



**Zoning Text Amendment (ZTA) No. 19-06, Vape Shops - Limited Use; Bill 29-19/Bill 31-19/Bill 32-19, Health and Sanitation – Electronic Cigarettes – Distribution, Use, and Possession/ Flavored Electronic Cigarettes**

---



Gregory Russ, Planner Coordinator, FP&P, [gregory.russ@montgomeryplanning.org](mailto:gregory.russ@montgomeryplanning.org), 301-495-2174



Jason Sartori, Chief, FP&P, [jason.sartori@montgomeryplanning.org](mailto:jason.sartori@montgomeryplanning.org), 301-495-2172

**Completed: 10/10/19**

---

### Description

Zoning Text Amendment (ZTA) 19-06 would add Vape Shop as a use allowed in certain zones as a limited use and establish the limited use standards for a Vape Shop. Three companion bills were also introduced to be adopted as Board of Health Regulations. Bill 29-19 would prohibit an electronic smoking devices manufacturer from distributing electronic cigarettes to retail stores within a certain distance of certain schools. Bill 31-19 would prohibit the distribution of any tobacco product, coupon redeemable for a tobacco product, cigarette rolling paper, or electronic cigarette to any individual under 21 except under certain circumstances. It would also prohibit an individual under 21 from using or possessing a tobacco product or electronic cigarette except under certain circumstances. Bill 32-19 would prohibit an electronic smoking devices manufacturer from distributing flavored electronic cigarettes to certain retail stores. ***This staff report addresses the changes to the Zoning Ordinance (ZTA provisions) and includes the companion bills for informational and contextual purposes only.***

### Summary

Staff recommends approval, with modifications, of ZTA 19-06 to add Vape Shop as a use allowed in certain zones as a limited use and establish the limited use standards for a Vape Shop.

One modification is that the Vape Shop definition be clarified to state that the Retail or Service Establishment must devote at least 51% of its floor area to the sale and display of electronic cigarettes to be classified as a Vape Shop. Otherwise, as written, a Vape Shop would be required to devote exactly 51% of its floor area to the sale and display of electronic cigarettes or allows vaping on site.

***One question staff raises (for clarification purposes) with the limited use standards is what constitutes an “established” middle or high school, in the context of a Vape Shop continuing as a nonconforming use if a middle or high school is “established” within 0.5 miles of a Vape Shop after the Vape Shop was established. Staff suggests possibly tying this provision to the issuance of a use and occupancy permit for the school.***

The ZTA limits the maximum floor area for a Vape Shop in the IL and IM zones to a maximum of 35% of the subject site’s FAR. This is consistent with the maximum percentage currently permitted for Retail/Service Establishment/Office, or Restaurant uses in the IL and IM zones.

**Finally, the amortization provision provides an existing Vape Shop that is located within 0.5 miles of a middle or high school a two-year timeframe to relocate.**

## **Background/Analysis**

As stated by one of the sponsors of the legislation, “Vaping has reached epidemic proportions among our youth. More than 3.6 million middle and high schoolers are currently using e-cigarettes.”

According to one of the sponsors, U.S. health officials identified approximately 450 possible cases of serious breathing illnesses in youth linked to vaping, including five in Maryland. In Montgomery County, three students were hospitalized after vaping on school grounds.

Nationwide there is a trend among youth of increasing use of e-cigarette and vaping devices. As such, the sponsors of the legislation believe that Montgomery County has the responsibility to restrict youth access to these devices beyond the typical measures, to prevent their addiction and the actualization of adverse health effects.

Montgomery County Health Officer Dr. Travis Gayles stated that vaping carries significant health risks, particularly for adolescents and young adults. Early exposure to nicotine can impact the development of key areas in the brain that are important for executive, higher-level functioning. Additionally, early exposure can increase a child’s level of dependence, withdrawal and initiation to other substances. There are also significant unknown risks given the recent cases of vaping-related respiratory illnesses.

