

Impact of California law prohibiting sale of flavored smoking products

Abstract

Background: Senate Bill 793, passed in 2022, made California the second state in the United States to ban the sale of flavored tobacco products, including electronic cigarettes. This legislation aimed to curb smoking rates, particularly among youth, and mitigate the adverse health effects of tobacco use. Our study aims to evaluate the effectiveness of the ban on flavored tobacco products.

Methods: Between May and September of 2023, a Google Forms survey was conducted among California residents, collecting demographic data, smoking status, and awareness of the ban. Data was analyzed in EpiInfo7.2.6 and GraphPad Software to examine significance through chi-squared tests and one-way t-tests.

Results: Responses from 248 California residents showed that 89% of smokers and 41% of non-smokers were aware of the ban. The majority of smokers did not quit post-ban, with 73% of tobacco smokers, 81% of e-cigarette users, and 73% of dual users continuing to smoke. Among those who supported the ban, 24% ceased smoking, 66% continued smoking flavored products, and 10% transitioned to non-flavored products.

Discussion: Awareness of the ban is high among smokers, but quitting the use of flavored products is low. The majority of smokers who agreed with the ban continued to smoke flavored tobacco products after the ban. Policymakers should focus on enforcing the ban by prohibiting the sale of flavored tobacco products and implementing measures to help people overcome addiction or transition to non-flavored alternatives.

Keywords: smoking cessation, tobacco, electronic cigarettes, flavored tobacco products

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Introduction

Senate Bill 793, passed in 2022, made California (CA) the second state in the United States, after Massachusetts, to ban the sale of flavored tobacco products.¹⁻³ This marked a significant legislative move aimed at curbing smoking rates, particularly among youth, and reducing the adverse health effects associated with tobacco use. This ban targeted a range of flavored tobacco products, including menthol cigarettes, flavored cigars, and flavored e-cigarettes, which have been increasingly popular among adolescents and young adults from 2018 and 2020.⁴ Our research sought to delve into the impact of this ban by analyzing survey data collected from a diverse sample of smokers and non-smokers across California.

The significance of our research lies in addressing the pervasive issue of tobacco use, which continues to pose a considerable public health challenge worldwide. In California, statistics reveal a substantial prevalence of smoking, with approximately 22% of Californians in 2023 reporting the use of any tobacco product in the past 30 days.⁵ Despite efforts to promote smoking cessation, the number of individuals who successfully quit smoking remains low, with a reported 7.5% of adult cigarette smokers in the U.S. successfully quitting in 2018.⁶

Based on previous studies, nearly half (43%) of California smokers plan to quit within six months, while 40% have tried to quit in the past year.⁵ Interestingly, electronic cigarette users are even more likely to consider quitting, with 54% planning to give it up in the next six months and 48% attempting to quit in the past year.⁵ Moreover, the financial burden associated with smoking in California is staggering, with an estimated \$43.5 billion spent annually on tobacco-related healthcare costs and lost productivity.⁴

The 2022 ban on flavored tobacco products is not the first endeavor to regulate tobacco consumption in California. Previous legislation has targeted tobacco advertising, smoking in public spaces, and the sale of tobacco products to minors. The Stop Tobacco Access to Kids Enforcement (STAKE) Act, prohibits the sale and supply of tobacco products to a person under 21 years of age.¹ While these measures have had some impact, the persistent allure of flavored tobacco products has posed a unique challenge, particularly in enticing young individuals into nicotine addiction. Nationally, 25% of the youth smoke E-cigarettes, and 90% of these smokers use flavored E-cigarettes.⁷

Of particular concern is the prevalence of smoking in the youth, with studies indicating that 87% of daily adult smokers initiate tobacco use before the age of 18 years old.⁸ Flavored tobacco products have played a significant role in this trend, with their appealing flavors and marketing strategies specifically targeting the youth.⁸

The health effects of tobacco and vaping devices are well-documented. While tobacco use is associated with an increased risk of various diseases, including lung cancer, cardiovascular disorders, and premature death, vaping devices have often been advertised to foster the false idea that vaping is a healthy alternative.^{9,10} However, emerging evidence suggests that vaping may pose its own set of health risks, particularly among young users.

Vaping contributes to deficits in cognition and memory impairment since young users' brains are still developing.¹¹ The addition of flavorings to nicotine proposes an equally concerning health hazard, as food additives may seem harmless but in fact their effects become apparent through indirect exposure.¹⁰

Against this backdrop, our study aimed to evaluate the effectiveness of the ban on flavored tobacco products implemented at the end of 2022. By surveying a diverse cross-section of the California population, we sought to assess whether the ban had succeeded in reducing smoking rates, particularly among youth, or if it had merely led to a shift in consumption patterns or increased use of non-flavored tobacco products.

