi-experimental evidence. *Addiction*, *114*(10), 1816-1823. https://doi.org/10.1111/add.14653

Garrett, B. E., Dube, S. R., Babb, S., & McAfee, T. (2014). Addressing the social determinants of health to reduce tobacco-related disparities. *Nicotine & Tobacco Research*, *17*(8), 892-897.

Golden, S. D., Kong, A. Y., & Ribisl, K. M. (2016). Racial and ethnic differences in what smokers report paying for their cigarettes. *Nicotine & Tobacco Research*, *18*(7), 1649-1655.

Hafez, A. Y., Gonzalez, M., Kulik, M. C., Vijayaraghavan, M., & Glantz, S. A. (2019). Uneven access to smoke-free laws and policies and its effect on health equity in the United States: 2000–2019. *American Journal of Public Health*, *109*(11), 1568-1575.

Hansen, B., Sabia, J. J., McNichols, D., & Bryan, C. (2023). Do tobacco 21 laws work? *J Health Econ*, *92*, 102818. https://doi.org/10.1016/j.jhealeco.2023.102818

Health, U. D. o., & Services, H. (2020). Smoking cessation: a report of the Surgeon General.

Henriksen, L., Andersen-Rodgers, E., Zhang, X., Roeseler, A., Sun, D. L., Johnson, T. O., & Schleicher, N. C. (2017). Neighborhood Variation in the Price of Cheap Tobacco Products in California: Results From Healthy Stores for a Healthy Community. *Nicotine Tob Res*, *19*(11), 1330-1337. https://doi.org/10.1093/ntr/ntx089

Higgins, S. T., Kurti, A. N., Palmer, M., Tidey, J. W., Cepeda-Benito, A., Cooper, M. R., Krebs, N. M., Baezconde-Garbanati, L., Hart, J. L., & Stanton, C. A. (2019). A review of tobacco regulatory science research on vulnerable populations. *Prev Med*, *128*, 105709. https://doi.org/10.1016/j.ypmed.2019.04.024

Hill, S., Amos, A., Clifford, D., & Platt, S. (2014). Impact of tobacco control interventions on socioeconomic inequalities in smoking: review of the evidence. *Tobacco Control*, *23*(e2), e89-e97. https://doi.org/10.1136/tobaccocontrol-2013-051110

Homa, D. M., Neff, L. J., King, B. A., Caraballo, R. S., Bunnell, R. E., Babb, S. D., Garrett, B. E., Sosnoff, C. S., Wang, L., Control, C. f. D., & Prevention. (2015). Vital signs: disparities in nonsmokers' exposure to secondhand smoke—United States, 1999–2012. *MMWR Morb Mortal Wkly Rep*, *64*(4), 103-108.

Huang, J., Chriqui, J. F., DeLong, H., Mirza, M., Diaz, M. C., & Chaloupka, F. J. (2016). Do state minimum markup/price laws work? Evidence from retail scanner data and TUS-CPS. *Tob Control*, *25*(Suppl 1), i52-i59. https://doi.org/10.1136/tobaccocontrol-2016-053093

Jacobson, P. D., & Wasserman, J. (1999). The implementation and enforcement of tobacco control laws: policy implications for activists and the industry. *Journal of health politics, policy and law*, *24*(3), 567-598.

Kleiman, A. J. (2021). Impoverishment by Taxation. *U. Pa. L. Rev.*, *170*, 1451.

Kong, A. Y., Delamater, P. L., Gottfredson, N. C., Ribisl, K. M., Baggett, C. D., & Golden, S. D. (2021). Sociodemographic inequities in tobacco retailer density: Do neighboring places matter? *Health & Place*, *71*, 102653.

Kong, A. Y., Delamater, P. L., Gottfredson, N. C., Ribisl, K. M., Baggett, C. D., & Golden, S. D. (2022). Neighborhood inequities in tobacco retailer density and the presence of tobacco-selling pharmacies and tobacco shops. *Health Education & Behavior*, *49*(3), 478-487.

Le, T. T., & Jaffri, M. A. (2022). The association between smoking behaviors and prices and taxes per cigarette pack in the United States from 2000 through 2019. *BMC Public Health*, *22*(1), 856.

Leas, E. C., Schliecher, N., Recinos, A., Mahoney, M., & Henriksen, L. (2020). State and regional gaps in coverage of 'Tobacco 21' policies. *Tob Control*, *29*(2), 226-227. https://doi.org/10.1136/tobaccocontrol-2019-054942

Lee, J. G., Sun, D. L., Schleicher, N. M., Ribisl, K. M., Luke, D. A., & Henriksen, L. (2017). Inequalities in tobacco outlet density by race, ethnicity and socioeconomic status, 2012, USA: results from the ASPiRE Study. *J Epidemiol Community Health*, *71*(5), 487-492.

Lopez-Quintero, C., Crum, R. M., & Neumark, Y. D. (2006). Racial/ethnic disparities in report of physician-provided smoking cessation advice: analysis of the 2000 National Health Interview Survey. *Am J Public Health*, *96*(12), 2235-2239. https://doi.org/10.2105/ajph.2005.071035

Mendez, D., & Warner, K. E. (2004). Adult cigarette smoking prevalence: declining as expected (not as desired). *American Journal of Public Health*, *94*(2), 251-252.

Mills, S. D., Kong, A. Y., Reimold, A. E., Baggett, C. D., Wiesen, C. A., & Golden, S. D. (2022). Sociodemographic disparities in tobacco retailer density in the United States, 2000–2017. *Nicotine and Tobacco Research*, *24*(8), 1291-1299.

