



# Monitoring E-Cigarette Trends in the United States

Urgent Action Needed to  
Protect Kids from Flavored  
E-Cigarettes



truth initiative



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## Acknowledgements

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC Foundation.

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# Executive Summary

Since the epidemic of youth vaping began in 2018, the e-cigarette market in the United States has changed dramatically. Products are both cheaper and stronger. Flavored products commonly used among youth continue to drive sales, defying regulations intended to curb youth use. Despite 2020 federal flavor restrictions, e-cigarette makers exploited a product loophole and continued to sell flavored products in disposable devices, which subsequently increased in use among young people. Over the period 2019-2023, e-cigarette sales increased 47.0%. While current federal efforts to regulate the marketplace of e-cigarettes have been slow to evolve, and regulation of menthol cigarettes and flavored little cigars have stalled, individual states have developed their own flavor restrictions to great effect.

This report examined sales data on e-cigarettes sold at traditional retail outlets from January 2019 through December 2023. It also examined state flavor policies in Massachusetts, California and New York as case studies that highlight the successes and challenges of these state laws.

The findings are clear: national e-cigarette sales remain high; the tobacco industry continues to develop new products and exploit a lack of comprehensive flavor restrictions; and states are leading the way in successfully reducing e-cigarette sales and subsequent youth use.

Specifically, the report finds that between 2019 and 2023:

- **E-cigarette sales increased:** E-cigarette sales surged nationwide, increasing 47.0% from 210.5 million units to 309.4 million units.<sup>i</sup>
- **Disposables took over the e-cigarette market:** Sales of disposable e-cigarettes

increased 541.3% and comprise 57.8% of the e-cigarette market. Disposable e-cigarettes have been the most commonly sold device type among youth since 2022.<sup>1</sup>

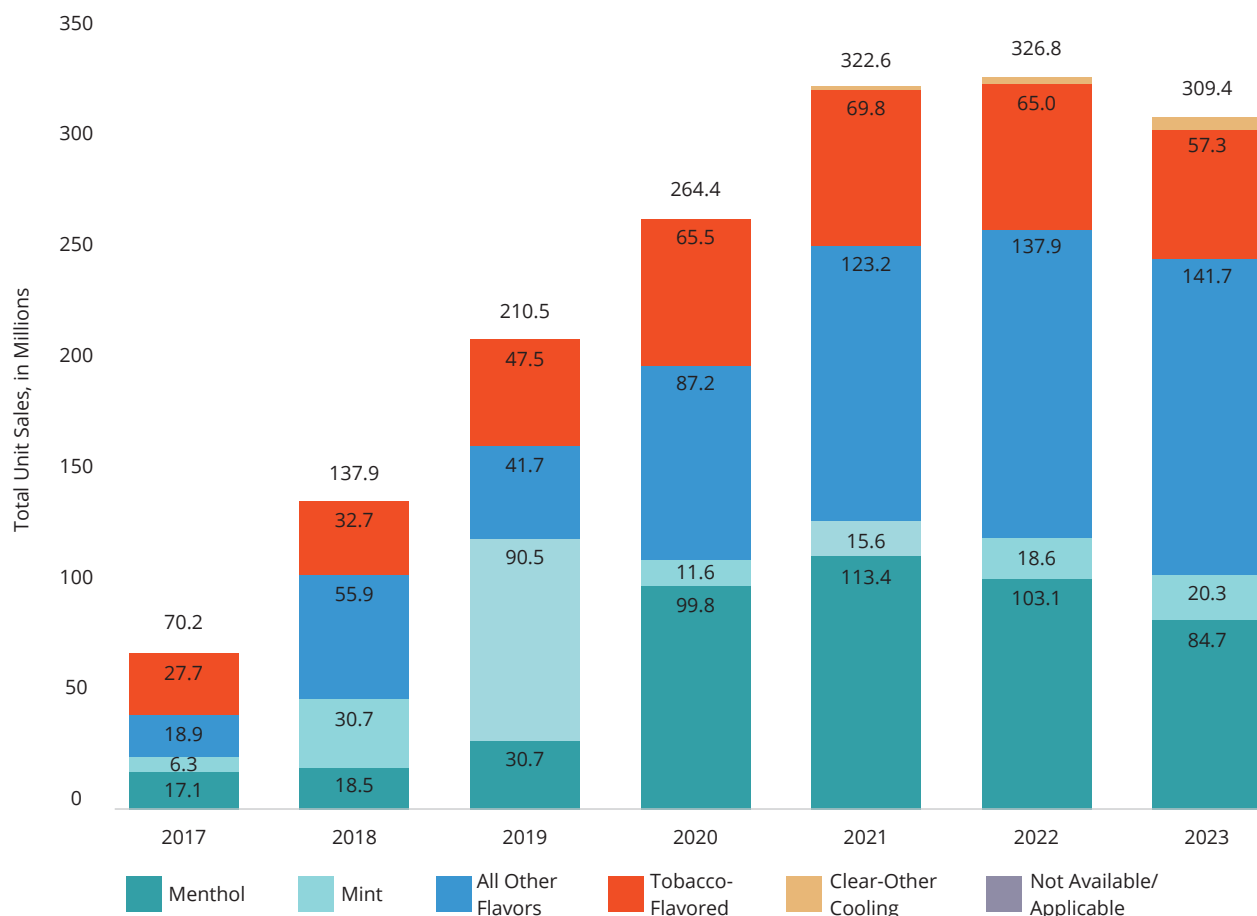
- **Flavors surged:** E-cigarettes in non-tobacco flavors like fruit, candy, mint, menthol and desserts made up 80.6% of all e-cigarette sales in 2023.<sup>1</sup>
- **Nicotine content increased:** Sales of high nicotine content e-cigarettes increased. Disposable e-cigarettes have nicotine levels similar to several cartons of cigarettes, with average nicotine strength increasing 294% in the span of five years.<sup>2</sup>
- **Menthol and cooling flavors increased:** Sales of menthol-flavored e-cigarettes rose 175.8% for all e-cigarettes and 207.4% for menthol-flavored prefilled cartridges not covered by the 2020 flavor policy. Sales of e-cigarettes with “clear” or other cooling flavor names increased 872.1% between 2020 to 2023.<sup>1</sup>
- **State flavor policies can be effective:** Statewide policies restricting flavored e-cigarette sales can reduce flavored e-cigarette sales. Massachusetts’ comprehensive statewide policy on flavored tobacco products reduced flavored e-cigarette sales by 98.2% and led to significant statewide decreases in youth access to and use of flavored tobacco products. Flavored e-cigarette sales decreased by 67.7% a year after California’s statewide flavored tobacco policy went into effect and 79.1% following implementation of New York’s statewide flavor tobacco policy in May 2020.

<sup>i</sup> Throughout this report, a unit is equal to five prefilled cartridges, one disposable device or one bottle of e-liquid.

These findings make clear that flavor restrictions that remove all flavored e-cigarettes from the market and do not contain exploitable loopholes, combined with appropriate enforcement, can effectively reduce e-cigarette sales.

Lessons learned from effective state and local policies can help inform the field and encourage continued adoption of impactful public health policies.

**Figure 1. National E-Cigarette Unit Sales by Flavor, Annual Estimates 2017-2023**



E-cigarette sales increased 47% from 2019 to 2023. In 2023, disposable e-cigarettes were the most commonly sold e-cigarette products, comprising approximately 60% of all e-cigarette sales. Flavors like fruit, candy, desserts, mint and menthol made up almost 80% of all e-cigarette sales in 2023.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; All Other Flavors category includes fruit, clove/spice, chocolate, alcoholic drink (such as wine, cognac, or other cocktails), candy/desserts/other sweets, some other flavor; Clear/Other Cooling include products with flavor names such as "clear", "clear ice", or unflavored, which likely contain non-menthol synthetic cooling agents (e.g., Flum Pebble Clear, EB Design BC5000 Clear); e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device or one e-liquid bottle.

## Forewords



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### **Rachel Boykan, MD, FAAP**

*Chair, American Academy of Pediatrics Section on  
Nicotine and Tobacco Prevention and Treatment*

Youth e-cigarette use continues to be a critical public health issue in our country. Pediatricians have long been sounding the alarm on e-cigarettes and the harm they pose to children's health.

E-cigarettes are addictive and they are dangerous for children. We must do all we can to keep them out of their hands. According to the National Youth Tobacco Survey, 1.63 million middle and high school aged youth currently use e-cigarettes. While this number is down from its peak a few years ago, it is still a shockingly and unacceptably high number. What's more, over a quarter of youth e-cigarette users use them every single day – which indicates that these products are both attractive to children and incredibly addictive.

One of the primary reasons children are attracted to e-cigarettes are the flavors – particularly sweet fruit, candy and mint (including menthol).

The flavors smell and taste good and they mask the harshness of e-cigarettes. This makes repeated use more likely, and – combined with the high nicotine content of today's products – thereby increases the likelihood of developing nicotine addiction.

Pediatricians see all too frequently how nicotine addiction can quickly take hold in teenage patients who vape e-cigarettes. The brain is more susceptible to nicotine addiction during adolescence. Indeed, symptoms of dependence can appear within days to weeks of a teen's first experimentation with e-cigarette use. When the brain does not get the nicotine it craves, teens experience unpleasant withdrawal symptoms such as irritability and anxiety, which leads to continued use. With repeated exposure, tolerance develops quickly, and the user requires more nicotine to just feel normal.

For many young people, this becomes not just sporadic use, but consistent, frequent and dependent use. Teens may wake in the middle of the night to vape – a sign of intense nicotine dependence. Unfortunately, the trusted adults they usually rely on – parents, teachers and pediatricians – have limited options to assist in quitting.

Furthermore, nicotine can have lasting damaging effects on adolescent brain development and nicotine exposure among youth is linked to reduced impulse control, increased risk of attention-deficit/hyperactivity disorder and increased risk for anxiety and depression.

The most effective way to stop youth e-cigarette use is to get flavored tobacco products off the market. As demonstrated in this report, e-cigarette use in children is a solvable problem with solutions that work. Urgent action is needed to remove all flavored e-cigarettes from the market. Doing so will make a significant difference in curbing youth e-cigarette use and prevent potential lifelong nicotine addiction.



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**Kate King, DNP, MS, RN, LSN**  
*President*  
*National Association of School Nurses*

Since e-cigarettes and vaping exploded amongst teens in schools in 2018, school nurses have been a first line of defense against this epidemic. School nurses have watched with alarm as their students became addicted to nicotine and they have dealt with the physical symptoms of nicotine use. School nurses have watched as e-cigarette companies concealed vapes as USB drives and pens and disguised the nicotine with sweet flavors such as bubble gum, fruit flavors and menthol flavors to hook our youth on these dangerous products.

When limited federal flavor restrictions came into effect in 2020 for e-cigarettes, manufacturers exploited loopholes and continued to market these products to adolescents.

Specifically, e-cigarettes with menthol and other cooling flavors increased exponentially as other flavors exited the market due to regulations. Disposable e-cigarettes have also overtaken the vape market. While the federal government has been slow to act, states and local governments have been driving action to prohibit flavored e-cigarettes and these efforts have begun to reverse this vaping epidemic. Now we need the federal government to catch up with states and localities. We need federal action to eliminate all flavored products from the marketplace. Further, we need strong enforcement of federal, state and local policies against illegal and unauthorized products.

We must stem the tide against vape and e-cigarette products that have caused our youth and teenagers to become addicted to nicotine. After years of declining nicotine use by youth, use of e-cigarettes has dramatically escalated, and we must prevent youth e-cigarette use and nicotine addiction. We owe it to our children and youth to take decisive action.



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**Yolanda Lawson, M.D., F.A.C.O.G.**  
*124th President, National Medical Association*

Few public health issues have sparked as much concern and debate as the rising use of e-cigarettes, particularly among our youth. The rapid proliferation of these devices, often mistakenly viewed as a risk-free alternative to traditional smoking, has outpaced our understanding of their long-term effects and their impact on public health.

It is within this context that this report seeks to illuminate the current state of e-cigarette use, sales data, flavor policies and policy recommendations.

The National Medical Association, as the leading voice for justice and parity in the healthcare community, has a profound responsibility to address emerging health threats and advocate for policies that protect the well-being of all individuals, especially minority youth. This report offers an in-depth analysis of e-cigarette sales and how state policies can help to reduce e-cigarette use among youth.

It also reflects the CDC Foundation and Truth Initiative's commitment to provide evidence-based recommendations that aim to curb the rising tide of e-cigarette use and mitigate its potential harms on health.

Youth are particularly vulnerable to the allure of e-cigarettes due to aggressive marketing tactics, appealing flavors and the misconception that these products are harmless. However, the growing body of evidence points to significant health risks, including nicotine addiction, respiratory issues and the potential for long-term cognitive and developmental consequences. The recent authorization of some menthol flavored e-cigarette products could further compound these health threats. Black youth experience health disparities disproportionately than their White counterparts. Black youth, for example, are nearly twice as likely to have asthma compared to their White peers.

These health disparities have a long-lasting effect on the persistence of health inequities. These findings necessitate a proactive and informed response from all stakeholders involved in youth health and education.

This report is not only a call to action but also a resource for policymakers, healthcare providers, educators and parents. It aims to equip them with the knowledge and tools needed to effectively combat the rise of e-cigarette use among youth and to implement state-based policies strategies.

We hope that this report will serve as a catalyst for meaningful dialogue and concerted efforts to safeguard the health of our youth. The National Medical Association stands ready to support and collaborate with all who are dedicated to this crucial cause. Together, we hope to foster a future where our young people are free from the dangers of e-cigarettes and empowered to make informed decisions that enhance their health and well-being.



# Introduction

## E-Cigarettes Entered the U.S. Market in 2007 and Rose to Prominence Among Young People Around a Decade Later

Their rise was no accident. The tobacco industry, including e-cigarette companies, employed a number of tactics to appeal to kids, such as colorful packaging and youth-appealing flavors, changes in product design that delivered nicotine more efficiently at higher levels and targeted advertising campaigns by market leader JUUL and others. Youth use is concerning because of the known risks of youth exposure to nicotine, which is harmful to developing brains. Nicotine use during adolescence can disrupt the formation of brain circuits that control attention, learning and susceptibility to addiction.<sup>3,4</sup>



Flavored e-cigarettes account for

**80.6%**

of total e-cigarette sales in December 2023

By 2019, more than one in four (27.5%) high school students reported currently using e-cigarettes.<sup>5</sup> Since then, the e-cigarette market – driven by a constantly changing landscape of e-cigarette manufacturers – has offered new youth-appealing designs, flavors and escalating levels of nicotine.<sup>2</sup>



U.S. annual e-cigarette sales increased

**47.0%** between 2019 and 2023,


from 210.5 million units to 309.4 million units

Unsurprisingly, e-cigarette sales soared as a result, increasing by 47.0% between 2019 to 2023.<sup>6</sup> The overwhelming growth was fueled by flavored e-cigarettes, which accounted for the large majority (80.6%) of total e-cigarette sales in December 2023.<sup>1</sup>

Single use, cheap disposable e-cigarettes that came in youth appealing flavors and high nicotine levels also played a role in growing e-cigarette use.

