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# Public support for policies to regulate flavoured tobacco and e-cigarette products in rural California

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## ABSTRACT

**Introduction** Flavoured tobacco control policy exemptions and electronic cigarette products may contribute to increased youth access and tobacco use disparities.

**Methods** We assessed public support among California Central Valley residents for four policies to regulate flavoured tobacco products and e-cigarettes. The probability-based, multimode survey was conducted with English-speaking and Spanish-speaking registered voters (n=845) across 11 counties between 13 and 18 August 2020. Weighted logistic regression analyses measured odds of policy support, adjusting for predictor variables (attitudes and beliefs) and covariates.

**Results** The weighted sample was 50% female and predominantly Latino (30%) or non-Hispanic white (46%); 26% had a high school education or less, and 22% an annual household income <US\$30 000. Overall, 58% support a comprehensive flavoured tobacco product sales ban, and 59% support a flavoured e-cigarette product sales ban. In addition, 81% support limiting the amount of nicotine in e-cigarette pods, and 91% support mandating vaping health warning signs at local retailers. Flavour bans were more likely to be backed by women, seniors, Latinos, non-smokers and non-vapers. Participants who believe minors have more access to flavoured products had greater odds of supporting all policies. Those aware of the association between e-cigarettes and lung injury were more likely to support non-ban policies. Participants who believe e-cigarettes help to reduce tobacco use or e-cigarettes are relatively less addictive were less likely to support bans.

**Discussion** Findings add to mounting evidence of support for policies to regulate flavoured tobacco and e-cigarette products. Results on attitudes and beliefs elucidate how these factors influence support.

e-cigarette use was a notable public health concern,<sup>7</sup> with popular flavours like fruit, mint, menthol and candy/desserts.<sup>8</sup> While pandemic shelter-in-place orders disrupted youth access and reduced utilisation,<sup>9</sup> 11% of high school students reported current e-cigarette use in 2021 and 85.8% of those current users said they used flavoured e-cigarettes.<sup>10</sup> Vaping uptake (with or without characterising flavours) is also associated with smoking initiation among youth and emerging adults.<sup>11</sup>

Flavour exemptions, lack of e-cigarette product regulation and industry marketing may contribute to increased access and disparities in tobacco and e-cigarette product use in the USA. Policy interventions to curb access and use include flavoured tobacco product sales bans, which are growing in popularity with promising results in terms of their effectiveness at reducing product availability.<sup>12–16</sup> Comprehensive action by policymakers and public health practitioners can help address youth e-cigarette use and existing disparities in tobacco use.<sup>17</sup> While the overall population has experienced decreases in flavoured tobacco product use, a menthol ban is estimated to have large reductions in smoking prevalence<sup>18</sup> with considerable benefits for populations who disproportionately smoke menthol cigarettes like African-Americans.<sup>19</sup>

Limited research exists assessing public support for policies to regulate flavoured tobacco or e-cigarette products, particularly in rural regions. This study assesses support for policies to regulate tobacco and e-cigarette products (particularly flavoured products) using a public opinion survey conducted in August 2020 with registered voters in California's Central Valley. Prior work suggests attitudes and beliefs about government regulation (ie, safety concerns) may influence policy support.<sup>20</sup>

## INTRODUCTION

In 2020, the US Food and Drug Administration (FDA) issued an enforcement policy against unauthorised flavoured cartridge-based electronic cigarettes (e-cigarettes) with tobacco and menthol flavour exemptions.<sup>1</sup> In April 2021, the FDA proposed banning menthol, the last allowable combustible cigarette flavour.<sup>2</sup> Five states and hundreds of local jurisdictions have also banned characterising flavours for tobacco and/or e-cigarette products<sup>3</sup> to curb minors' access and use.

Flavoured tobacco and e-cigarette products are particularly enticing to youth<sup>4</sup> who report using them.<sup>5,6</sup> Prepandemic, 64% of minors who were current users reported using at least one flavoured tobacco product in the past 30 days<sup>5</sup> and youth

## METHODS

Data were obtained from a probability-based, multimode (telephone-landline, cellular phone; online) survey conducted with a representative sample of registered voters in California's Central Valley. Eligibility criteria included: adults (18 years or older) who spoke either English or Spanish and were registered to vote in one of 11 counties in the region.