The U.S. Food and Drug Administration (FDA) has recently issued more than 1,300 warning letters and fines to retailers that illegally sold e-cigarettes and other vaping products to minors, in what it calls “the largest coordinated enforcement effort in the FDA’s history<sup>1</sup>.” It has called e-cigarette use among teens an “epidemic.”

In addition to the statements above, the County Council staff provided background information on e-cigarette use and common health concerns associated with its usage. Staff has provided this information as Attachment 5 to the technical staff report. Below, staff provides some general findings of the background information:

### ***Use among youth***

- The Surgeon General's Advisory on e-cigarette use among youth notes that e-cigarette use among U.S. middle and high school students increased 900% during 2011-2015, before declining during 2015-2017.
- The Advisory also notes that e-cigarette use among high schoolers increased from 11.7% in 2017 to 20.8% in 2018.
- In 2018, 1 in 5 high school students and 1 in 20 middle school students use e-cigarettes.

---

<sup>1</sup> <https://www.fda.gov/news-events/press-announcements/fda-takes-new-steps-address-epidemic-youth-e-cigarette-use-including-historic-action-against-more>

- E-cigarettes are now the most commonly used tobacco product among youth, surpassing conventional cigarettes in 2014.

### **Health concerns**

- E-cigarettes often contain nicotine and exposure to nicotine during adolescence can impact learning, memory, and attention, and can increase the risk for future addiction to other drugs.
- In addition to concerns regarding nicotine, e-cigarettes can expose the user and bystanders to other harmful substances, including heavy metals, volatile organic compounds, and ultrafine particles that can be inhaled deeply into the lungs. The Centers for Disease Control is currently investigating an outbreak of lung illness associated with e-cigarette use.
- According to the 2018 National Youth Tobacco Survey (NYTS), many of the vaping devices contain significantly higher levels of addictive nicotine than traditional cigarettes, and in some cases, include additional harmful substances and drug paraphernalia.

### **ZTA 19-06 and Bills 29-19, 31-19, and 32-19**

*ZTA 19-06* would add Vape Shop as a new use to the use table as a limited use allowed only in all Commercial/Residential (CRN, CRT and CR), Employment (GR, NR, LSC and EOF), and Industrial (IL, IM and IH) zones. A Vape Shop is defined as “..any Retail or Service Establishment that devotes 51% of its floor area to the sale and display of electronic cigarettes or allows vaping on site. An electronic cigarette is any product containing or delivering nicotine or any other substance intended for human consumption that can be used by a person to simulate smoking through inhalation of vapor or aerosol from the product. The term electronic cigarette includes any such device, whether manufactured, distributed, marketed, or sold as an e-cigarette, e-cigar, e-pipe, e-hookah, or vape pen, or under any other product name or descriptor.”

**Staff recommends that the Vape Shop definition be clarified to state that the Retail or Service Establishment must devote at least 51% of its floor area to the sale and display of electronic cigarettes to be classified as a Vape Shop. Otherwise, as written, a Vape Shop would be required to devote exactly 51% of its floor area to the sale and display of electronic cigarettes or allows vaping on site.**

Under the proposed limited use standards of ZTA 19-06, a Vape Shop must be located at least 0.5 miles from any property in the County on which a middle or high school is located as a principal use and where a Vape Shop is allowed, access to the use must be prohibited to any person under the age of 21 years old. A Vape Shop may continue as a nonconforming use if a middle or high school is established within 0.5 miles of a Vape Shop after the Vape Shop was established. Further, in the IL and IM zones a Vape Shop may occupy a maximum of 35% of the mapped FAR on the subject site. Also under ZTA 19-06, an existing Vape Shop (existing as of the effective date of the adoption of ZTA 19-06) may continue to operate for 24 months after the effective date of the ZTA and then must cease to operate unless it meets the requirements for a Vape Shop under the standards in the ZTA.