# Youth E-Cigarette Use Remains a Serious Public Health Concern

E-cigarettes have been the most commonly used tobacco product among youth since 2014. Fueled by the popularity of the brand JUUL, youth e-cigarette past 30-day use surged by 135.0% from 2017 to 2019 (from 11.7% to 27.5%).<sup>5,8</sup> The rapid rise in youth e-cigarette use led the U.S. Surgeon General to declare youth e-cigarette use an epidemic in 2018.<sup>9</sup>

 **1.63 million** youth reported currently using e-cigarettes in 2024

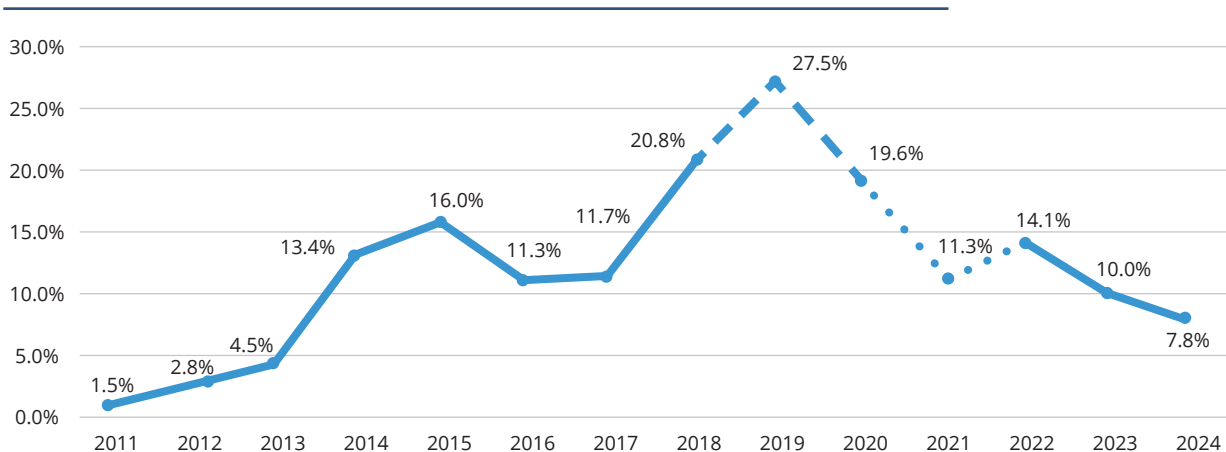
## A Note on Data:

Unless otherwise cited, estimates presented in this report are based on CDC Foundation analysis of Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Data are market-level representative for covered brick-and-mortar retailers (e.g., food and grocery stores, drug stores/pharmacies, convenience stores, mass merchandisers, club stores, dollar stores and military stores/exchanges). Data do not include and are not representative of online sales or sales from tobacco or vape specialty stores.

According to Circana, new e-cigarette product coding is managed to consistently meet or exceed releasing products that cover a minimum of 95.5% of total e-cigarette dollar sales at any given time. Coding and releasing of new products are prioritized based on significance of dollar sales to continually comply with capturing at least 95.5% of total e-cigarette dollar sales in each period.

More information on methods and frequently asked questions are available on the CDC Foundation *Monitoring Tobacco Product Use* website (<https://tobaccomonitoring.org/program-overview/>).

Figure 2. Current E-Cigarette Use Among High School Students, NYTS, 2011-2024



E-cigarettes have been the most used tobacco product by middle and high school students since 2014. In 2019, 27.5% of youth reported current use of e-cigarettes. In 2024, 1.63 million youth reported current use of e-cigarettes.

Note: Different types of lines (solid, dashed, dotted) represent changes in survey mode and administration. The 2020 NYTS was fielded between January 16 and March 16, 2020. However, all analyses were limited to the period between February 6 and March 16, 2020, following the implementation of the FDA's flavor enforcement regulations. 2021 NYTS results cannot be directly compared with results from previous years that were primarily conducted in-person on school campuses. Comparisons between the 2022 NYTS and prior years are limited due to changes in methodology (administration, data collection procedures). Differences observed in prevalence estimates for these years may be due to change in behavior, changes in methodology or both – it is not possible to attribute any differences in these years to behavior change alone.<sup>13</sup>

According to data from the *Monitoring the Future* survey, 2018 saw the largest one-year increase in nicotine vaping among 10th and 12th grade students – the largest increase in any substance use among this population in 44 years of tracking this data.<sup>10</sup>

While youth e-cigarette use has declined since its peak in 2019, it remains too high and risks addicting another generation to nicotine.

In 2024, the National Youth Tobacco Survey showed 1.6 million youth reported using e-cigarettes in the past 30 days, including 7.8% of high school students and 3.5% of middle school students.<sup>13</sup> Over the last several years, the dramatic increase in sales of menthol e-cigarettes and disposable e-cigarettes suggest that youth-appealing options expanded.<sup>2,12</sup>

## Young People Show Signs of Nicotine Addiction

Many young people are not experimenting with e-cigarettes but are instead using e-cigarettes frequently. In 2024, 42.1% of high school e-cigarette current users reported using e-cigarettes frequently (on 20 or more days per month), including 29.7% who reported using e-cigarettes daily.<sup>13</sup>



Disposable e-cigarettes today can have nicotine levels **equivalent to several cartons** of cigarettes

Nicotine can harm developing brains and its use during adolescence can disrupt the formation of brain circuits that control attention, learning and susceptibility to addiction to other substances, including alcohol, cocaine and opioids.<sup>3,4</sup> Frequent and daily e-cigarette use among youth present particular concern because e-cigarette products that are most commonly used today deliver increasingly high levels of nicotine.

Today, disposable e-cigarettes have nicotine levels similar to several cartons of cigarettes, with average nicotine strength increasing 294% in the span of five years, while price drops have nearly tripled the purchasing power for youth.<sup>2</sup> Despite frequent use, many young people want to quit e-cigarettes. According to a December 2023 Truth Initiative survey of 15-to-24-year-olds, 79.0% of past 30-day users reported quitting or intentions to quit at some point.<sup>14</sup> Past research and previous surveys have found similar levels of interest in quitting.<sup>15,16</sup>





## Flavors Continue to Dominate Sales and Entice Young E-Cigarette Users

Flavors are a top reason why young people begin and continue using e-cigarettes. In 2024, 87.6% of current youth e-cigarette users reported using flavored e-cigarettes, with fruit, candy and mint ranked as the most used flavors.<sup>13</sup>

In 2014, eight out of 10 current youth e-cigarette users said they use e-cigarettes “because they come in flavors I like.”<sup>17</sup>

Today’s e-cigarettes come in a dizzying array of flavors, from fruit, candy, desserts and chocolate to energy drinks, clove, spice and alcoholic drinks. Flavors with candy-like names and tastes naturally appeal to young people and research shows that youth perceive fruit flavors to be less harmful.<sup>19</sup> Given the appeal and variety of flavors available, it is no surprise the majority of e-cigarette sales in 2023 were of flavored e-cigarettes.

As of May 2024, concept flavors with ambiguous names like “marigold,” “artic” or “solar,”<sup>20</sup> as well as “clear” flavors that have recently crept into the market appear to be designed to evade flavor policies restricting the sale of flavored products. While naming conventions are constantly evolving, manufacturers typically use ambiguous names to elude flavor restrictions.<sup>21</sup>

## Disposables Corner Market on Flavors

The e-cigarette market has increased dramatically with flavored, disposable products in recent years, primarily in response to federal regulation limiting specific types of flavors in certain devices. In January 2020, the U.S. Food and Drug Administration (FDA) issued an enforcement policy implemented in February 2020 that effectively prohibited all flavors except menthol in prefilled cartridges (e.g., JUUL), but did not restrict flavors in other products, such as refillable cartridges for open systems or disposable products.<sup>22</sup> As a result, flavored disposable e-cigarettes and menthol-flavored prefilled devices increased in sales<sup>2</sup> as well as in use among young people. Potentially flavored products with ambiguous names and products labeled as “clear” or “ice” also emerged after the policy went into effect.<sup>1</sup>



# 8 out of 10

current youth e-cigarette users say they use e-cigarettes “because they come in flavors I like”

Disposable e-cigarettes are cheap, high in nicotine content and come in flavors enticing to youth. According to the 2024 National Youth Tobacco Survey, the most commonly used e-cigarette device types were disposable e-cigarettes (55.6%), prefilled or refillable pods or cartridges (15.6%) and tanks or mod systems (7.0%).<sup>13</sup> The most commonly used brands among youth were Elf Bar, Breeze, Mr. Fog, Vuse and Juul.<sup>13</sup>

## Federal E-Cigarette Regulation Leaves Many E-Cigarettes Widely Available

The FDA's February 2020 enforcement policy prioritized enforcement of existing regulations against prefilled e-cigarette cartridges in flavors other than tobacco and menthol. Since the February 2020 enforcement policy, attempts to curb youth e-cigarette use through federal regulation are ongoing. The FDA began issuing marketing denial orders for certain flavored e-cigarette products in September 2021 (see "E-Cigarette Regulation" on [page 17](#)).

The FDA has denied permission to market many non-tobacco and non-menthol flavored e-cigarette products; however, many of those denials are currently under judicial or supervisory review. In recent years, the FDA has increased enforcement efforts around e-cigarette manufacturers and retailers for continuing to sell youth-appealing e-cigarettes. These actions include issuing warning letters, fines, injunctions and joint operations with other federal officials to seize imports of unauthorized e-cigarette products.<sup>23</sup> However, illegally marketed flavored e-cigarettes remain widely available, continuing to put youth at risk. Over 2.1 million youth in 8th through 12th grade have initiated vaping since 2021.<sup>24</sup>

## State and Local Restrictions Are Key in Curbing the Sale of Flavored E-Cigarettes

A growing number of states, cities, localities and tribes have taken action over the past few years to address high rates of youth e-cigarette use by enacting their own laws to prohibit or strictly limit the sale of flavored e-cigarettes.

As of December 31, 2023, seven states (California, Maryland, Massachusetts, New Jersey, New York, Rhode Island and Utah) restrict flavored tobacco product sales, including restrictions on the sale of flavored e-cigarettes.<sup>25</sup> Policies range in scope and comprehensiveness:

- Massachusetts covers all tobacco products and all flavors. California does the same, with exceptions for loose leaf pipe tobacco, premium cigars and flavored hookah in certain retailers.
- New York, New Jersey and Rhode Island restrict the sale of all flavored e-cigarettes.
- Maryland and Utah restrict the sale of certain flavored e-cigarette products but allow for exemptions for certain flavors and retail locations.



Massachusetts' comprehensive statewide policy decreased flavored e-cigarette sales by

# 98.2%

and led to an 86.2% decline in overall e-cigarette sales between 2019 and 2023



# 28.5%

of the U.S. population  
is covered by a flavored  
tobacco sales restriction

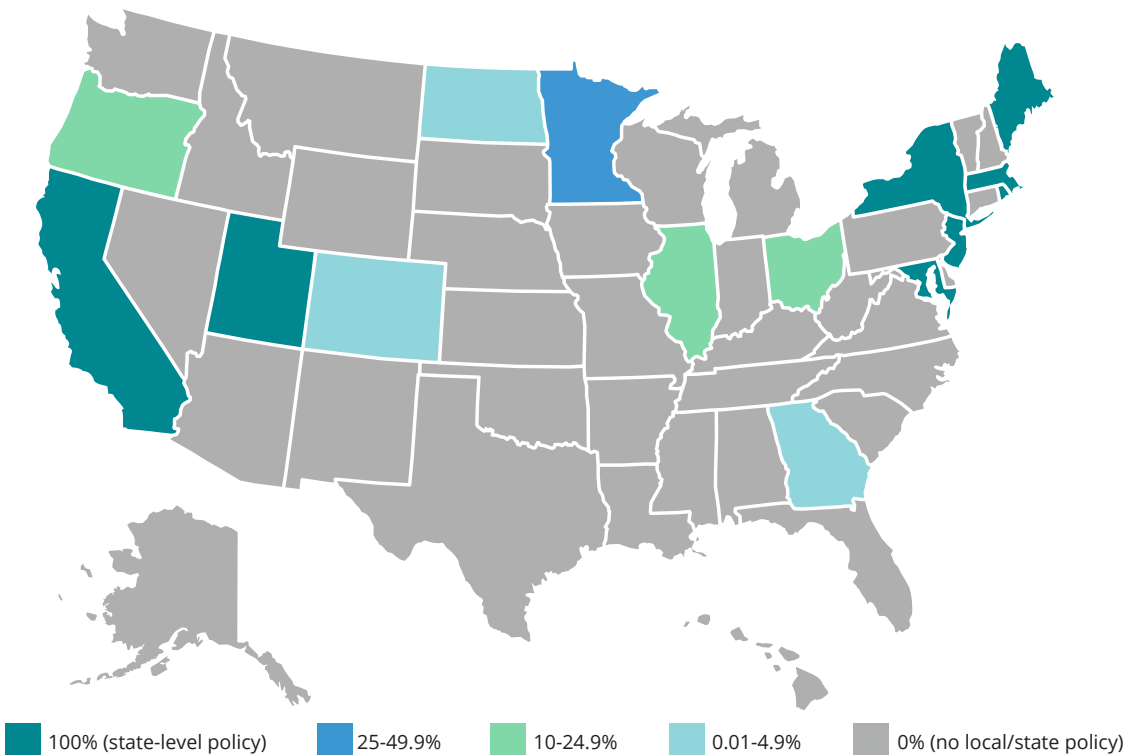
In addition, 395 counties, cities, towns and tribes have restricted the sale of flavored tobacco products, including e-cigarettes. In total, 28.5% of the U.S. population is covered by a flavored tobacco restriction, although these policies vary by products that are restricted and some allow for retailer exemptions.<sup>25</sup>

The growing arsenal of state and local policies have been an effective tool for public health. Retail data from these states show that strong state policies can effectively drive down e-cigarette sales and youth access.

Massachusetts' comprehensive statewide policy nearly eliminated flavored e-cigarette sales – which decreased by 98.2% – and led to an 86.2% decline in overall e-cigarette sales between 2019 and 2023.<sup>1</sup> A year after California's law went into effect, flavored e-cigarette sales decreased by 67.7%.<sup>26</sup>

State experiences show that strong enforcement of flavored e-cigarette policies is critical to driving e-cigarette sales down. The drastic declines in e-cigarette sales in Massachusetts can be credited to a range of enforcement efforts, including educational materials, retailer trainings, dedicated funding, fines for violations, a named enforcement agency, a permitting system and regular inspections. California's reduction in flavored e-cigarette sales, while impressive, may have been dampened by the lack of dedicated funding for enforcement and not having a dedicated enforcement agency from the outset of the policy.

Figure 3. State and Local Restrictions Map, as of June 30, 2024



This map indicates the percentage of the state population covered by any type of flavored tobacco sales restriction. Flavored tobacco sales restrictions range in comprehensiveness based on whether all flavors, products and retailers are restricted, or if there are exemptions in any of these categories.

Source: Local restrictions on flavored tobacco and e-cigarette products. [Internet]. Truth Initiative; 2024. Available from: <https://truthinitiative.org/research-resources/emerging-tobacco-products/local-restrictions-flavored-tobacco-and-e-cigarette>

# National and State Retail Data Inform Policy

This report uses retail sales data on e-cigarettes sold from January 2019 through December 2023 at traditional retail outlets (not including vape shops or online sales) to show the shifting patterns in product sales. While retail sales data do not include sales from independently owned vape shops and online retailers, this information does provide a snapshot of the in-person e-cigarette market in real time that can inform policy.

Trends in sales data around several critical points in federal regulatory policy, such as the FDA's enforcement policy on flavored e-cigarettes in February 2020, reveal the negative repercussions of incomplete regulation and the dramatic increase in flavored disposable products as well as sales of menthol-flavored prefilled e-cigarettes.<sup>2</sup>

This report also details how three states responded to rising e-cigarette use among youth by enacting state-level restrictions and the resulting downward trend in flavored e-cigarette sales. Taken together, these findings provide compelling support for the speedy removal of all flavored e-cigarettes to protect public health.