The authors designed the instrument drawing on their survey expertise and using guidance and items from existing resources.<sup>21–24</sup> The instrument was reviewed and revised by coauthors and pilot tested with five Central Valley residents who provided feedback. The instrument is available in online supplemental material.



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Data collection was completed between 13 and 18 August 2020 by an opinion research company with 40 years of experience conducting policy-oriented surveys. If questions were not available in Spanish, they were translated by a native Spanish-speaking employee; the final version was reviewed and edited by another Spanish-speaking employee for accuracy. The margin of sampling error was estimated at  $\pm 3.5$  percentage points for a sample of 800 adults.

The company collected survey data in collaboration with two other companies to obtain voter registration data and complete interviews within the time frame. Quality assurance procedures included on-site supervisors to monitor and audit interviews as well as trained interviewers who collect data on a full-time basis. Telephone interviews were administered on landlines or cell-phones in the participant's preferred language.

In addition to survey data, the opinion research company included age and political party affiliation from the voter registration file.

### Outcome variables: policy support

Respondents were asked whether they strongly supported, somewhat supported, somewhat opposed or strongly opposed a policy to: (1) ban the sale of all flavoured tobacco products (including mint, menthol and fruit flavours); (2) ban the sale of all flavoured e-cigarette products; (3) mandate warning signs about the health risks of vaping be posted at all retailers where e-cigarettes are sold or (4) limit the maximum amount of nicotine in an e-cigarette pod. Responses consisted of Likert scales with four options, which were dichotomised to support or oppose categories.

### Predictor variables and covariates

Respondents were asked whether they strongly agreed, somewhat agreed, somewhat disagreed or strongly disagreed with six attitude and belief statements about: (1) youth access to flavoured tobacco products, (2) culpability of tobacco companies for smokers' health issues, (3) youth access to flavoured e-cigarette products, (4) e-cigarette use to reduce tobacco consumption, (5) relative addictiveness of e-cigarettes and (6) e-cigarette or vaping use-associated lung injury (EVALI). Responses were dichotomised to agree or disagree.

Statement 1 was included as a predictor variable to assess support for a flavoured tobacco ban and was not included in models to assess support for e-cigarette policies since it focuses on the availability of flavoured tobacco products. Statements 3–6 on e-cigarette products were not included as predictor variables to assess support for a flavoured tobacco ban.

Covariates were sociodemographic characteristics (age, sex, race/ethnicity, education, employment status, household size, income), smoking status, vaping status and political party affiliation. Smoking and vaping status were categorised as current (including trying to quit or smoked occasionally), former or never.

### Statistical analysis

We calculated descriptive statistics (unadjusted and weighted). Weighted logistic regression models were conducted to estimate adjusted ORs for public support for each policy. P values  $\leq 0.05$  were considered statistically significant. We completed data analyses in June and July 2021 using Stata.<sup>25</sup>

### RESULTS

The sample included 845 adults (400 phone, 445 online). Survey completion rate was 30.3% (1940 refused to participate).

Additionally, 614 respondents contacted by phone were ineligible because they spoke a language other than English or Spanish.

Weighted descriptive results indicate 50% were female and 34% were 30–49 years of age. Nearly a third identified as Hispanic/Latino and 46% white. Twenty-six per cent completed high school or less. The mean household size for participants was six, and 22% had an annual household income below US\$30 000. In terms of political party affiliation, 38% registered Democrat, 35% Republican and 22% Independent.

A majority never smoked or vaped—17% were smokers and 10% vaped. Nearly half believed minors had access to flavoured products. Thirty-six per cent did not believe tobacco companies were culpable for health issues, and 71% were aware of EVALI. Only 13% believed e-cigarettes were relatively less addictive.

Table 1 provides sample characteristics and outcomes. A majority supported each policy with comparable support to ban all flavoured tobacco product sales (58%) or all flavoured e-cigarette product sales (59%). Eighty-one per cent supported limiting e-cigarette pod nicotine amounts. Ninety-one per cent supported mandating vaping health warning signs at local retailers.

### Regression outcomes

Adjusted logistic regression models reveal women had significantly greater odds of supporting either flavour ban or a warning sign mandate. Participants aged 65+ years had significantly higher odds of supporting either flavour ban while those aged 30–49 or 65+ years were less likely to support a warning sign mandate compared with young adults. Hispanic/Latinos were more likely to support a flavoured e-cigarette sales ban compared with whites.