Our research aims to contribute to the ongoing discourse on tobacco control by providing empirical evidence on the effectiveness of the 2022 California ban on flavored tobacco products. While there are studies that shed light on flavored tobacco sales,¹² a critical gap remains in understanding how these trends influence individual smoking patterns. This information is vital to effectively address the public health concerns associated with flavored tobacco. By analyzing survey data and considering the broader context of tobacco control efforts, we aim to provide valuable insights into the effectiveness of this policy intervention and its implications for public health in California.

Table 1 Baseline demographics of study with 248 unique participants, all of which were residents of California

		Non-Smoker	Smoker	Total
n		75	173	248
Age (years)	<17	2 (50%)	2 (50%)	4
	18-21	49 (38.59%)	78 (61.42%)	127
	22-35	11 (14.10%)	67 (85.90%)	78
	>36	13 (64.98%)	26 (35.02%)	39
Race/Ethnicity	African American	2 (100%)	0	2
	American Indian/ Alaskan	1 (100%)	0	1
	Hispanic	8 (36.36%)	14 (63.64%)	22
	Asian/ Pacific Island	19 (55.88%)	15 (44.12%)	34
Gender	White/Caucasian	38 (23.60%)	123 (76.40%)	161
	Mixed	5 (35.71%)	9 (64.29%)	14
	Prefer not to state	3 (20%)	12 (20%)	15
	Male	22 (20.75%)	84 (79.25%)	106
Education	Female	50 (37.59%)	83 (62.41%)	133
	Non-Specified	3 (60%)	6 (40%)	9
	Less than High School Diploma	2 (50%)	2 (50%)	4
	High School Diploma or	14 (38.84%)	24 (63.16%)	38
Education	Bachelor Degree or High School Diploma	24 (24%)	76 (76%)	100
	Some College	35 (34.31%)	67 (65.69%)	102
	Prefer Not to Say	0	4 (100%)	4

*Smokers include all participants with any past history of smoking.

No significant results were concluded.

Table 2 A majority of participant's smoke flavored-nicotine products post-ban

Types of nicotine product consumption among participants	
	n%
Flavored	91 (37%)
Non-Flavored	21 (8%)
Both	52 (21%)
Non-Smoker	84 (34%)
Total	248 (100%)

Participants were asked to specify the type of product they use based on flavor. No significant results were concluded.

Figure 1 illustrates the impact of the ban on smoking cessation rates among different groups of smokers. The majority of smokers did

Methods

Our study aims to determine how effective the CA ban against the sale of flavored smoking products is and what health and lifestyle consequences it encounters. To gather our data, we utilized Google Forms, as an efficient and accessible online medium for conducting a survey. The data collection phase of our research started in May 2023 and concluded in September 2023, which ensured a substantial timeframe to gather a comprehensive dataset. Of the 255 responses received from our public survey, 248 were included in our analysis. Exclusionary criteria included incomplete survey responses and non-California residents. The survey collected demographic data, information regarding smoking status, and determined awareness of the ban. Data was analyzed in EpiInfo7.2.6 and GraphPad Software to examine significance through chi-squared tests and one-way t-tests.

Results

In Table 1 and Table 2, no significant results were observed regarding the cessation rates in relation to demographic variables such as age, gender, or race or education.

not quit post-ban, with 73% of tobacco smokers, 81% of e-cigarette users, and 73% of dual users continuing to smoke. Additionally, 9% of tobacco smokers and 3% of dual smokers had quit prior to the ban (See Figure 1). A one way t-test was performed, showing significance (P-VALUE of 0.0012) in those who quit versus did not quit post-ban in each group of product users.

Figure 2 depicts the relationship between support for the ban, smoking cessation rates, and the tendency to switch to non-flavored products. Among smokers who supported the ban, 24% ceased smoking, 66% continued smoking flavored products, and 10% transitioned to non-flavored products. Conversely, among those who opposed the ban, none ceased smoking; 90% continued smoking flavored products, and 10% switched to non-flavored products.

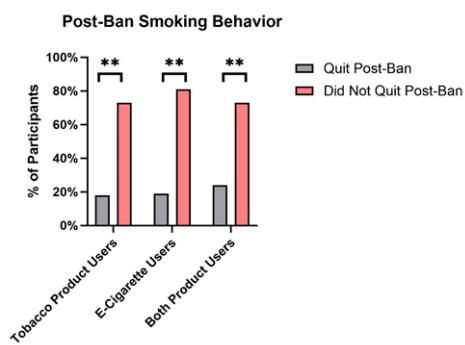


Figure 1 The majority of smokers did not quit smoking post-ban. The impact of the ban on smoking cessation rates among groups of only tobacco product users, e-cigarette users and both product users was assessed through a public survey. Participants, represented in percentages, also indicated their decision whether or not they quit smoking post-ban. A one way t-test was performed, showing significance (P-VALUE of 0.0012) in those who quit versus did not quit post-ban in each group of product users.