# E-Cigarette Sales Skyrocket

## The Story of E-Cigarettes in Recent Years Features a Constantly Changing Landscape of Widely Available Products

Different types and brands dominated depending on trends as well as the regulatory environment. Retail sales data show e-cigarette sales grew by 47.0% – from 210.5 million units to 309.4 million units – between 2019 and 2023. JUUL, which emerged in 2017 and was the leader, comprises around one-quarter of the market in sales today and continues to decline. The top ten brands between September 2023 through December 2023 were Vuse, JUUL, Breeze Smoke, Elfbar, NJOY, HQD, Lost Vape Orion, Juicy Bar, Loon Maxx and Mr. Fog, in descending order of dollar sales (Circana Syndicated Category: Electronic Smoking Devices). The top five brands and top ten brands accounted for 67.2% and 76.4% of total dollar sales, respectively.<sup>1</sup>

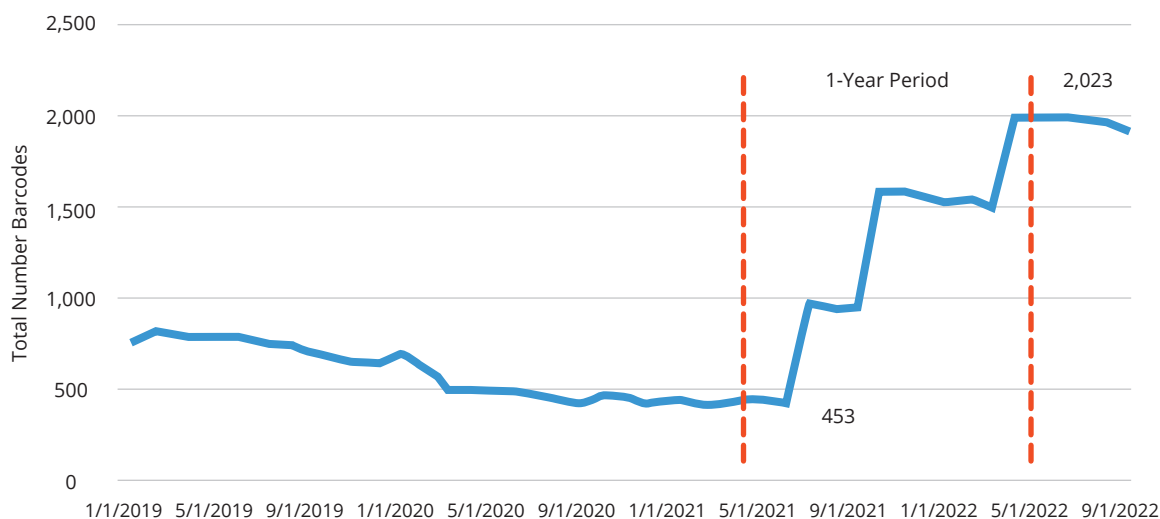
The FDA has only authorized 34 e-cigarette products in tobacco flavor and menthol flavors to date – four of which are disposable.<sup>11</sup> As of March 2024, authorized e-cigarettes comprised approximately 13.7% of dollar sales.<sup>iv,v</sup>

However, the number and variety of available e-cigarette brands continue to climb as companies launch new products, almost all of which are flavored, without authorization.<sup>27</sup> The number of unique e-cigarette products (as measured in new barcodes with sales data) available for sale in U.S. stores more than quadrupled from 453 to 2,023 between 2021 and 2022, according to a Truth Initiative review of NielsenIQ<sup>v</sup> U.S. retail sales data.<sup>28</sup> During the six month period ending on December 31, 2023, the total number of e-cigarette products sold in the United States reached 6,323 products; of which 94.0% were disposable e-cigarettes.

iv. NielsenIQ xAOC including Convenience Stores. Data compiled by Truth Initiative Schroeder Institute.

v. The conclusions drawn from the Nielsen data are those of the researcher(s) and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported.

Figure 4. Total Count of Unique E-Cigarette Barcodes with Recorded Sales Dollars



Between 2021 and 2022, there was a more than fourfold increase in the number of unique e-cigarette products available for sale in U.S. stores, with the number of new barcodes with sales data growing from 453 to 2,023.



## ***E-Cigarette Regulation***

E-cigarettes have been allowed to stay on the market for years without undergoing a full review of their public health impact, sparking increases in youth use. The FDA has received premarket tobacco applications (PMTAs) for nearly 27 million e-cigarette products and has resolved more than 26 million of these applications. To date, the FDA has denied permission to market flavored and menthol e-cigarette products such as Vuse Solo, Vuse Vibe, Vuse Ciro and Vuse Alto.

The FDA has denied permission to market many non-tobacco and non-menthol flavored e-cigarette products; however, many of those denials are currently under judicial or supervisory review. In recent years, the FDA has increased enforcement efforts around e-cigarette manufacturers and retailers for continuing to sell youth-appealing e-cigarettes.

These actions include issuing warning letters, fines, injunctions and joint operations with other federal officials to seize imports of unauthorized e-cigarette products.<sup>23,29</sup>

In June 2024, the U.S. Department of Justice (DOJ) and the U.S. Food and Drug Administration (FDA) announced the creation of a federal multi-agency task force to combat the illegal distribution and sale of e-cigarettes.

Some state and local authorities have restricted the sale of flavored tobacco products, including e-cigarettes. Monthly e-cigarette sales trends mirror annual e-cigarette sales trends, increasing 62.9% from 13.7 million units sold in February 2019 to 22.3 million units sold in December 2023. The increase in e-cigarette sales has primarily been driven by sales of disposable e-cigarettes in fruit and sweet flavors. Monthly unit e-cigarette sales peaked in March 2022 at 26.4 million units. However, it is important to note that units of e-cigarettes are not adjusted to account for variations in milliliter unit size. Because large-format disposable e-cigarettes that allow for thousands of “puffs” are now available, declines in unit sales may not necessarily mean that prevalence of use or consumption has declined as well. (See “Capturing Growing Nicotine Content in an Evolving E-Cigarette Market” on **page 18**).

# ***Capturing Growing Nicotine Content in an Evolving E-Cigarette Market***

While national surveys and population-level data are necessary to assess e-cigarette use and trends, retail sales data provide critical information in near real time about the e-cigarette market, including for new and emerging products.<sup>30</sup> Retail sales data are available weekly, monthly or quarterly – more frequently than other surveillance systems, which are often annual and lag in their reporting. Research shows that retail and rapid surveillance data can be used complementarily in characterizing the top e-cigarette brands currently on the market.<sup>31</sup>

This report uses retail sales data to highlight changes in the e-cigarette market over the past four years, including significant increases in both e-liquid volume and nicotine strength. Increases in the capacity of e-cigarette products translate to a significant increase in nicotine content.<sup>2</sup> For example, JUUL pods most popular with young people in 2017 contained less than 1 mL of e-liquid at 5% nicotine strength. A disposable e-cigarette device sold today – such as ElfBar – can contain up to 13 mL at the same 5% nicotine strength.

It is important to note that this growth in nicotine content is not captured in the way retail sales data has been historically measured.

Most surveillance and studies to date – including the retail data used in this report – estimate the e-cigarette market size using standardized units to represent the most common package size for each product type, with standardized units equal to five pods/prefilled cartridges, one disposable device or one e-liquid bottle. Sales data in this report indicate that unit e-cigarette sales have decreased slightly in recent years.

However, given that today's e-cigarettes – especially disposable e-cigarettes – are bigger and stronger than before and that this nuance isn't captured by the standard unit, the decrease in e-cigarette unit sales may not represent a real decrease in prevalence of e-cigarette use or consumption.

While this standardized unit of measurement was effective during the early years of e-cigarette sales, a new standard unit of analysis that incorporates e-liquid volume and nicotine strength may better capture important details of e-cigarette capacity, strength and size. This shift will help ensure sales data better reflect the dynamic landscape of the e-cigarette market, provide a more precise measure of total e-cigarette nicotine sales in the United States and allow for more accurate comparisons between products, akin to cigarette sticks or standardized packs of cigarettes.<sup>2</sup>

# Disposable E-Cigarettes Flood the Market



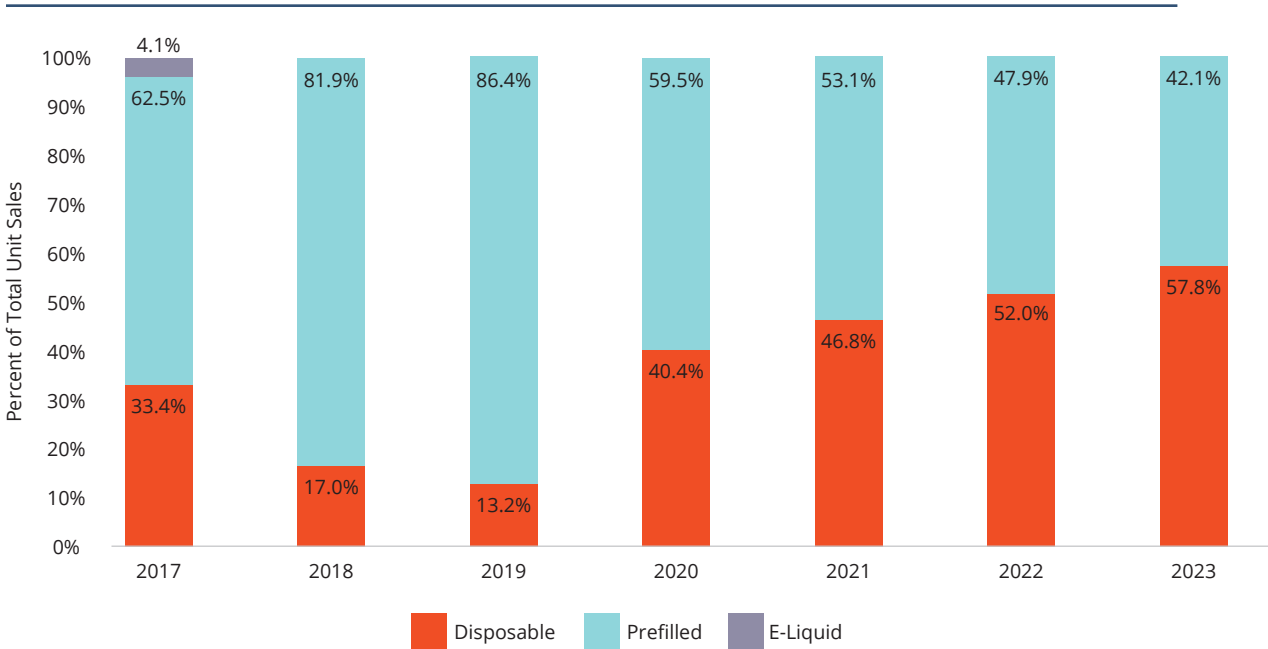
Disposable e-cigarettes have been the most common device type among youth since 2022 and make up

# 57.8%

of the e-cigarette market today

Sales of disposable e-cigarettes have increased significantly since their exemption from the 2020 federal enforcement policy that restricted flavors in prefilled cartridge e-cigarettes.<sup>22</sup> Disposable e-cigarettes are sleek, available in a wide variety of flavors and designs and are sold with increasingly high levels of nicotine.

Figure 5. Unit Share of National E-Cigarette Unit Sales by Product Type, Annual Estimates 2017-2023



Disposable e-cigarettes comprised 57.8% of the e-cigarette market in December 2023, surpassing sales of cartridge-based products like JUUL in 2022.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device or one e-liquid bottle.

Disposable e-cigarettes come in a vast array of flavors, from fruit, candy, desserts and chocolate to energy drinks, clove, spice and alcoholic drinks as well as concept flavors with ambiguous names.<sup>6</sup>

They may be more dangerous than other types of e-cigarettes because they burn hotter and their quality of construction is lower.<sup>32</sup> Disposable e-cigarettes comprised 57.8% of the e-cigarette market in December 2023, surpassing sales of cartridge-based products like JUUL in 2022.

Between 2019 and 2023, sales of disposable e-cigarettes increased by 541.3% (from 27.9 million units sold in 2019 to 178.7 million units sold in 2023), while sales of prefilled cartridges declined by 28.3% (from 181.9 million units to 130.4 million units during the same timeframe). During this time, disposable e-cigarettes became the most common device type among youth.

More of the growing number of e-cigarette brands are disposable. In 2024, 55.6% of current youth

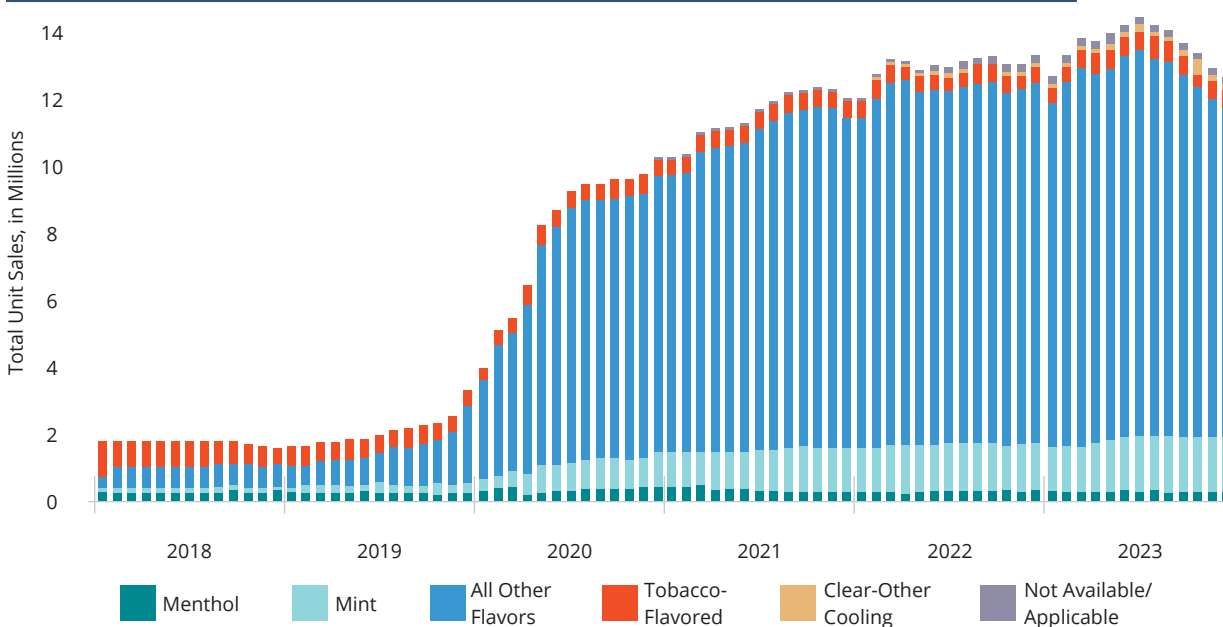
e-cigarette users reported using disposable e-cigarettes.<sup>13</sup> Elf Bar, the top e-cigarette among youth in 2024, is a disposable product.<sup>13</sup> Despite disposable e-cigarette trends among youth, some prefilled cartridge products, like Vuse and JUUL, remain commonly sold.<sup>1</sup>

The rapid growth in disposable e-cigarette unit sales was driven primarily by product flavors like fruit, candy and dessert flavors that are especially used among youth – and which represent a growing majority (79.1%) of all disposable e-cigarette unit sales, up from 50.9% in 2019.



Sales of disposable e-cigarettes increased more **than 6x** between 2019 and 2023

Figure 6. National Disposable E-Cigarette Unit Sales by Flavor, 4 Week Estimates 2018-2023



Flavors represent a growing majority (79.1%) of all disposable e-cigarette unit sales, up from 50.9% in 2019.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; dates represent end of four-week periods; All Other Flavors category includes fruit, clove/spice, chocolate, alcoholic drink (such as wine, cognac, or other cocktails), candy/desserts/other sweets, some other flavor; Clear/Other Cooling include products with flavor names such as "clear", "clear ice", or unflavored, which likely contain non-menthol synthetic cooling agents (e.g., Flum Pebble Clear, EB Design BC5000 Clear); e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device or one e-liquid bottle.

## Flavors Drive E-Cigarette Sales

Flavored e-cigarettes continue to dominate overall e-cigarette sales, comprising 80.6% of sales in December 2023. To date, the FDA has authorized 34 e-cigarettes, including four menthol flavored e-cigarettes. The number of unique flavor names increased from 659 in 2019 to 1,788 in 2023. Between 2019 and 2023, mint-flavored e-cigarette sales plummeted by 77.6%, reflecting state and federal policies limiting their sale. Since menthol e-cigarettes were excluded from these policies,<sup>33</sup> they remained popular, increasing by 175.8% in the same timeframe.<sup>1</sup> Tobacco-flavored product sales remained stable during this timeframe.