Respondents with a bachelor's degree+ were less likely to support a flavoured tobacco ban and those at the highest income level were less likely to support a flavoured e-cigarette ban compared with counterparts in the lowest category. The presence of additional household members increased flavour ban support.

Independents had increased odds of supporting e-cigarette nicotine limits compared with Republicans. Current smokers were less likely to support either ban and current vapers less likely to support a flavoured tobacco ban compared with never smokers/vapers.

Participants who believed minors had greater access had significantly higher odds of supporting all policies. Those who believed tobacco companies were culpable for health issues had greater odds of supporting most policies (except the warning sign mandate). Those aware of EVALI were more likely to support non-ban policies.

Those who believed e-cigarettes reduced tobacco consumption were less likely to support a flavoured e-cigarette sales ban or warning sign mandate. Those who believed e-cigarettes were less addictive were less likely to support a flavoured e-cigarette sales ban.

### DISCUSSION

This study assessing public support for tobacco and e-cigarette policies among adults in rural California found a majority support a comprehensive flavoured tobacco or e-cigarette product sales ban (including menthol) with higher levels of support for other policies to regulate e-cigarette products. Support for a flavoured tobacco ban (58%) in our study was higher than a 56% rate from a nationally representative online panel.<sup>26</sup> Support for a flavoured e-cigarette sales ban (59%) was lower compared with a 63% rate from an online panel,<sup>27</sup> but similar to a 57%