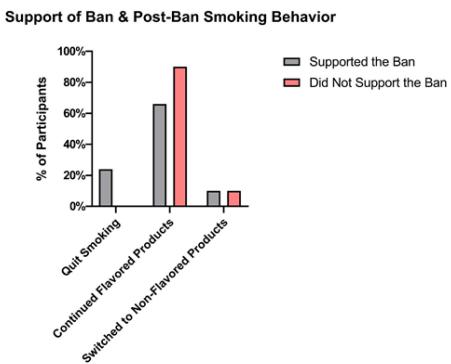


Figure 2 Whether or not participants supported the ban, the majority of smokers continued consuming flavored products. The stance on the ban, whether in favor or not, was examined among groups who quit smoking post-ban, continued smoking flavored products post-ban, and those who switched to non-flavored products. The analysis considered the percentage of participants in each group. No significant results were concluded from statistical analysis.

Figure 3 shows the awareness of the ban, with 89% of smokers being aware compared to only 41% of non-smokers. This indicates a notable difference in awareness levels between these two groups, suggesting a higher engagement with tobacco policies among smokers.

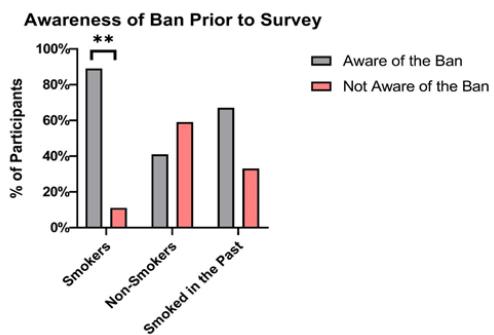


Figure 3 Significant awareness of the ban among smokers. The awareness of the ban on flavored tobacco products among different groups of smokers and non-smokers was analyzed. Based on a chi-squared test (P value of 0.0001), those who smoked were significantly more aware of the ban prior to the survey.

Figure 4 explores perceived health risks associated with tobacco products and e-cigarettes. Among tobacco users, 68% believed e-cigarettes posed greater health risks, while 73% of e-cigarette users believed tobacco products were more harmful. Dual users and non-smokers were evenly split, with 49% perceiving greater health risks from tobacco products.

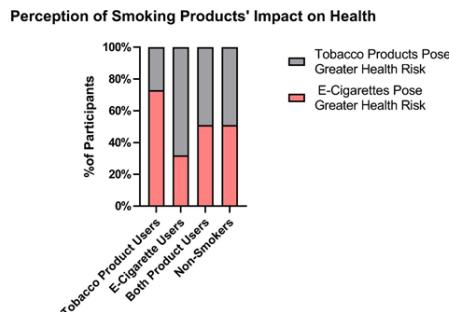


Figure 4 Misconceptions revealed as there are opposing perceptions of health risks associated with smoking tobacco products versus e-cigarettes across groups. Perceptions of health risks associated with tobacco products and e-cigarettes among four groups: Tobacco Product users, E-Cigarette users, Both Product users, and Non-Smokers.

Potential biases were analyzed, including the self-reported nature of smoking habits and awareness levels. While self-reporting can introduce bias, the large sample size and consistency across responses support the reliability of the findings. Further research may be necessary to explore these results in more diverse populations and settings.

Discussion

This study investigates the impact of a ban on flavored tobacco products and e-cigarettes, focusing on smoking cessation rates, continued use patterns, awareness of the ban, and perceptions of health risks associated with different smoking methods. The data suggests that while the ban on flavored tobacco products and e-cigarettes had some impact on smoking cessation, the overall effect was limited. The higher cessation rates among dual users, those who smoked tobacco and e-cigarettes, might indicate that individuals using multiple nicotine products are more flexible or responsive to changes in product availability. However, the majority of smokers continued using flavored products, signaling a strong preference or addiction that the ban alone could not overcome. Overall, only 13% of all smokers quit smoking following the implementation of the ban.

The findings of this study align with previous research that has documented the limited effectiveness of flavor bans in reducing overall smoking rates. A study analyzed the impact of flavor bans in several U.S. states and found that while such policies were associated with a slight decrease in youth vaping, they did not significantly reduce overall tobacco use or smoking among adults.¹³ Similarly, a longitudinal study conducted in Massachusetts, the first state to implement a comprehensive flavor ban, revealed that the ban had minimal impact on smoking cessation rates among adult smokers.¹⁴ These studies, consistent with our findings, suggest that flavor bans alone may be insufficient in driving substantial and sustained reductions in tobacco consumption. Our study contributes to this growing body of evidence by specifically examining the impact of California's flavor ban on individual smoking patterns and perceptions, highlighting the need for more comprehensive and targeted interventions to address the complex factors influencing tobacco use.