Flavors remain a huge draw for young people and are widely credited with increasing the appeal of tobacco products, including e-cigarettes.<sup>34,35</sup> According to the 2024 NYTS, 87.6% of middle and high school students who reported currently using e-cigarettes used flavored products.<sup>13</sup>



# 87.6%

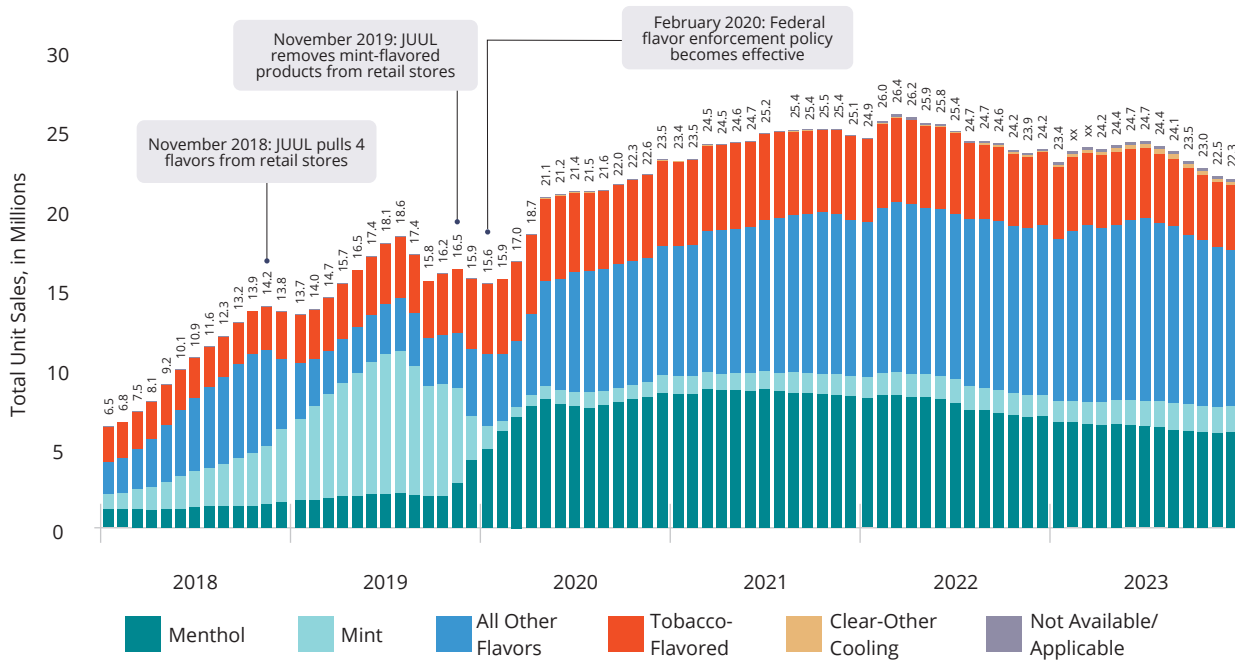
of middle and high school students currently using e-cigarettes reported using flavored products



Among youth e-cigarette users, the most commonly used flavor category is fruit (62.8%), candy (33.3%) and mint (25.1%).<sup>13</sup>

The data is clear: flavored e-cigarettes – especially flavored disposable products – are driving e-cigarette sales. Any meaningful policies that effectively address youth use will need to directly address the flavored products that appeal to youth, without leaving loopholes for newer, flavored products that continue to enable nicotine addiction among youth.

Figure 7. National E-Cigarette Unit Sales by Flavor, 4 Week Estimates 2018-2023



In December 2023, flavored e-cigarettes comprised 80.6% of sales. Mint e-cigarette sales dropped by 77.6% between 2019 and 2023 due to sales limitations, while menthol e-cigarettes increased by 175.8% during the same period.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; All Other Flavors category includes fruit, clove/spice, chocolate, alcoholic drink (such as wine, cognac, or other cocktails), candy/desserts/other sweets, some other flavor; Clear/Other Cooling include products with flavor names such as clear, clear ice, or unflavored, which likely contain non-menthol synthetic cooling agents (e.g., Flum Pebble Clear, EB Design BC5000 Clear); e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device or one e-liquid bottle.

- As of 2018, there were no actively enforced regulations of these products in the United States and products were available in a multitude of flavors, such as tobacco, menthol, mint, candy, fruit, beverages, dessert and spice.
- In February 2020, FDA began prioritizing enforcement of existing regulations against prefilled e-cigarette cartridges in flavors other than tobacco and menthol. This prioritization did not apply to e-liquid bottles or single use disposable e-cigarettes.
- As a result, flavored disposable e-cigarettes and menthol-flavored prefilled devices soared in sales.

# Menthol and Cooling Flavors Remain Widely Available

Menthol flavoring has long been used in tobacco products because it reduces the harshness of tobacco by creating a cooling sensation in the mouth and throat.<sup>35,38</sup> It is particularly appealing to those who are new to tobacco products, especially youth.<sup>35</sup>

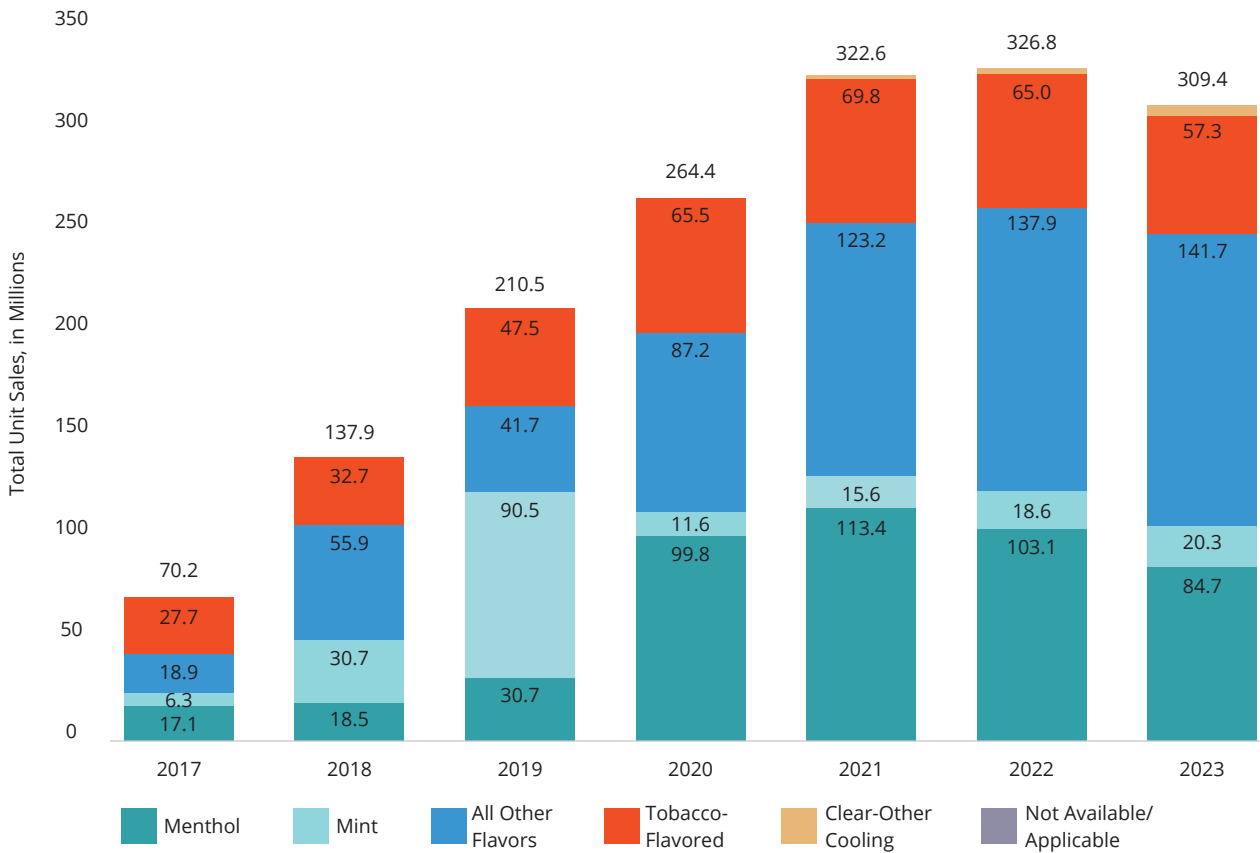
Today, menthol-flavored e-cigarettes are frequently

used. Menthol-flavored e-cigarette sales increased by 175.8% (from 30.7 million units to 84.7 million units) between 2019 and 2023, helping to drive overall e-cigarette sales upward.

The rise in menthol e-cigarette sales were particularly driven by menthol-flavored prefilled cartridges like JUUL – which were not restricted as part of the 2020 FDA enforcement policy.<sup>2</sup>

Between 2019 and 2023, sales of these products increased by 207.4%, from 25.9 million units sold to 79.5 million units sold.

**Figure 8. National E-Cigarette Unit Sales by Flavor, Annual Estimates 2017-2023**



Menthol-flavored e-cigarette sales increased by 175.8% between 2019 and 2023.

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Sales of e-cigarettes with “clear” or cooling flavor names increased

**872.1%**

between 2020 to 2023

Recently, the introduction of synthetic cooling agents that can impart similar cooling sensations entered the market. Recognizing the appeal of “cooling” flavors – not just menthol – tobacco companies market such e-cigarettes in “ice,” “cool,” “chill,” “frost,” “freeze” and similar cooling flavors or pair them with flavored products, offering concoctions such as “blueberry ice” or “melon ice.”<sup>39</sup>

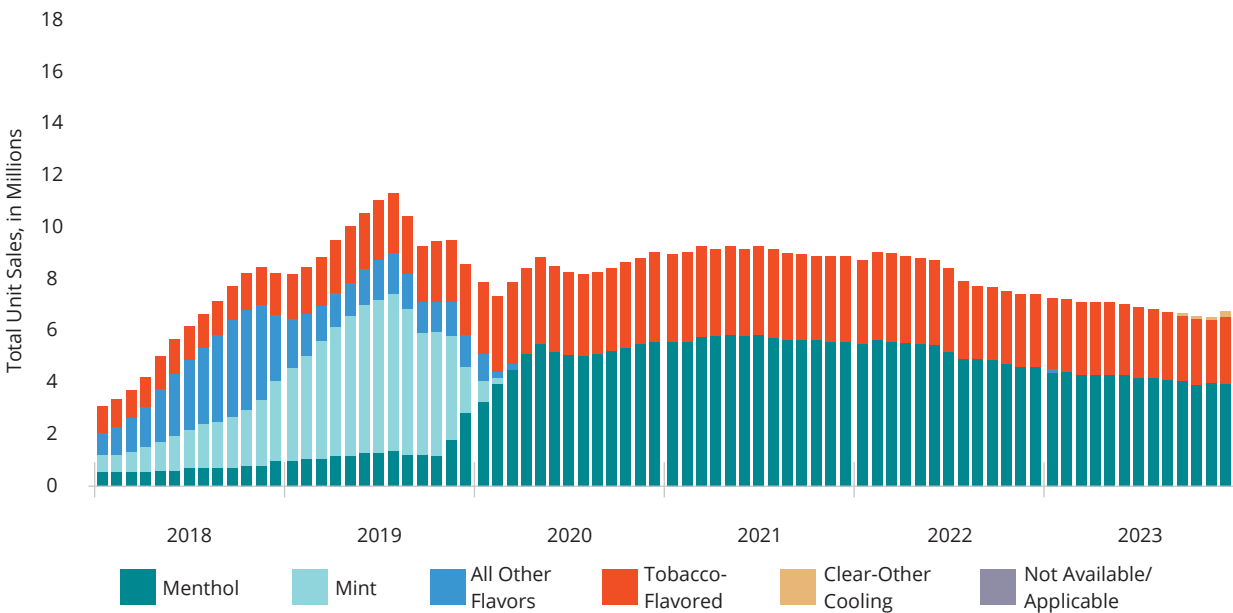
Sales of cooling-flavored e-cigarettes increased 693.0% (from 1.5 million to 12 million units) between 2017 and 2021,<sup>39</sup> an increase from about

a quarter (26.4%) to more than half (54.9%) of total e-cigarette sales during this time period.

While representing a small percentage of the overall e-cigarette market, sales of “clear” and other cooling flavored e-cigarettes have been on the rise recently. These products, with flavor names such as “clear,” “clear ice” or unflavored (e.g., Flum Pebble Clear, EB Design BC5000 Clear) contain non-menthol synthetic cooling agents.<sup>40</sup>

Sales of these e-cigarettes increased 872.1% from 245,563 units in 2020 to 2.4 million units in 2023. Sales of these products have increased even in states with strong flavored tobacco policies (See “E-Cigarettes in New “Clear” Flavors on the Rise” on page 36). These products are commonly used among youth – in 2024, 54.6% of all youth e-cigarette users reported using flavors that included the word “ice” or “iced.”<sup>13</sup>

Figure 9. National Prefilled Cartridge E-Cigarette Unit Sales by Flavor, 4 Week Estimates 2018-2023



Since 2019, changes in FDA regulations, sales of pod-based e-cigarettes (prefilled cartridges) have shifted from Mint to Menthol products. In 2023, Menthol products constituted approximately 61% of the total unit sales of pod-based e-cigarettes.

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The increase in menthol, “clear” and cooling products is not an accident. In response to regulation, the tobacco industry has intentionally introduced “new” products that achieve the same results – youth appeal and addiction. Products with names that mask the same youth-appealing characteristics undermine the spirit of flavored tobacco policy regulations and present an enormous risk to young people who are attracted to flavored products.