**Table 1** Respondent characteristics (n=845) and multivariable logistic regression model results for policy support

Variable	Total n=845 n (weighted %)	Ban sale of all flavoured tobacco products n=457 support, 58% OR (95% CI)	Ban sale of all flavoured e-cigarettes n=456 support, 59% OR (95% CI)	Mandate e-cigarette warning signs about health risks at retailers n=702 support, 91% OR (95% CI)	Limit maximum nicotine amount in e-cigarette pod n=571 support, 81% OR (95% CI)
Female	404 (50.1%)	<b>2.28*** (1.44 to 3.61)</b>	<b>2.05** (1.29 to 3.25)</b>	<b>2.30** (1.20 to 4.39)</b>	1.42 (0.80 to 2.54)
Age (years)					
18–29	118 (20.1%)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
30–49	232 (33.9%)	0.67 (0.32 to 1.40)	0.56 (0.27 to 1.18)	<b>0.26* (0.08 to 0.86)</b>	0.54 (0.23 to 1.17)
50–64	213 (23.0%)	1.65 (0.81 to 3.36)	1.98 (0.91 to 4.27)	0.46 (0.13 to 1.64)	1.20 (0.46 to 3.14)
65+	277 (22.4%)	<b>3.96*** (1.84 to 8.54)</b>	<b>4.04*** (1.79 to 9.12)</b>	<b>0.19** (0.05 to 0.72)</b>	0.93 (0.34 to 2.57)
Race/Ethnicity					
Asian or Pacific Islander	30 (5%)	1.12 (0.35 to 3.54)	1.20 (0.26 to 5.51)	1.55 (0.16 to 14.68)	1.43 (0.42 to 4.82)
Hispanic/Latino	192 (29.9%)	1.74 (0.96 to 3.15)	<b>1.96* (1.07 to 3.56)</b>	0.98 (0.43 to 2.23)	0.62 (0.30 to 1.29)
Non-Hispanic black/African-American	37 (3.1%)	1.49 (0.50 to 4.41)	0.64 (0.21 to 1.96)	0.63 (0.11 to 3.73)	0.42 (0.09 to 2.00)
Non-Hispanic white	455 (46.1%)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Other	78 (10.2%)	1.49 (0.73 to 3.04)	1.68 (0.79 to 3.58)	1.01 (0.34 to 2.95)	0.52 (0.22 to 1.22)
Education					
High school or less	194 (25.8%)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Some college	314 (37.9%)	0.67 (0.35 to 1.31)	1.12 (0.58 to 2.15)	1.89 (0.85 to 4.17)	1.56 (0.74 to 3.28)
Bachelor's degree+	320 (36.2%)	<b>0.48* (0.24 to 0.94)</b>	0.75 (0.38 to 1.49)	1.46 (0.62 to 3.46)	1.84 (0.82 to 4.12)
Employed	400 (51.5%)	0.95 (0.73 to 1.25)	1.00 (0.80 to 1.26)	1.23 (0.99 to 1.52)	0.87 (0.66 to 1.15)
Household size, mean (SD)	6.2 (1.89)	<b>0.81** (0.71 to 0.93)</b>	<b>0.77*** (0.66 to 0.88)</b>	0.82 (0.66 to 1.02)	0.92 (0.78 to 1.09)
Annual household income (US\$)					
≤30 000	127 (21.5%)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
30 001–50 000	128 (22.1%)	0.71 (0.33 to 1.50)	0.61 (0.27 to 1.36)	1.66 (0.65 to 4.24)	1.24 (0.49 to 3.13)
50 001–100 000	188 (29%)	0.77 (0.37 to 1.62)	0.49 (0.22 to 1.11)	<b>2.54* (1.03 to 6.25)</b>	1.18 (0.48 to 2.89)
≥100 001	180 (27.5%)	0.53 (0.25 to 1.09)	<b>0.37* (0.17 to 0.83)</b>	2.11 (0.84 to 5.27)	1.11 (0.43 to 2.90)
Political party					
Democrat	325 (38%)	1.37 (0.81 to 2.31)	1.09 (0.63 to 1.89)	1.60 (0.70 to 3.60)	1.56 (0.86 to 2.85)
Republican	338 (34%)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Independent	137 (21.5%)	1.20 (0.62 to 2.31)	0.84 (0.42 to 1.71)	1.32 (0.48 to 3.60)	<b>3.37** (1.34 to 8.44)</b>
Smoking status					
Current smoker	139 (16.8%)	<b>0.42** (0.22 to 0.81)</b>	<b>0.30*** (0.16 to 0.58)</b>	1.10 (0.46 to 2.52)	0.55 (0.27 to 1.13)
Former smoker	201 (21.5%)	1.15 (0.65 to 2.04)	1.29 (0.72 to 2.31)	1.39 (0.58 to 3.32)	0.84 (0.40 to 1.75)
Never smoker	497 (61.7%)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Vaping status					
Current vaper	73 (9.6%)	<b>0.26** (0.9 to 0.74)</b>	0.74 (0.34 to 1.60)	1.15 (0.34 to 3.88)	0.85 (0.45 to 1.62)
Former vaper	27 (3.2%)	1.00 (0.31 to 3.21)	1.36 (0.63 to 2.96)	3.39 (0.28 to 41.28)	1.18 (0.62 to 2.24)
Never vaper	736 (86.8%)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Attitudes or beliefs about tobacco and e-cigarette products (agree)					
It is easy for minors <21 years to buy flavoured tobacco products at local retailers	393 (46.3%)	<b>2.94*** (1.88 to 4.60)</b>	--	--	--
It is easy for minors <21 years to buy e-cigarettes at local retailers	415 (49.7%)	--	<b>2.31*** (1.44 to 3.70)</b>	<b>2.00* (1.03 to 3.89)</b>	<b>3.05*** (1.66 to 5.63)</b>
Tobacco companies should not be blamed for smoker's health problems	303 (35.7%)	<b>0.33*** (0.20 to 0.54)</b>	<b>0.40*** (0.24 to 0.66)</b>	0.50 (0.24 to 1.05)	<b>0.31*** (0.18 to 0.55)</b>
Using e-cigarettes can cause a vaping-related lung injury	586 (71%)	--	1.49 (0.88 to 2.53)	<b>2.10* (1.07 to 4.11)</b>	<b>2.38** (1.31 to 4.30)</b>
E-cigarettes help smokers reduce or quit using other tobacco products	234 (29.7%)	--	<b>0.38*** (0.22 to 0.64)</b>	<b>0.42** (0.22 to 0.82)</b>	0.52 (0.25 to 1.08)
E-cigarettes are not as addictive as cigarettes	104 (12.7%)	--	<b>0.46* (0.23 to 0.92)</b>	0.71 (0.31 to 1.61)	0.56 (0.25 to 1.09)

Counts may not add up to 100% due to refused or missing responses.

Any significant values are in bold.