However, many research papers have identified opposing analyses of how the ban on flavored tobacco products and e-cigarettes impacted Californians. According to a research group at UC Irvine, “residents ... with a comprehensive sales ban have a 30% reduced odds of using flavored tobacco.”¹⁰ They believe that these policies have the potential to significantly reduce and even eliminate tobacco use as a leading cause of preventable death and disease globally. However, our data supports the opposite as 88.5% of surveyed smokers were able to purchase and consume flavored tobacco products, indicating that California residents were not impacted by the ban.

The paradox of individuals who agreed with the ban but continued smoking flavored products suggests a complex dynamic between personal beliefs, addiction, and behavior. This highlights the need for comprehensive strategies that go beyond regulatory measures, incorporating behavioral support, education, and accessible cessation resources. Notably, our data revealed that 66% of individuals who supported the ban continued to smoke flavored products, indicating that while they may have agreed with the policy in principle, overcoming addiction and changing deeply ingrained behaviors presented significant challenges. This underscores the importance of not only implementing regulatory measures but also ensuring that effective and accessible quitting programs and support services are available to those seeking to quit smoking.

Moreover, our findings revealed a striking divide in the perceptions of health risks associated with tobacco products and e-cigarettes among different smoking groups. Tobacco product users predominantly believed that e-cigarettes pose greater health risks, while e-cigarette users perceived tobacco products as more harmful. This polarization in beliefs emphasizes the need for evidence-based public health campaigns to address misconceptions and provide accurate information about the relative risks of different smoking methods.

Importantly, our study indicated that there was sufficient awareness of the ban, with 89% of smokers being aware of it prior to the survey. This suggests that lack of awareness was not a major contributing factor to the limited impact of the ban.

This study highlights the complexity of tobacco use and the necessity for diverse interventions beyond regulations. Although flavor bans are a positive step, their limited effect on smoking cessation indicates that such policies alone are not enough to drive significant behavior change. We encourage public health campaigns to target the youth, those under the age of 18 years old, in order to prevent addiction at an early age. Future studies should explore the synergistic effects of combining flavor bans with complementary interventions, such as targeted smoking cessation programs, public awareness campaigns, and support services tailored to specific demographic groups. Additionally, long-term studies tracking individual smoking behaviors over an extended period could provide valuable insights into the impacts of flavor bans and identify critical time points for intervention.

Furthermore, qualitative research exploring the underlying motivations, attitudes, and barriers faced by smokers could inform the development of more effective and culturally responsive smoking cessation strategies. By integrating these diverse approaches, policymakers and public health professionals can develop more comprehensive and evidence-based strategies to combat the ongoing public health challenge posed by addiction to smoking products.

Limitations

This study included various limitations. Firstly, there is a skewed age distribution of the participants, predominantly comprising young adults. This bias stems from the data collection methods, which heavily relied on disseminating the survey through college campuses and social media platforms. This may hinder the generalizability of the study. However, this age distribution may not be entirely problematic as adults aged 18–25 and 26–44 have the highest prevalence estimates for current smoking, at 24.6% and 27.3% in the U.S., respectively.¹⁵ Therefore, while the sample may be skewed towards younger adults, this group represents a significant portion of the smoking population, making the findings relevant to a critical demographic. Secondly, due to the observational and cross-sectional design of the survey, we cannot exclude the possibility that other factors influenced the findings. Future research employing stronger longitudinal methodologies will be essential to more conclusively link the effects to the policy changes. By extending the survey duration, future studies can allow for a greater influx of responses to facilitate an enhanced comparison between smokers and non-smokers. These studies should also be conducted in additional regions of California to examine how geographical location affects the use of flavored nicotine products and the perception of the ban. Finally, convenience sampling methods such as voluntary response sampling and snowball sampling were utilized to collect data. These methods can introduce biases and limit the generalizability of the study’s findings. Despite the inherent biases of convenience sampling, the diversity found within college campuses likely enhances the representativeness of the sample to some extent. Students and staff on these campuses may offer a broader spectrum of perspectives and behaviors compared to a more homogeneous setting.

Conclusion

In conclusion, the findings from this cross-sectional and observational study offer valuable insights into the impact of smoking cessation policies on public health. Understanding the nuances of policy effects can inform future state and federal initiatives, potentially paving the way for broader implementation across states to address smoking cessation and improve public health outcomes nationwide.

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None.

Conflicts of interest

The authors declare there are no conflicts of interest.

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