## High Nicotine E-Cigarettes Dominate the Market

The e-cigarette market today is dominated by e-cigarettes with high nicotine content. E-cigarettes with the highest nicotine levels took a firm hold of the e-cigarette market by 2022, when e-cigarettes with 5% or more nicotine concentrations comprised the majority of e-cigarette sales across all flavors and device types.<sup>42</sup>

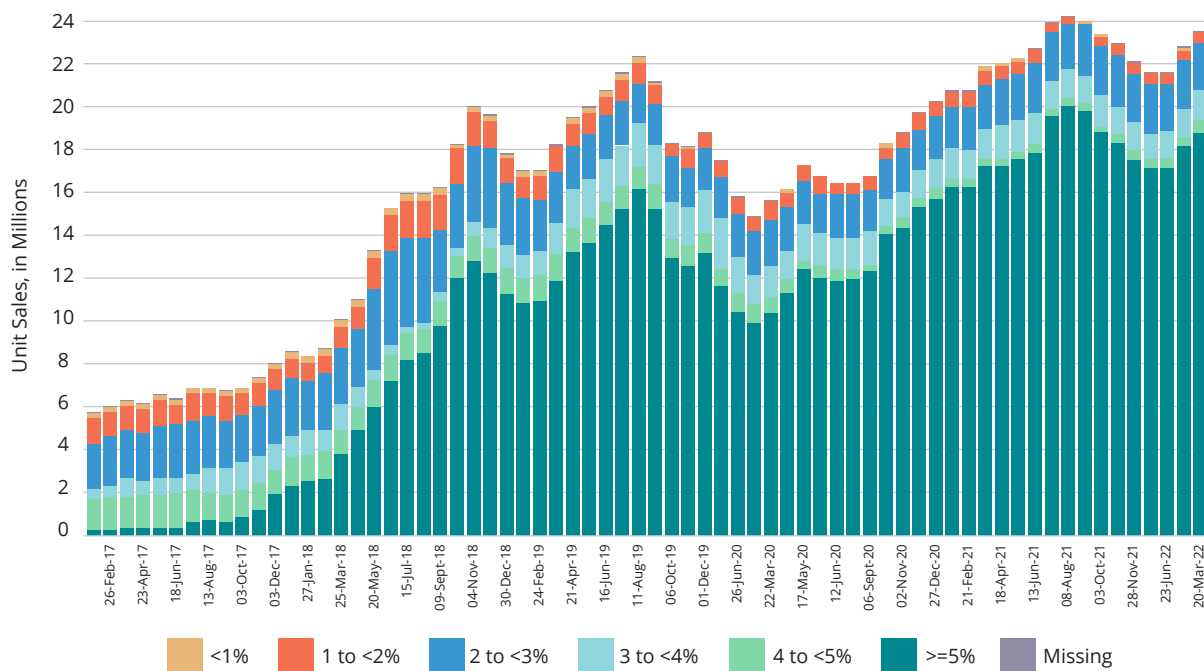
For example, one cartridge of e-cigarette JUUL’s 5% nicotine strength pods is estimated to contain about the same amount of nicotine found in a pack of 20 cigarettes.<sup>43,44</sup>

By March 2022, the majority of e-cigarettes (80.9%) sold contained greater than or equal to 5% nicotine strength, including 90.0% of disposable e-cigarettes, about three-quarters (74.2%) of prefilled cartridge e-cigarettes and nearly all (96.1%) e-cigarettes in flavors other than tobacco, mint or menthol.<sup>42</sup>

The majority of tobacco-flavored (61.3%), menthol (79.3%) and mint (87.4%) e-cigarette sales were also at or above 5% nicotine strength.<sup>42</sup>

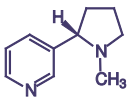
The trends illustrate massive sales growth in recent years: the unit share of products containing greater than or equal to 5% nicotine strength increased nearly 15-fold (1,486.0%) while the dollar share increased by more than 13-fold (1,346.0%) between January 2017 and March 2022. A separate study found that 2022 alone saw the debut of 48 disposable e-cigarettes with 6% or greater nicotine strength.<sup>2</sup>

Figure 10. Total E-Cigarette Unit Sales, in Millions, by Nicotine Strength, United States, 2017-2022



Between 2017 and 2022, nicotine strength grew in capacity by five-fold from 1.1 mL to 5.7 mL.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Unit sales were summed in four-week periods. To account for variations in product type when summing unit sales, all units were standardized to reflect the most common package size: a standardized unit was equal to: Five prefilled cartridges/pods; one disposable device; or one e-liquid bottle. Nicotine strength information was available in the data for 92.6% of the Universal Product Codes. Products with missing nicotine strength (7.4%) were searched online and identified. Nicotine strength level was categorized into five mutually exclusive categories: <1%; 1% to <2%; 2% to <3%; 3% to <4%; 4% to <5%; ≥5%. Data were included from the 48 continental states (excluding Alaska and Hawaii) and Washington, DC. Each bar in the figure represents a four-week aggregate interval.



By March 2022

**80.9%**

of e-cigarettes sold contained equal to or greater than 5% nicotine strength

Disposable e-cigarettes are also becoming larger and cheaper, making these products particularly appealing for price-sensitive youth. A Truth Initiative study found that disposable e-cigarettes sold between 2017 and 2022 grew in capacity by five-fold from 1.1 mL to 5.7 mL, and the average price of each milliliter of e-liquid decreased from \$7.96 to \$2.45 between 2020 and 2022, effectively tripling the purchasing power of consumers of disposable e-cigarettes.<sup>2</sup>

High nicotine e-cigarettes have fueled youth addiction. The increase in sales of high nicotine e-cigarettes coincided with an increase in the proportion of youth e-cigarette users who reported using e-cigarettes frequently or daily. In 2024, 42.1% of high school e-cigarette current users reported using e-cigarettes frequently (on 20 or more days per month), including 29.7% who reported using e-cigarettes daily.<sup>13</sup>



In 2022,

**48** disposable e-cigarettes with

6% or greater nicotine strength entered the market

# State Case Studies:

## Understanding Impacts of Strong State Policies

Increasing sales indicate that e-cigarettes are highly appealing and may be easily accessible to youth. Statewide policies can and have addressed regulatory gaps, but their impact may be hindered by tobacco industry interference, flavor or product exceptions and a lack of enforcement resources.

Several states have successfully taken matters into their own hands by enacting statewide policies restricting the sale of flavored e-cigarettes. Seven states – California, Maryland, Massachusetts, New Jersey, New York, Rhode Island and Utah – have implemented some restrictions on flavored tobacco product sales as of December 2023. Massachusetts has implemented the most comprehensive flavored policy in the nation, covering all tobacco products and all flavors, including menthol.<sup>25</sup>



# 28.5%

of the U.S. population is covered by a flavored tobacco sales restriction

California prohibits the sale of all tobacco products and flavors, except for loose leaf pipe tobacco, premium cigars and flavored hookah in certain retailers. New York, New Jersey and Rhode Island restricted the sale of all flavored e-cigarettes. Maryland prohibits the sale of all flavored cartridge-based and disposable e-cigarettes except for menthol, and Utah's policy restricts the sale of flavored e-cigarettes, except for menthol and mint, in non-retail tobacco specialty businesses. Beginning in January 2025, Utah will prohibit the sale of flavored e-cigarettes, except for menthol, in all retailers.

Case studies of Massachusetts, New York and California demonstrate the effect that strong state policies can have on reducing flavored e-cigarette sales. Additionally, studies of bordering states provide evidence that state policies do not significantly affect flavored tobacco sales in neighboring states.

In addition, 395 counties, cities, towns and tribes have passed policies restricting the sale of flavored tobacco products, including e-cigarettes. In total, about 28.5% of the U.S. population is covered by an active flavored tobacco restriction, although these policies vary by products and flavors that are restricted and some allow for retailer exemptions.<sup>25</sup>

# Massachusetts: A Leader in Enacting Flavored Tobacco Policies

Massachusetts has been a leader in implementing statewide policies restricting the sales of flavored e-cigarettes. It made history as the first U.S. state to end the sale of all flavored tobacco products, including flavored e-cigarettes, menthol cigarettes and flavored cigars, except in licensed adult-only smoking bars, in November 2019.<sup>45,46</sup>

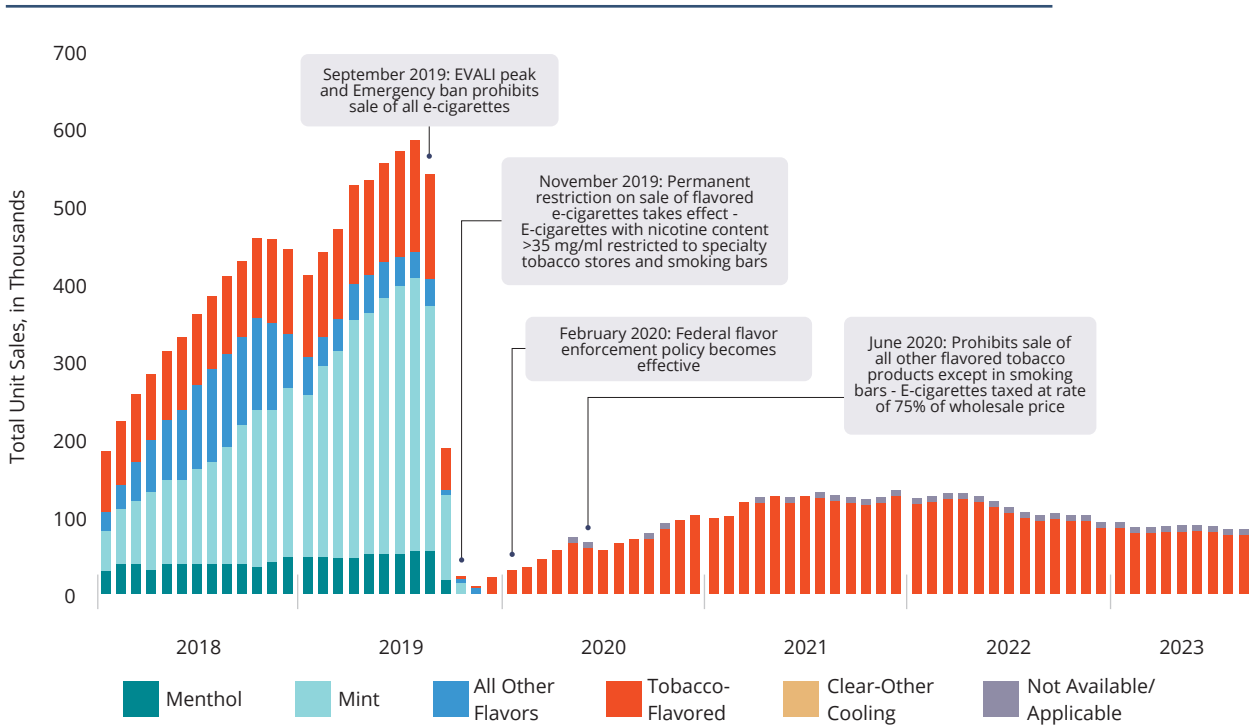
This law, *An Act Modernizing Tobacco Control*, immediately restricted the sale of flavored e-cigarettes to licensed smoking bars and extended this restriction to all other flavored tobacco products as of June 1, 2020.

The law was a success, leading to significant decreases in youth access to and use of flavored tobacco products in the state.



Massachusetts made history in 2019 as the **first U.S. state** to end the sale of all flavored tobacco products

Figure 11. Massachusetts E-Cigarette Unit Sales by Flavor, 4 Week Estimates 2018-2023



Overall e-cigarette sales in Massachusetts declined by 86.2% and flavored e-cigarette sales fell 98.2% between 2019 and 2023.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; All Other Flavors category includes fruit, clove/spice, chocolate, alcoholic drink (such as wine, cognac, or other cocktails), candy/desserts/other sweets, some other flavor; Clear/Other Cooling include products with flavor names such as "clear", "clear ice", or unflavored, which likely contain non-menthol synthetic cooling agents (e.g., Flum Pebble Clear, EB Design BC5000 Clear); e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device or one e-liquid bottle.

## Local Flavored Tobacco Policies Respond to Youth Vaping Epidemic

Massachusetts had robust local flavored tobacco policies in place well before the state policy was enacted, with 179 policies covering 66.3% of the population by March 2020.<sup>25</sup> The vast majority of these policies exempted menthol cigarettes and other mint, menthol and wintergreen flavored tobacco products.

Local flavored tobacco policies in Massachusetts were first passed in response to the vaping epidemic. Many states are not permitted to have local laws stronger than state laws when it comes to regulating tobacco products. This barrier, known as preemption, prevents local jurisdictions in many states from adopting strong flavor policies.<sup>47</sup> Because Massachusetts did not have preemption, localities were able to enact robust local laws to protect public health of many in the state, illustrating the importance of not having preemption laws in place. These local laws eventually paved the way for a strong statewide law.

## Permanent Statewide Restriction Drives Down Flavored E-Cigarette Sales

In November 2019, permanent restrictions on sales of flavored e-cigarettes went into effect. The sale and consumption of all flavored e-cigarettes was restricted to licensed adult-only smoking bars. In addition, the law restricted sales of non-flavored e-cigarettes with a nicotine concentration of 3.5% or more to licensed adult-only retail tobacco stores and smoking bars.

In June 2020, additional, permanent restrictions went into effect. The sale of all other types of flavored and menthol tobacco products, including cigarettes, cigars and smokeless tobacco, was restricted to licensed adult-only smoking bars.

## Emergency Restriction Halts All E-Cigarette Sales

Vaping-related illnesses prompted the state to issue a temporary statewide ban on all e-cigarette sales. In 2019, about 2,800 cases of e-cigarette, or vaping, product use-associated lung injuries (EVALI) were reported to the Centers for Disease Control and Prevention, with 68 cases resulting in deaths.<sup>48</sup>

The outbreak of vaping-related deaths – most of which were ultimately linked to an additive in tetrahydrocannabinol (THC)-containing vaping products<sup>48</sup> – prompted Massachusetts to temporarily ban the sales of all e-cigarette products in stores and online between October 2019 and December 2019.

The law also imposed a 75% excise tax on e-cigarettes on top of the state's 6.25% sales tax, expanded penalties for illegal tobacco sales and required commercial health insurers and the state's Medicaid program to cover tobacco cessation counseling and nicotine replacement therapies.<sup>3</sup> Restrictions on the sale of all other flavored tobacco products, including menthol cigarettes and flavored cigars, also went into effect.



Overall e-cigarette sales in Massachusetts declined by

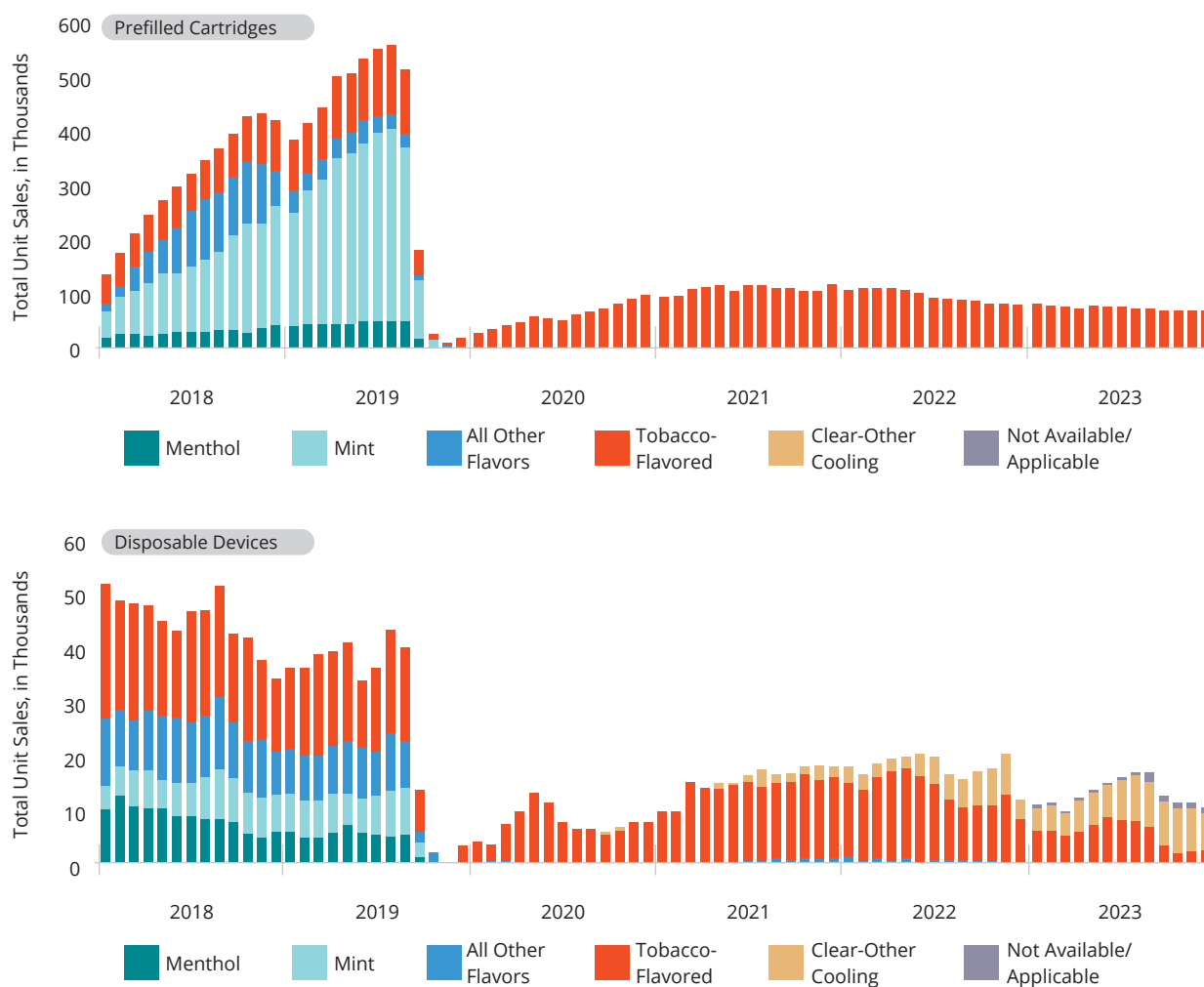
# 86.2%

and flavored e-cigarette sales fell 98.2% between 2019 and 2023

Massachusetts' comprehensive statewide policy led to an immediate and drastic decrease in e-cigarette sales: overall e-cigarette sales declined by 86.2% (from 549,000 to 75,910 units) between September 2019 and December 2023. Flavored e-cigarette sales fell 98.2% (from 413,000 to 7,640 units sold) in the same timeframe.