\*P≤0.05; \*\*p≤0.01; \*\*\*p≤0.001.

ref, reference.

rate reported from a 2015 representative sample of California voters.<sup>28</sup>

Similar to comparable studies, we found smokers were less likely to support a flavour ban.<sup>26</sup> Unlike existing work,<sup>28</sup> we

found participants from high-income households were less likely to support a flavoured e-cigarette sales ban.

Our findings on the role of beliefs about minors' access to flavoured products and policy support adds to evidence that the

public favours restrictive e-cigarette policies to protect minors.<sup>20</sup> Future research should analyse differences in support between parents and adults without dependents since parents may have particularly high levels of support for tobacco and e-cigarette control.<sup>29</sup>

Our study is the first to report on support for policies to regulate e-cigarettes after the 2019 EVALI outbreak. We found EVALI awareness was associated with support for non-ban policies. While EVALI cases were believed to be due to additives like tetrahydrocannabinol (THC) or vitamin E acetate oil, studies with animal models suggest acute EVALI may occur without the use of THC, vitamin E acetate or nicotine.<sup>30</sup> Policymakers may also consider pursuing nicotine concentration limits, a policy supported by 81% of adults in our study, to reduce the addictiveness and harmful effects associated with nicotine exposure and e-cigarette use.<sup>31</sup>

Research is needed on the impacts of policies that exempt flavours or product types. Total e-cigarette sales declined following the FDA's 2020 policy, yet, menthol-flavoured e-cigarette sales increased,<sup>32</sup> signalling the importance of comprehensive policies. Further research is warranted on e-cigarette policies and smoking initiation and cessation, since there is some evidence that e-cigarettes with nicotine may increase cessation,<sup>33</sup> particularly among adults,<sup>11</sup> and on unintended policy consequences.<sup>17</sup> While San Francisco's flavoured tobacco product sales ban was associated with significant decreases in flavoured tobacco products and tobacco sales overall,<sup>34</sup> smoking appeared to increase among high school students compared with areas without a flavour ban.<sup>35</sup>

Study strengths include multimode sampling and administration, use of voter registration rolls and inclusion of Spanish-speaking participants. Probability sampling with hard-to-reach populations that may be more reluctant to participate due to social or economic conditions and who reside in a predominantly rural and agricultural region with higher levels of tobacco use disparities is another strength. The completion rate (30.3%) is on par with response rates of phone-based surveys in rural regions. A study comparing telephone and in-person survey administration with three tribes in rural American Indian communities found in-person administration yielded a higher response rate (68.8%) compared with the telephone survey (35.7%).<sup>36</sup> While we considered in-person sampling, it was not permitted due to COVID-19 restrictions. Future research is needed to improve survey data collection with rural populations with a focus on obtaining racially and ethnically balanced samples.<sup>37</sup>

Limitations include a focus on registered voters from California's San Joaquin Valley region who agreed to participate. Findings may not be generalisable to adults not registered to vote or those without listed contact information. Item phrasing may have influenced outcomes.<sup>26 27</sup>

Our results add to mounting evidence of public support for a comprehensive flavoured tobacco policy and policies to regulate e-cigarette products, particularly when concerned about minors' safety. While pandemic shelter-in-place orders disrupted youth access and reduced utilisation,<sup>38</sup> a return to in-person gatherings may lead to increases. Information about public support for policies to regulate tobacco and e-cigarette products can inform local, state and federal policymakers' efforts to reduce and prevent youth smoking and vaping and address tobacco use disparities.

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**Competing interests** None declared.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants but UC Merced Institutional Review Board exempted this study. A third party collected the data and we analysed the de-identified dataset.

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#### What this paper adds

- ⇒ Flavoured tobacco and e-cigarette products are attractive to youth and can promote disparities in tobacco use.
- ⇒ Limited research exists examining public support for a comprehensive flavoured tobacco product sales ban and policies to regulate electronic cigarette products, particularly in rural areas.
- ⇒ This study found that 58% of registered voters in California's Central Valley support a comprehensive flavoured tobacco product sales ban (including menthol), and 59% support a flavoured e-cigarette product sales ban.
- ⇒ High levels of support exist for policies to limit the quantity of nicotine in e-cigarettes (81%) or mandate posting vaping health warning signs at retailers (91%).
- ⇒ Participants who believe minors have more access to flavoured products had greater odds of supporting all four policies.



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