Moolchan, E. T., Fagan, P., Fernander, A. F., Velicer, W. F., Hayward, M. D., King, G., & Clayton, R. R. (2007). Addressing tobacco-related health disparities. *Addiction*, *102*, 30-42.

Murray, R. L., Bauld, L., Hackshaw, L. E., & McNeill, A. (2009). Improving access to smoking cessation services for disadvantaged groups: a systematic review. *Journal of Public Health*, *31*(2), 258-277.

Myers, M. G., Edland, S. D., Hofstetter, C. R., & Al-Delaimy, W. K. (2013). Perceived price sensitivity by ethnicity and smoking frequency among California Hispanic and non-Hispanic white smokers. *Nicotine & Tobacco Research*, *15*(6), 1069-1074.

Newman, K. S., & O'Brien, R. (2011). *Taxing the poor: Doing damage to the truly disadvantaged* (Vol. 7). Univ of California Press.

Okuyama, K., Lönn, S. L., Khoshnood, A. M., Assari, S., Sundquist, J., & Sundquist, K. (2025). School performance gap between non-immigrant and second-generation immigrant children in Sweden-time trends and contributing factors. *Front Public Health*, *13*, 1521387. https://doi.org/10.3389/fpubh.2025.1521387

Organization, W. H. (2018). WHO global report on trends in prevalence of tobacco smoking 2000–2025.

Parks, M. J., Patrick, M. E., Levy, D. T., Thrasher, J. F., Elliott, M. R., & Fleischer, N. L. (2021). Tobacco taxation and its prospective impact on disparities in smoking initiation and progression among young adults. *Journal of Adolescent Health*, *68*(4), 765-772.

Pesko, M. F., Licht, A. S., & Kruger, J. M. (2013). Cigarette price minimization strategies in the United States: price reductions and responsiveness to excise taxes. *Nicotine Tob Res*, *15*(11), 1858-1866. https://doi.org/10.1093/ntr/ntt068

Remler, D. K. (2004). Poor smokers, poor quitters, and cigarette tax regressivity. *American Journal of Public Health*, *94*(2), 225-229.

Roberts, M. E., Klein, E. G., Ferketich, A. K., Keller-Hamilton, B., Berman, M. L., Chacko, M., Jenkins, C. F., Segall, M. H., & Woodyard, K. C. (2021). Beyond strong enforcement: understanding the factors related to retailer compliance with tobacco 21. *Nicotine and Tobacco Research*, *23*(12), 2084-2090.

Rose, S. W., Ickes, M., Patel, M., Rayens, M. K., van de Venne, J., Annabathula, A., & Schillo, B. (2022). Centering equity in flavored tobacco ban policies: implications for tobacco control researchers. *Preventive medicine*, *165*, 107173.

Shenassa, E. D., Rossen, L. M., Cohen, J., Morello-Frosch, R., & Payne-Sturges, D. C. (2017). Income inequality and US children's secondhand smoke exposure: Distinct associations by race–ethnicity. *Nicotine & Tobacco Research*, *19*(11), 1292-1299.

Siahpush, M., Wakefield, M. A., Spittal, M. J., Durkin, S. J., & Scollo, M. M. (2009). Taxation reduces social disparities in adult smoking prevalence. *American journal of preventive medicine*, *36*(4), 285-291.

Smith, C. E., Hill, S. E., & Amos, A. (2020). Impact of population tobacco control interventions on socioeconomic inequalities in smoking: a systematic review and appraisal of future research directions. *Tob Control*, *30*(e2), e87-95. https://doi.org/10.1136/tobaccocontrol-2020-055874

Tabuchi, T., Iso, H., & Brunner, E. (2018). Tobacco Control Measures to Reduce Socioeconomic Inequality in Smoking: The Necessity, Time-Course Perspective, and Future Implications. *J Epidemiol*, *28*(4), 170-175. https://doi.org/10.2188/jea.JE20160206

Tauras, J. A. (2007). Differential impact of state tobacco control policies among race and ethnic groups. *Addiction*, *102*, 95-103.

Tynan, M. A., Ribisl, K. M., & Loomis, B. R. (2013). Impact of cigarette minimum price laws on the retail price of cigarettes in the USA. *Tob Control*, *22*(e1), e78-85. https://doi.org/10.1136/tobaccocontrol-2012-050554

Vijayaraghavan, M., Benmarnhia, T., Pierce, J. P., White, M. M., Kempster, J., Shi, Y., Trinidad, D. R., & Messer, K. (2018). Income disparities in smoking cessation and the diffusion of smoke-free homes among US smokers: Results from two longitudinal surveys. *Plos one*, *13*(7), e0201467.

Vijayaraghavan, M., Messer, K., White, M. M., & Pierce, J. P. (2013). The effectiveness of cigarette price and smoke-free homes on low-income smokers in the United States. *American Journal of Public Health*, *103*(12), 2276-2283.

Wang, Y., Max, W., Yao, T., Keeler, C., & Sung, H. Y. (2021). Differential price-responsiveness of smoking behaviors among non-Hispanic African Americans and non-Hispanic whites in the United States. *Addiction*, *116*(10), 2859-2869.

Warner, K. E. (1987). Health and economic implications of a tobacco-free society. *Jama*, *258*(15), 2080-2086.

Welwean, R. A., Andersen-Rodgers, E., Akintunde, A., & Zhang, X. (2022). Evaluating the impact of strong and weak California flavored tobacco sales restriction policies on the tobacco retail environment. *American Journal of Health Promotion*, *36*(4), 687-696.

Yao, T., Ong, M. K., Max, W., Keeler, C., Wang, Y., Yerger, V. B., & Sung, H.-Y. (2018). Responsiveness to cigarette prices by different racial/ethnic groups of US adults. *Tobacco Control*, *27*(3), 301-309.