The decline in sales was largely driven by the near elimination of e-cigarettes in menthol, mint and other flavors that include fruit, candy, desserts, chocolate, energy drinks, clove, spice and alcoholic drinks as well as concept flavors with ambiguous names.

Figure 12. Massachusetts E-Cigarette Unit Sales by Product Type and Flavor, 4 Week Estimates 2018-2023



Sales of prefilled cartridges fell by 87.1% and sales of disposable e-cigarettes decreased 74.1% between September 2019 and December 2023.

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Sales of flavored e-cigarettes fell by 99.0% for menthol, 100.0% for mint and 98.9% for other flavors.<sup>26</sup> However, it is important to note that recently “clear and other cooling” flavors are emerging in e-cigarette sales. While “clear” flavors only took 8.9% of overall e-cigarette sales, most disposable e-cigarette sales (63.9%) in Massachusetts were for these flavors, presenting new concerns. (See “E-Cigarettes in New “Clear” Flavors on the Rise” on [page 36](#)).

Sales of disposable e-cigarettes significantly decreased between September 2019 and December 2023, falling by 74.1%, in sharp contrast to nationwide increases in disposable e-cigarette sales seen at the same time. Similarly, prefilled cartridge sales fell by 87.1% during the same timeframe. In December 2023, only 10.1% of total e-cigarette sales were flavored, indicating compliance with the regulations is high. Many of these flavored products came in “clear or other cooling” flavors – a flavor category that has emerged in recent years, especially in certain states. (See “E-Cigarettes in New “Clear” Flavors on the Rise” on [page 36](#)).



The law led to significant statewide **decreases in youth access** to and use of flavored tobacco products

Decreases in sales were sustained in part by Massachusetts’ strong enforcement efforts. Most researchers attribute the success to comprehensive policies that prioritize compliance – including local permit systems, inspections, technical assistance and dedicated funding for tobacco retailer education and enforcement.<sup>50</sup>

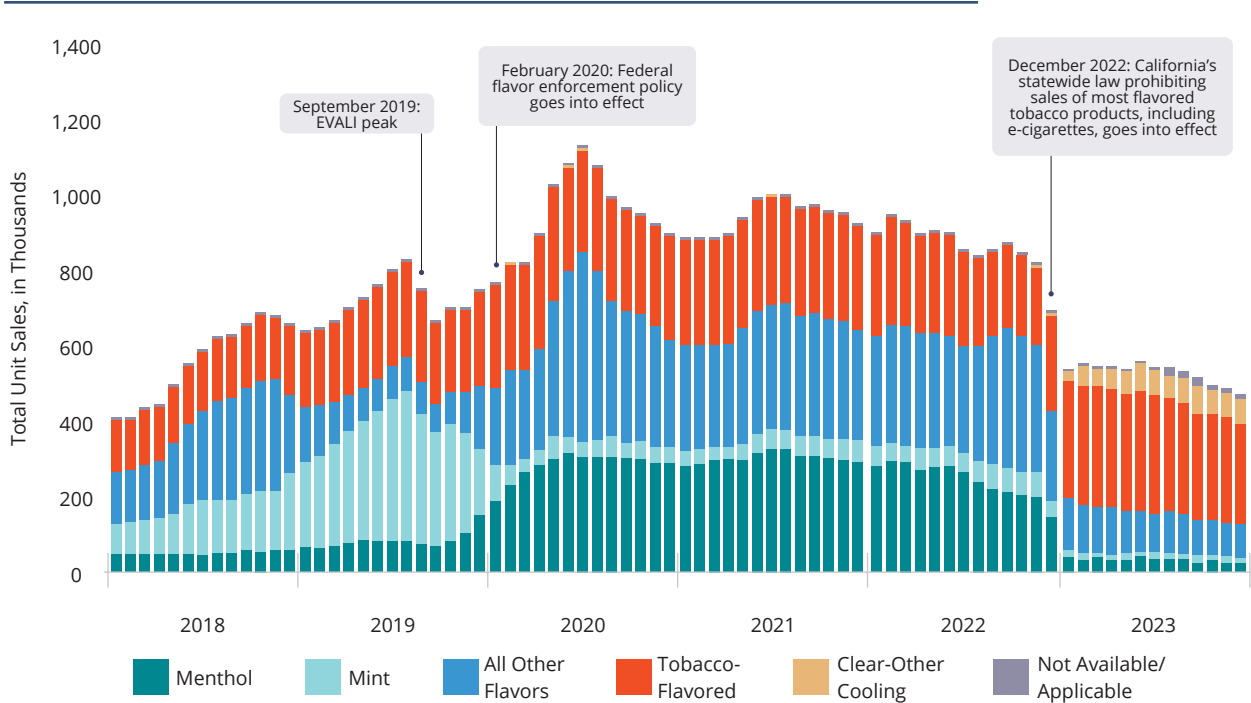
Following the implementation of the statewide law restricting the sale of flavored tobacco products in Massachusetts, youth access to and use of flavored tobacco products greatly decreased in the state. The Massachusetts Youth Health Survey showed statistically significant declines in current (past 30-day) rates of e-cigarette (32.0% to 17.6%), cigarette (4.3% to 2.9%) and cigar (4.7% to 2.0%) use among high school students.<sup>49</sup> In addition, fewer high school tobacco users reported accessing tobacco products from stores (16.7% to 11.9%) and vape shops (17.4% to 13.0%).<sup>49</sup>

# California: Curbing Flavored Tobacco Sales Despite Tobacco Industry Interference

In August 2020, California passed a law prohibiting the sale of most flavored tobacco products, including flavored e-cigarettes, menthol cigarettes and flavored cigars, but exempting loose leaf pipe tobacco, hookah sold in licensed stores that only permit people 21 years or older and premium cigars with a wholesale price of \$12 or more.<sup>51</sup> However, the tobacco industry successfully delayed implementation by forcing Californians to vote to uphold the law.

Californians voted in favor of the law, which went into effect on December 21, 2022. Prior to implementation of the statewide law, 32.0% of California's population was covered by 129 local flavored product sales restrictions.<sup>25</sup>

Figure 13. California E-Cigarette Unit Sales by Flavor, 4 Week Estimates 2018-2023



Flavored e-cigarette sales decreased by 67.7%, and monthly sales of all e-cigarettes sales decreased by 42.7% between December 2022 and December 2023.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; dates represent end of four-week periods; All Other Flavors category includes fruit, clove/spice, chocolate, alcoholic drink (such as wine, cognac, or other cocktails), candy/desserts/other sweets, some other flavor; Clear/Other Cooling include products with flavor names such as "clear", "clear ice", or unflavored, which likely contain non-menthol synthetic cooling agents (e.g., Flum Pebble Clear, EB Design BC5000 Clear); e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device or one e-liquid bottle.



Effects of the statewide policy on retail sales were immediate: twelve months after the state policy went into effect (between December 2022 and December 2023) flavored e-cigarette sales decreased by 67.7% and monthly sales of all e-cigarettes sales decreased by 42.7%. The decline in California's e-cigarette sales represents 21.2% of the decrease in national e-cigarette sales in the year after the restriction was implemented.<sup>52</sup>

The 67.7% decrease in flavored e-cigarette sales was largely driven by falling sales of e-cigarettes in mint (82.4%), menthol (85.3%) and all other flavors – including fruit, candy, desserts, chocolate, energy drinks, clove, spice and alcoholic drinks as well as concept flavors with ambiguous names (72.7%). Of concern, however, are large increases in sales of “clear and other cooling” e-cigarettes, which increased 782.1% (from 7,530 units to 66,390 units) between December 2022 and December 2023. These products have flavor names such as “clear,” “clear ice,” or are unflavored, and contain non-menthol synthetic cooling agents but without the aroma or taste of menthol. (See “E-Cigarettes in New “Clear” Flavors on the Rise” on [page 36](#)).

The policy reduced sales of disposable e-cigarettes by more than half (52.2%) and prefilled cartridges by 32.1% between December 2022 and December 2023. Sales have shifted towards tobacco-flavored e-cigarettes, which comprised the majority (56.9%) of the market in December 2023, up from 24.8% in December 2022.

Early research presented at the 2024 Society for Research on Nicotine and Tobacco showed California's restrictions on flavor tobacco product availability are reducing youth access.

California youth and young adults who used menthol cigarettes, flavored cigars and flavored e-cigarettes before policy passage had significantly greater odds of reporting perceived difficulty in purchasing these products in 2023.<sup>53</sup>



Young people who used flavored e-cigarettes before California's policy had **significantly greater odds** of reporting perceived difficulty in purchasing these products in 2023



While California has made impressive strides in reducing flavored e-cigarette sales as intended with its statewide policy, sales of illegal flavored e-cigarettes continue. More than 40% of total e-cigarette sales in December 2023 were of prohibited flavors. Disposable e-cigarettes are the main reason, comprising nearly all (93.3%) e-cigarettes sold in prohibited flavors.

Online e-cigarette sales, not captured in sales data presented here, also raise cause for concern. California's policy did not explicitly address online sales of flavored tobacco products, and research suggests online searches for e-cigarettes were 160.0% higher in the state the week the law was implemented and remained elevated for six weeks.<sup>54</sup> Access to online sales are a concern, as surveys show that youth primarily used online sales to purchase e-cigarettes during the COVID-19 pandemic.<sup>55</sup>



Dedicated funding, a designated enforcement agency and heavy penalties for policy violations can be **key to strong enforcement** and overall effectiveness of policies

## Tackling Enforcement Challenges is Key to Flavored Policy Success

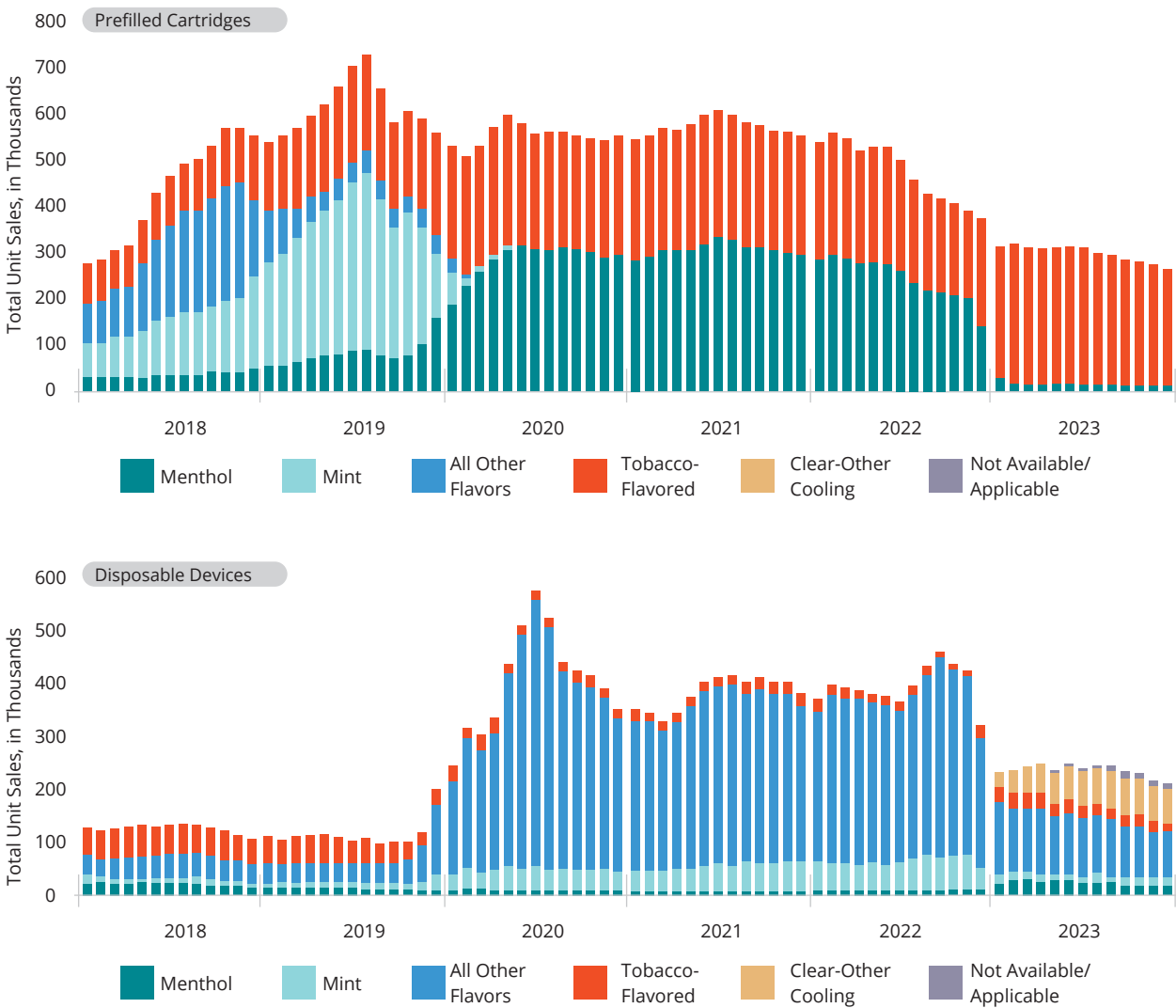
California reduced e-cigarette sales after overcoming several roadblocks in enforcement and funding. The state did not name an enforcing agency until October 2023 – more than ten months after the law went into effect.<sup>56</sup> After retailers were notified of the law in January 2023, it was implemented and enforced at the local level since there was no state funding specifically identified for enforcement. As a result, enforcement during the policy's first year was limited to local efforts which were sometimes limited or delayed due to available resources that varied by jurisdiction.

Recognizing the need to improve enforcement of the flavor policy, a new law that authorizes the California Department of Public Health to enforce the flavored tobacco state law went into effect on January 1, 2024.<sup>57</sup> The law increases penalties for retailers who continue to sell illegal flavored e-cigarettes, with fines ranging from \$400 to \$6,000 as well as tobacco retail license suspension after multiple violations. Two additional bills were introduced in the current California state legislative session to strengthen enforcement.

The first would give the California Department of Tax and Fee Administration authority to seize flavored tobacco products at retail locations.<sup>58</sup> The second would create a list of tobacco products

that lack a characterizing flavor and require manufacturers to provide proof that their products are unflavored, with seizure as the penalty.<sup>59</sup>

Figure 14. California E-Cigarette Unit Sales by Product Type and Flavor, 4 Week Estimates 2018-2023



Statewide flavor restriction policies in California helped decrease flavored e-cigarette sales. But in 2023, illegal flavored e-cigarette sales comprised over 40% of total e-cigarette sales. Disposable e-cigarettes make up the majority of e-cigarettes sold in prohibited flavors.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; dates represent end of four-week periods; All Other Flavors category includes fruit, clove/spice, chocolate, alcoholic drink (such as wine, cognac, or other cocktails), candy/desserts/other sweets, some other flavor; Clear/Other Cooling include products with flavor names such as "clear", "clear ice", or unflavored, which likely contain non-menthol synthetic cooling agents (e.g., Flum Pebble Clear, EB Design BC5000 Clear); e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device or one e-liquid bottle.

# ***E-Cigarettes in New “Clear” Flavors on the Rise***

California, New York and Massachusetts sales data highlight notable increases in a new category of flavors called “clear and other cooling” flavors. These products have flavor names such as “clear,” “clear ice” or unflavored and include products like Flum Pebble Clear and EB Design BC5000 Clear. They likely contain non-menthol synthetic cooling agents. The overall market share of “clear and other cooling” e-cigarettes remains small at 0.9% nationwide. However, in California, sales of “clear and other cooling” e-cigarettes increased 782.1% between December 2022 and December 2023. Unit share increased from less than 1% to nearly 14% in the same timeframe.

Similarly, most disposable e-cigarette sales (63.9%) in Massachusetts in December 2023 were for “clear and other cooling” flavors, up from 36.8% in December 2022.



**A 782.1% increase** in sales of e-cigarettes in flavors like “clear” and “clear ice” a year after California’s policy went into effect raises new concerns

This data indicates despite strong flavored tobacco policies in both Massachusetts and California, these products are evading regulation under the guise of not being flavored. Emerging research currently undergoing peer-review indicates “clear” e-liquids contain synthetic cooling agents as well as menthol and other flavorings.<sup>40</sup>

As with other instances of the tobacco industry pivoting to new flavors in response to regulations, “clear” flavors present another avenue to continue selling the products known to be popular with e-cigarette users and warrant a speedy regulatory response.

## ***Tobacco Industry Response to State Menthol Restrictions***

In addition to the tobacco industry's response to a shifting e-cigarette regulatory landscape, there is evidence of product development in response to cigarette menthol restrictions. After Massachusetts and California successfully ended the sale of menthol cigarettes, tobacco companies began marketing new "non-menthol" cigarettes in both states.<sup>60</sup> These cigarette brand variants are advertised with the same green and blue hues typically used to advertise menthol-flavored cigarettes with slogans evoking a menthol flavor experience like "still bold, still smooth," and "fresh intensity," according to a series of focus groups of young adult smokers conducted by Truth Initiative.<sup>61-63</sup>

The tobacco industry has resisted attempts to regulate new "non-menthol" cigarettes. The California Attorney General's office notified makers of many of these cigarettes – including Kool Non-Menthol, Kool Blue Non-Menthol, Newport Non-Menthol Green, Newport EXP, Camel Crisp Non-Menthol Green and Camel Crush Non-Menthol Oasis – that their products are prohibited because their packaging implies that they are flavored.<sup>64</sup>

R.J. Reynolds filed a complaint in response, arguing that its products are not flavored and thus do not violate California's flavor restriction.<sup>65</sup>

In June 2024, the Massachusetts Department of Public Health sent a similar letter to all local boards of health and licensed retailers indicating their determination that Newport Non-Menthol Green, Newport EXP Non-Menthol, Camel Crush Non-Menthol Oasis, Camel Crisp Non-Menthol Green and Maverick Non-Menthol are considered prohibited flavored tobacco products.

While the legal situation remains unresolved, recent data suggest that marketing may have worked for the tobacco industry. In California, the latest data show rising sales of these new "non-menthol" cigarettes. Sales of this new type of "non-menthol" cigarettes went up from 659,000 packs to 24.8 million packs between 2022 and 2023. Massachusetts saw a rise of 1.5 million packs of new "non-menthol" cigarettes in 2023 (sales were approximately zero in 2022).

# New York: Reducing Mint and Menthol E-Cigarette Sales

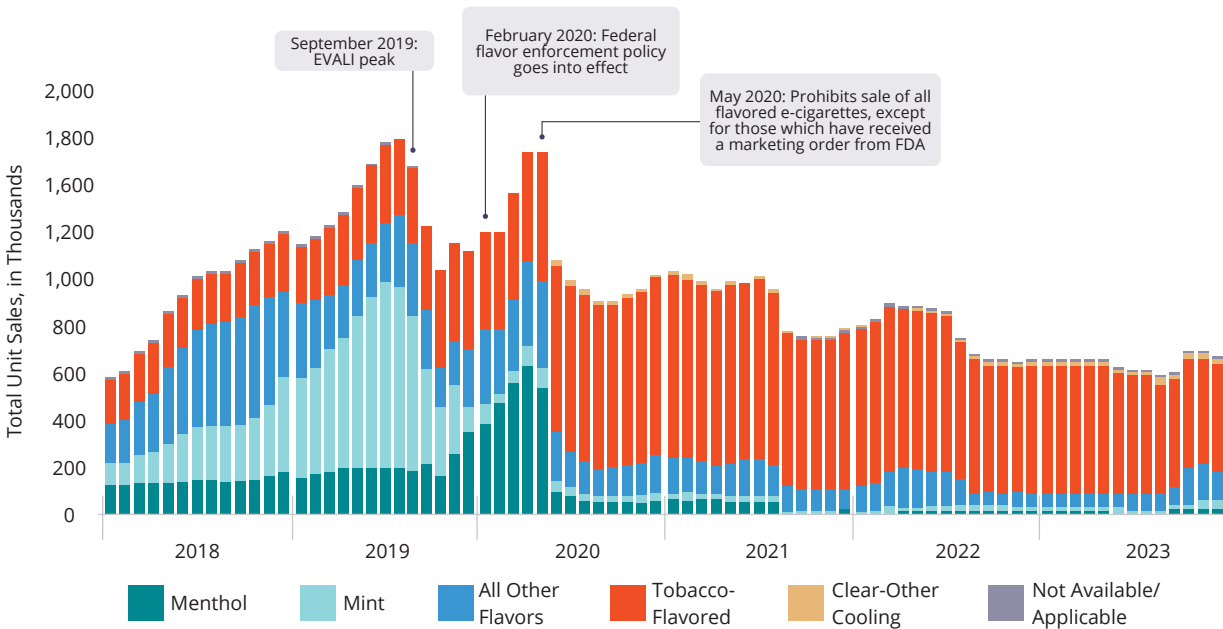
New York State prohibited the sale of all flavored e-cigarettes on May 18, 2020. Prior to the state law going into effect, three jurisdictions – Nassau County, New York City and Yonkers – restricted the sale of some flavored tobacco products. Except for New York City, these policies included e-cigarettes, although New York City’s law was subsequently amended to include e-cigarettes, which went into effect after implementation of the state law.

As a result, about 51% of New York State’s population was covered by a flavor policy by March 31, 2020. The Saint Regis Mohawk Tribe also implemented a flavored tobacco policy prior to the state law.<sup>25</sup>

## Policy Effects

Following the implementation of the statewide restriction, e-cigarette unit sales decreased for all devices and flavors except for tobacco. Unit sales decreased for all e-cigarettes (by 56.8%) as well as for flavored e-cigarettes (by 79.1%) between May 2020 and December 2023. Disposable e-cigarette sales, which peaked in May 2020 at 559,000 units sold, decreased by 54.0% by December 2023. In December 2023, 31.3% of the total e-cigarette units sold in New York were of prohibited flavors, nearly all of which (89.2%) were disposable e-cigarettes.

Figure 15. New York E-Cigarette Unit Sales by Flavor, 4 Week Estimates 2018-2023



Between May 2020 and December 2023, overall e-cigarette sales dropped by 56.8%, flavored e-cigarettes by 79.1%, and disposable e-cigarette sales by 54.0%. However, in December 2023, 31.3% of e-cigarette units sold in New York were of prohibited flavors and 89.2% were disposable e-cigarettes.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; dates represent end of four-week periods; All Other Flavors category includes fruit, clove/spice, chocolate, alcoholic drink (such as wine, cognac, or other cocktails), candy/desserts/other sweets, some other flavor; Clear/Other Cooling include products with flavor names such as "clear", "clear ice", or unflavored, which likely contain non-menthol synthetic cooling agents (e.g., Flum Pebble Clear, EB Design BC5000 Clear); e-cigarette accessories and devices sold without e-liquids were excluded (9.5% of total dollar sales in 2022). Unit sales were standardized to reflect the most common package size for each product type. A standardized unit was equal to five prefilled cartridges, one disposable device, or one e-liquid bottle.



Following New York statewide restrictions, unit sales fell

**56.8%**

for all e-cigarettes and 79.1% for flavored e-cigarettes between 2020 and 2023

Stronger enforcement is needed to achieve even greater reductions in sales and to maximize the public health impact of the law. Efforts are underway to identify opportunities for improved enforcement.

Unit shares of tobacco-flavored e-cigarettes rose from 35.2% to 68.1% following policy implementation, indicating that flavored e-cigarette users may be switching to tobacco-flavored e-cigarettes that remain legal in New York.

## State Flavor Policies Do Not Significantly Impact Neighboring State Sales

It is clear states with flavored tobacco sales restrictions experience decreases in flavored tobacco sales, as seen in the states profiled above as well as in a growing body of peer-reviewed research.<sup>66-68</sup>

Opponents of statewide flavored tobacco sales restrictions contend that people may travel across state borders to purchase products that remain legal in neighboring states. However, research overwhelmingly shows that state laws restricting the sale of flavored tobacco products have no sustained or significant impact on cross-border sales of restricted products in bordering states.

A 2022 study found that while sales of menthol, non-flavored and overall cigarettes increased in states bordering Massachusetts, trends were similar to those seen in non-border states.<sup>69</sup> A follow-up study confirmed that sales decreased in Massachusetts by about 350 packs per 1,000 people while they only increased by about 10 packs per 1,000 people in bordering states, leading to net reductions in packs sold. In addition, initial cigarette sales increases in bordering states were not sustained. Most states neighboring Massachusetts (New York, Rhode Island and Vermont) did not see increases in overall tobacco sales. Although New Hampshire saw an initial increase in menthol sales, largely driven by menthol cigarettes, the increase was not sustained.<sup>70</sup> Research shows policies restricting flavored tobacco sales did not negatively affect retailers who sell tobacco and vaping products, suggesting businesses are able to successfully adapt to such restrictions.<sup>71</sup>



There was a net reduction of **about 340**

cigarette packs per 1,000 people sold in Massachusetts and bordering states following passage of the Massachusetts flavor tobacco policy

## E-Cigarette Flavor Restrictions Do Not Lead to Increases in Cigarette Sales

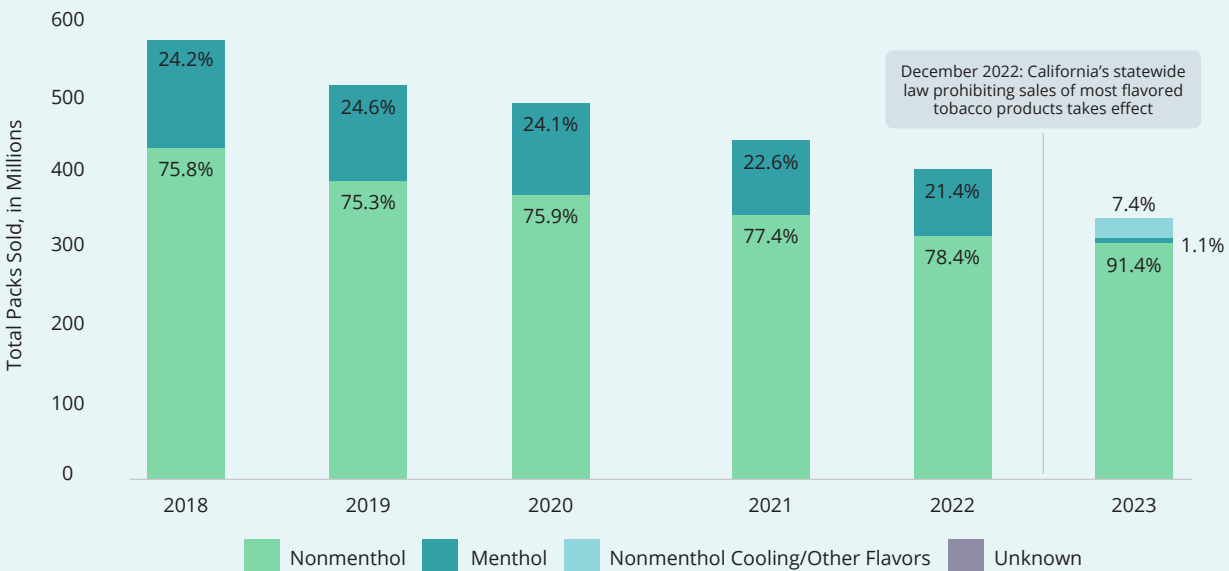
There is no evidence e-cigarette flavor restrictions lead to increases in cigarette sales, despite tobacco industry claims to the contrary.<sup>72,73</sup>

States that prohibit the sale of flavored e-cigarettes have seen declines in e-cigarette sales as well as declines in cigarette sales. States with more comprehensive flavor restrictions, including flavored e-cigarettes and menthol cigarettes, experience even greater declines in total cigarette sales. For example, cigarette sales declined more in Massachusetts and California, which have more comprehensive laws, than in the United States overall and more than in New York,

which only prohibits the sale of flavored e-cigarettes. Data clearly show that restrictions on the sale of flavored e-cigarettes reduce e-cigarette sales and do not lead to increases in cigarette sales.

- In 2023, following implementation of California's law, total cigarette pack sales decreased by 16.2% (64.5 million packs) compared to total sales during 2022.
- In the 12 months following Massachusetts' menthol cigarette restriction, total cigarette sales decreased by 17.2% (18.5 million packs).
- In New York State, cigarette sales have declined every year since 2018, and declines were even greater after the state prohibited the sale of flavored e-cigarettes in 2020. A research study found that cigarette sales trends in New York State were no different than a control state during the same time period, indicating the law did not lead to substitution of cigarettes, overall or among menthol cigarettes.<sup>74</sup>

Figure 16. Cigarette Pack Sales by Flavor, California, 2018-2023

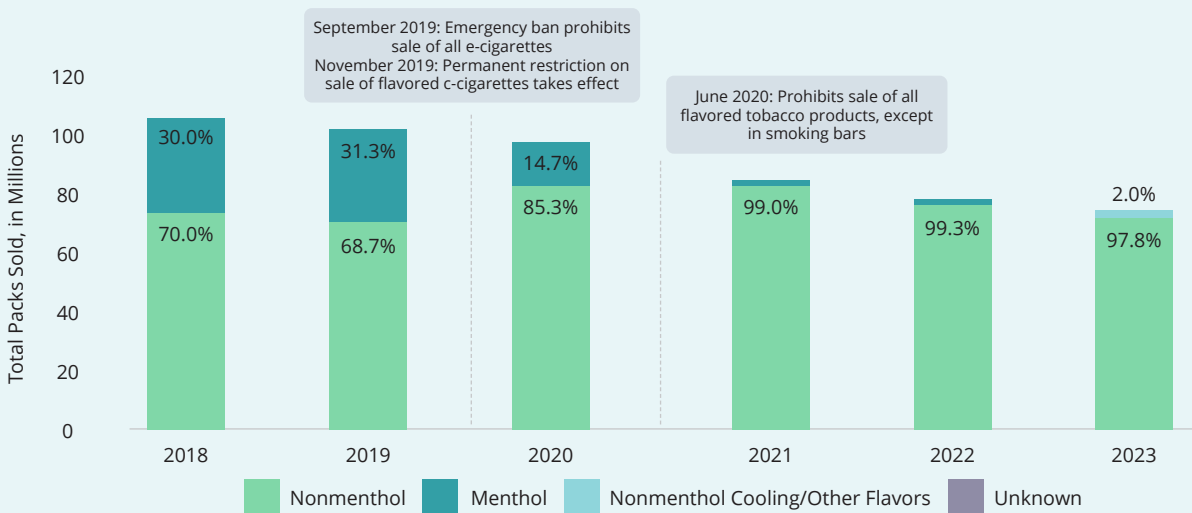


In 2023, after California's law was implemented, cigarette pack sales decreased by 16.2% (64.5 million packs) compared to total sales in 2022.

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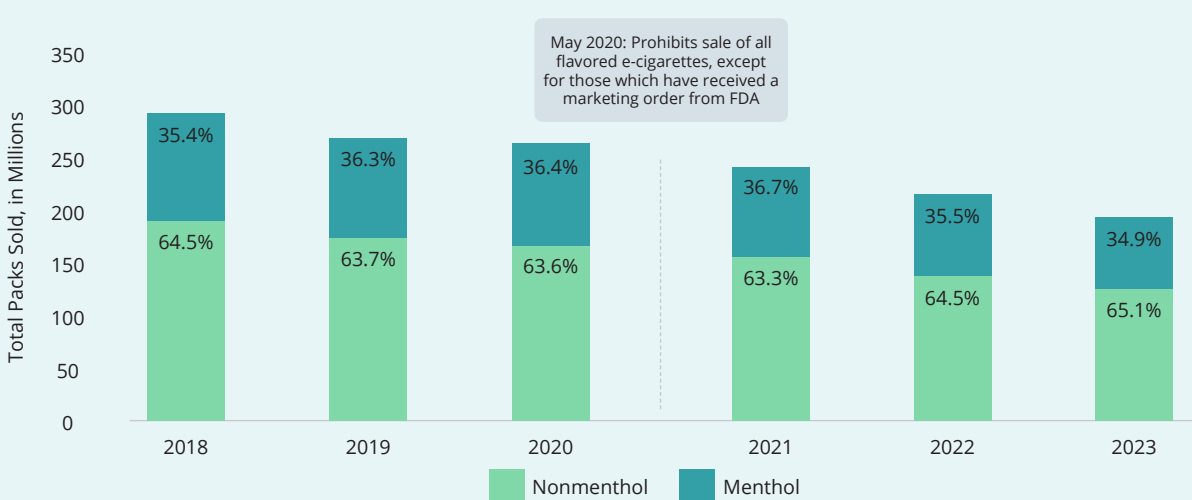
**Figure 17. Cigarette Pack Sales by Flavor, Massachusetts, 2018-2023**



In the 12 months after Massachusetts implemented a menthol cigarette restriction, total cigarette sales dropped by 17.2%, equivalent to 18.5 million packs

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; dates represent end of four-week periods; Nonmenthol Cooling/Other Flavors include products confirmed by chemical testing to contain synthetic cooling ingredients, such as WS-3 or WS-23, and/or other flavorants, such as ethylvanillin; change in units is presented for Nonmenthol Cooling/Other Flavors sales instead of annual percentage change as sales were zero or almost zero in years prior to 2023. Unit sales reflect a standard pack of 20 cigarettes.

**Figure 18. Cigarette Pack Sales by Flavor, New York, 2018-2023**



In New York State, cigarette sales have declined every year since 2018, and declines were even greater after the state prohibited the sale of flavored e-cigarettes in 2020.

Note: Estimates and analyses in this figure based on Circana (formerly IRI, Information Resources, Inc.) Multi-Outlet + Convenience data are by the author and not by Circana. Sales data do not reflect sales from vape shops or online retailers; dates represent end of four-week periods. Unit sales reflect a standard pack of 20 cigarettes.

# Maximizing The Impact of State Flavor Policies

These state experiences clearly show that flavor policies work. New York, Massachusetts and California provide compelling examples of well-executed, comprehensive flavored e-cigarette policies. Studies of neighboring states demonstrate that policies do not affect tobacco sales in surrounding states without such policies. Taken together, these findings make a strong case in support of flavored e-cigarette policies as a tool to reduce flavored e-cigarette sales and use.

While statewide policies can be enormously successful when it comes to reducing flavored e-cigarette sales, not all state policies are created equal. Successful policies clearly define products and include comprehensive flavored tobacco restrictions without flavor or product exceptions, incorporate community and retailer education and are complemented by equitable tobacco control policy enforcement.<sup>75</sup>

Some of the components of effective policies include:

- **Comprehensive flavored tobacco policies:** Successful flavored tobacco policies explicitly restrict all flavors, products and types of retailers. Policies that include exemptions in any of these areas can result in unintended consequences and lessen the potential public health impact of flavored tobacco policies. For example, Maryland prioritized enforcement against flavored, cartridge-based and disposable e-cigarettes but exempted tobacco and menthol in February 2020. Utah restricted the sale of flavored-e-cigarettes except menthol and mint to adult-only retail tobacco specialty businesses. Both policies led to increases in menthol-flavored e-cigarette sales between 2019 and 2023. In contrast, comprehensive policies that include language in the definition of a characterizing flavor such as “a cooling or numbing sensation imparted during consumption of a tobacco product” can help to prevent the rise of alternative products like the new “non-menthol” cooling cigarettes seen in California.

- **Community education:** Community education and outreach can enhance policy impact. This includes efforts to engage with retailers and those involved in enforcement. In particular, it can be a challenge to overcome lack of awareness and knowledge about which products are permitted under new laws.<sup>75,76</sup> To address this, the Massachusetts Association of Health Boards developed educational materials for retailers, including mailings, in-person retailer visits and online trainings for retailers to become familiar with policies.<sup>49</sup> In Boston, compliance officers conducted in-person visits in multiple languages and provided a guidance list of prohibited flavored products that retailers cited as most helpful in complying with the new flavor policy.<sup>77</sup> In Columbus, Ohio, the city council created a Comprehensive Tobacco Cessation Education and Awareness campaign<sup>78</sup> to accompany its prohibition on the sale of flavored tobacco products to “connect residents addicted to nicotine to resources and programs through community events, youth education and training for medical professionals.”



- **Strong enforcement:** Enforcement plays a vital role in the ultimate success or failure of these policies. Assessing compliance with the policy through store audits or inspections is the first step to ensuring the removal of any remaining illegal products, along with identifying appropriate fines and license suspensions for violations. Massachusetts' positive experience in reducing e-cigarette sales was due to a slate of efforts, including issuing fines between \$1,000 to \$5,000 for violations as well as suspending tobacco sales for repeated offenses; implementing permit systems and inspections; naming a dedicated enforcement agency; and dedicating funding for these efforts.<sup>49</sup> California introduced a law in 2024 with similar fines and license suspensions for violations.<sup>79</sup>

States and localities that implement flavored tobacco policies may face additional challenges in making them successful. These may include budget constraints that limit effective enforcement as well as tobacco industry efforts to introduce and market rebranded products to evade enforcement, as seen in California and Massachusetts.<sup>75,76</sup>

# Action Needed Now on Flavored E-Cigarettes to Protect Public Health

This report demonstrates policies that prohibit the sale of flavored e-cigarettes significantly reduce e-cigarette sales and help to reduce youth access to and youth use of flavored e-cigarettes. Against a backdrop of rising national e-cigarette sales, the states that have implemented successful flavored tobacco policies offer powerful examples of what should happen on a national and local scale to prevent the increasing nicotine addiction among young people.

While some states and localities have made laudable progress when it comes to regulating e-cigarettes to protect the health of the public, more must be done to address youth e-cigarette use. The data highlighted in this report offer a clear and compelling direction: eliminating all flavored e-cigarettes will protect kids and address the high levels of youth use. Action is needed by all levels of government. There is an urgent need for comprehensive federal action to regulate e-cigarettes, and in the meantime, for states, localities and tribal nations to take action to protect their own populations through strong state and local flavored e-cigarette sales restrictions that clearly work.

Specific actions include:

- **Ongoing federal regulation that works to eliminate flavored e-cigarette products from the market is needed.** Preventing youth from using nicotine products hinges on the removal of all flavored products from the market, and e-cigarettes with the ability to deliver high levels of nicotine deserve special attention due to the risks of nicotine exposure to young people.
- **States, localities and tribal nations should continue their efforts to prohibit the sale of all flavored e-cigarettes,** with no flavor, product or retailer exemptions. Data and experience show as long as some flavored e-cigarettes remain available, young people will shift to buying and using these products and we will not succeed in driving down youth use. Historically, states and cities have been important incubators of effective strategies to reduce tobacco use. State-level sales data indicate that these policies drive down e-cigarette sales and can decrease subsequent youth e-cigarette use and are an important approach until more comprehensive federal policies are enacted.

- **Passing strong policies and educating retailers is key.** Policies should be comprehensive, including all flavors, all products and all retailers. Policy efforts should include community education with retailers and others to make everyone aware of which products are permitted under new laws.
- **Federal and statewide policies need strong enforcement** to effect real change in access to and use of flavored e-cigarettes. The federal government must take enforcement action against unauthorized products that continue to be sold illegally and ensure no new products are introduced. States need to prioritize enforcement with steady and adequate funding, retailer education, routine compliance checks and hefty fines and penalties. E-cigarette sales policies are only as effective as their enforcement.

- **Federal and statewide policies should anticipate tobacco industry strategies to evade regulation.** The tobacco industry has a history of quickly pivoting to new products – including disposable e-cigarettes, synthetic nicotine and cooling agents to mimic menthol – in response to regulation. The industry’s steady introduction of new products is designed to attract new users and maintain existing users to generate profit and stay one step ahead of regulation. Policy language must be carefully crafted to anticipate and address these strategies.

Left unchecked, sales of new, flavored e-cigarette products will continue to rise, accompanied by youth nicotine use and addiction. This report provides compelling data showing that urgent action is needed to remove flavored e-cigarettes from the marketplace. This comprehensive policy change can make a significant difference in curbing youth e-cigarette use and nicotine addiction.



# **Glossary and References**



# Glossary

**Concept flavors** – Concept flavors have vague, non-characterizing descriptions that do not expressly refer to flavors, such as “marigold,” “arctic” or “solar.”<sup>21,41</sup>

**Disposables** – Disposable e-cigarettes are intended to be thrown away once the e-liquid reservoir has been depleted. Disposables are not intended to be refillable, and they come in an array of flavors. Disposable e-cigarettes have increased in size and nicotine content in recent years, and some disposable-cigarettes can contain as much nicotine as several packs of cigarettes. Disposable e-cigarettes are the most commonly used device type among youth.<sup>23,34</sup>

**Electronic cigarettes (e-cigarettes)** – E-cigarettes, also called e-cigs, vapes, vape pens or electronic nicotine delivery systems (ENDS), are battery-operated devices that heat a liquid mixture to produce an aerosol. E-cigarettes come in a variety of sizes and shapes and most contain nicotine and flavoring.<sup>23</sup> E-cigarettes are reflective of products belonging to Circa's Electronic Smoking Devices syndicated category with custom research conducted by CDC Foundation.

**E-liquid** – E-liquid is the liquid that is converted into an aerosol through the use of an e-cigarette or vaping product. The e-liquid used in e-cigarettes usually contains nicotine, water, food grade flavoring, propylene glycol (PG) and vegetable glycerin (VG).<sup>23,80</sup>

**E-Cigarette or Vaping Associated Lung Injury (EVALI)** – In September 2019, there was a sudden increase in hospital admissions for patients with lung injuries related to e-cigarette use or vaping, later termed EVALI. By February 2020, a total of 2,807 hospitalized EVALI cases or deaths had been reported to CDC across the United States and its territories. As a result of EVALI cases, various states implemented emergency bans on e-cigarette products, causing e-cigarette sales to drop in those states.<sup>48</sup>

**FDA enforcement policy** – In response to the growing popularity of e-cigarettes among youth, the FDA issued a flavor guidance prohibiting all flavors except menthol in prefilled cartridge-based devices that became effective in February 2020. The policy did not apply to other devices, such as disposable products.<sup>22</sup>

**JUUL** – JUUL is a prefilled cartridge e-cigarette that was introduced to the market in 2015, and the product saw significant growth and popularity between 2016 and 2018. JUUL looks like a USB drive and was initially available in flavors that were found to be attractive to youth. In response to widespread criticism of the company's marketing to young people and rising youth e-cigarette use, JUUL voluntarily pulled four flavors (mango, fruit, creme and cucumber) from retail stores in November 2018 and ceased sales of its mint-flavored pods in November 2019, leaving only tobacco and menthol-flavored pods available.<sup>81</sup>

**Marketing authorization** – To legally market a tobacco product in the United States, a company must receive a written marketing order from the FDA. As of August 2024, the FDA has authorized 34 e-cigarettes, including four menthol flavored e-cigarettes. All other e-cigarettes, most of which are flavored, are unauthorized and illegal to be sold in the United States.<sup>22,82</sup>

**Marketing denial order (MDO)** – The FDA reviews all Premarket Tobacco Product Applications for marketing authorization of any new tobacco products. If the FDA issues a marketing denial order, then the tobacco products covered under the MDO cannot be legally introduced into the U.S. market.<sup>22,82</sup>

**Menthol** – Menthol is a chemical compound naturally found in peppermint and other mint plants. Menthol is added to tobacco products because it reduces the harshness of tobacco by creating a cooling sensation in the mouth and throat. Menthol is appealing to youth and young adults.<sup>18</sup>

**Monitoring the Future Survey** – Monitoring the Future is an ongoing study of the behaviors, attitudes and values of Americans from adolescence through adulthood. The survey includes questions related to tobacco use.<sup>10</sup>

**National Youth Tobacco Survey** – The National Youth Tobacco Survey (NYTS) is a school-based survey that collects information on tobacco use from middle school (grades 6 to 8) and high school (grades 9 to 12) students. NYTS includes measures on tobacco-related behaviors, attitudes, beliefs and exposure to pro- and anti-tobacco influences.<sup>7,13</sup>

**Nicotine** – Nicotine is a highly addictive, toxic chemical found in tobacco plants. Nicotine can harm brain development in youth and young adults. Synthetic nicotine is created in a laboratory as opposed to being derived from tobacco.<sup>3,4</sup>

**Prefilled cartridges** – E-cigarettes with a prefilled cartridge, also referred to as pods, are rechargeable and intended to be reused. As of the 2020 flavor guidance issued by the FDA, all flavors other than menthol and tobacco are restricted in prefilled cartridge systems.<sup>22,23</sup>

**Preemption** – Many states are not permitted to have local laws stronger than state laws when it comes to regulating tobacco products. This barrier, known as preemption, prevents local jurisdictions in many states from adopting strong flavor policies.<sup>47</sup>

**Retail sales data** – The CDC Foundation’s Monitoring E-Cigarette Use Among Youth project purchases and analyzes retail sales data on e-cigarettes sold at traditional retail outlets, not including vape shops or online sales, to show the shifting patterns in product sales. While retail sales data do not include sales from tobacco specialty stores and online retailers, it does provide a snapshot of real purchases in the e-cigarette market in near real time that can inform policy.<sup>30</sup>

**Standardized units** – Standardized units represent a ratio used to compare e-cigarette sales across different types of e-cigarette products. In the sales estimates presented in this report, five cartridges are equivalent to one disposable e-cigarette.<sup>6</sup>

### **Statewide flavored tobacco sales restrictions**

– The 2009 Family Smoking Prevention and Tobacco Control Act (TCA) gave the FDA authority over tobacco products and prohibited the sale of cigarettes with flavors other than menthol. In addition to the federal ban on flavored cigarettes, the TCA allows states and localities to implement additional restrictions on sales to address flavored non-cigarette tobacco products and their potential to appeal to youth and young adults. As a result, some states have implemented statewide restrictions on the sale of flavored tobacco products.<sup>37</sup>

**Synthetic cooling agents** – Mint and menthol flavored e-cigarettes are popular due to their “cooling” effect, which creates a less harsh sensation. In an attempt to evade flavored tobacco product sales restrictions, e-cigarette manufacturers started using synthetic cooling agents as additives to e-cigarettes to mimic the cooling effect of mint and menthol flavors. These non-menthol synthetic cooling agents are marketed in flavor such as “ice,” “cool,” “chill,” “frost” and “freeze.” The newest synthetic cooling agents have been marketed in flavors such as “clear,” clear ice” or unflavored.<sup>35,39,61,62</sup>

**Vape shops** – Vape shops are physical or online retailers where consumers can purchase a variety of vaping products and accessories. The FDA considers a vape shop a tobacco retailer if it sells e-liquids but does not mix or prepare e-liquids. If a vape shop is defined as being only for individuals 18 years and older, some states allow vape shops to be exempt from flavor restrictions. Sales from vape shops are not included in the retail sales data found in this report.<sup>83</sup>



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