**Staff has no objection to the proposed limited use standards for a Vape Shop given the intent to reduce access to e-cigarette products for County youth. *The one question staff raises (for clarification purposes) is what constitutes an “established” middle or high school in the context of a Vape Shop continuing as a nonconforming use if a middle or high school is “established” within 0.5 miles of a***

***Vape Shop after the Vape Shop was established. Staff suggests possibly tying this provision to the issuance of a use and occupancy permit for the school.***

**The maximum floor area restriction for a Vape Shop proposed in the IL and IM zones is consistent with the maximum percentage currently permitted for Retail/Service Establishment/Office, or Restaurant uses in the IL and IM zones. The amortization provision provides an existing Vape Shop that is located within 0.5 miles of a middle or high school a two-year timeframe to relocate. Staff has no objections to either of these components of the ZTA.**

Bill 29-19 would prohibit an electronic smoking devices manufacturer from distributing electronic cigarettes to retail stores within 0.5 miles of middle and high schools in the County. The Resolution would adopt the bill as a Board of Health regulation.

Bill 31-19 would update County law prohibiting the distribution of tobacco products, cigarette rolling paper, or coupons redeemable for tobacco to people under 21 (or 18 with military ID), extend the distribution prohibition to electronic cigarettes, and prohibit the use and possession of tobacco products and electronic cigarettes for people under 21 (or 18 with military ID).

State law, effective on October 1, raised the age to purchase tobacco products and electronic cigarettes to 21 (or 18 with military ID). Therefore Bill 31-19 updates County law to reflect state law changes and provides an enforcement mechanism for young people using and possessing tobacco products and electronic cigarettes.

Bill 32-19 would prohibit an electronic smoking devices manufacturer from distributing flavored electronic cigarettes to stores within 1 mile of an elementary, middle, or high school, library, park, playground, or recreational facility in the County. The Resolution would adopt the bill as a Board of Health regulation.

As stated by the legislation's sponsor, flavored electronic cigarettes have become very popular amongst the County's youth. According to preliminary results from the Centers for Disease Control and Prevention's annual National Youth Tobacco Survey, more than a quarter of high school students admitted to using e-cigarettes, and the majority cited the fruit, menthol and minty flavors. According to a report by the Surgeon General (*E-Cigarette Use Among Youth and Young Adults-2016*), these products are not harmless. They lead teens to become addicted to nicotine and may be implicated in the mysterious lung illnesses and deaths that have been linked to vaping.

#### GIS Findings

Attachment 6 depicts a map showing the locations of Vape Shops and other retail sales and service establishments located within 0.5 miles from a middle or high school located in Montgomery County. The results are summarized as follows:

- Vape Shops-18
- Beer and Wine stores-155
- Filling Stations-98
- Drugstores- 33
- Liquor Stores- 11

## Conclusion

Staff recommends approval, with modifications, of ZTA 19-06 to add Vape Shop as a use allowed in certain zones as a limited use and to establish the limited use standards for a Vape Shop. One modification is that the Vape Shop definition be clarified to state that the Retail or Service Establishment must devote at least 51% of its floor area to the sale and display of electronic cigarettes to be classified as a Vape Shop. The one question staff raises (for clarification purposes) is what constitutes an “established” middle or high school in the context of a Vape Shop continuing as a nonconforming use if a middle or high school is “established” within 0.5 miles of a Vape Shop after the Vape Shop was established. Staff suggests possibly tying this provision to the issuance of a use and occupancy permit for the school.

As stated above, the three companion bills (as Board of Health Regulations) are included only to provide context to the Zoning Text Amendment.

## **Attachments**

1. ZTA No. 19-06 as modified by staff
2. Bill 29-19 as introduced
3. Bill 31-19 as introduced
4. Bill 32-19 as introduced
5. 2016 Surgeon General Report executive summary; 2016 Surgeon General Report fact sheet; 2018 Surgeon General Advisory; CDC Quick Facts; 2018 National Youth Tobacco Survey; CDC Investigation Notice; Washington Post article; New York Times article
6. GIS Map of Existing Vape Shops and other Retail and Service Establishments where e-cigarettes and e-cigarette products can be sold within 0.5 miles of middle or high school

# ATTACHMENT 1

Zoning Text Amendment No.: 19-06  
Concerning: Vape Shops  
Draft No. & Date: 3 – 9/11/19  
Introduced: September 17, 2019  
Public Hearing:  
Adopted:  
Effective:  
Ordinance No.:

## COUNTY COUNCIL FOR MONTGOMERY COUNTY, MARYLAND SITTING AS THE DISTRICT COUNCIL FOR THAT PORTION OF THE MARYLAND-WASHINGTON REGIONAL DISTRICT WITHIN MONTGOMERY COUNTY, MARYLAND

---

Lead Sponsor: Councilmembers Albornoz and Rice  
Co-Sponsors: Councilmember Jawando, Council President Navarro, Councilmembers Hucker,  
Riemer, and Friedson, Council Vice President Katz, and Councilmember Glass

---

AN AMENDMENT to the Montgomery County Zoning Ordinance to:

- add Vape Shop as a use allowed in certain zones; and
- establish the standards for a Vape Shop

By amending the following sections of the Montgomery County Zoning Ordinance,  
Chapter 59 of the Montgomery County Code:

Division 1.4.	“Defined Terms”
Section 1.4.2.	“Specific Terms and Phrases Defined”
Division 3.1.	“Use Table”
Section 3.1.6.	“Use Table”
Division 3.5.	“Commercial Uses”
Section 3.5.11.	“Retail Sales and Service”

**EXPLANATION:** ***Boldface** indicates a Heading or a defined term.*

*Underlining indicates text that is added to existing law by the original text amendment.*

*[Single boldface brackets] indicate text that is deleted from existing law by the original text amendment.*

*Double underlining indicates text that is added to the text amendment by amendment.*

*[[Double boldface brackets]] indicate text that is deleted from the text amendment by amendment.*

*\* \* \* indicates existing law unaffected by the text amendment.*

*ORDINANCE*

*The County Council for Montgomery County, Maryland, sitting as the District Council for that portion of the Maryland-Washington Regional District in Montgomery County, Maryland, approves the following ordinance:*

**Sec. 1. Division 1.4 is amended as follows:**

**Division 1.4. Defined Terms**

**Section 1.4.2. Specific Terms and Phrases Defined**

\* \* \*

**Vape Shop:** See Section 3.5.11.E.1.

\* \* \*

**Sec. 2. Division 3.1 is amended as follows:**

**Division 3.1. Use Table**

\* \* \*

**Section 3.1.6. Use Table**

The following Use Table identifies uses allowed in each zone. Uses may be modified in Overlay zones under Division 4.9.

USE OR USE GROUP	Definitions and Standards	Ag	Rural Residential				Residential												Commercial/ Residential			Employment				Industrial		
		AR	R	RC	RNC	Residential Detached							Residential Townhouse			Residential Multi-Unit			CRN	CRT	CR	GR	NR	LSC	EOF	IL	I M	IH
						RE-2	RE-2C	RE-1	R-200	R-90	R-60	R-40	TLD	TMD	THD	R-30	R-20	R-10										
* * *																												
COMMERCIAL																												
* * *																												
Retail Sales and Service	3.5.11																											
* * *																												
Retail/Service Establishment (Up to 5,000 SF)	3.5.11.B																	L	P	P	P	P	P	L	L	L	L	L
* * *																												
<u>Vape Shop</u>	<u>3.5.11E</u>																		L	L	L	L	L	L	L	L	L	L
* * *																												

13 **Key:** P = Permitted Use L = Limited Use C = Conditional Use Blank Cell = Use Not Allowed

**Sec. 3. Division 3.5 is amended as follows:**

**Division 3.5. Commercial Uses**

\* \* \*

**Section 3.5.11. Retail Sales and Service**

\* \* \*

**E. Vape Shop**

**1. Defined**

Vape Shop means any Retail or Service Establishment that devotes at least 51% of its floor area to the sale and display of electronic cigarettes or allows vaping on site. An electronic cigarette is any product containing or delivering nicotine or any other substance intended for human consumption that can be used by a person to simulate smoking through inhalation of vapor or aerosol from the product. The term electronic cigarette includes any such device, whether manufactured, distributed, marketed, or sold as an e-cigarette, e-cigar, e-pipe, e-hookah, or vape pen, or under any other product name or descriptor.

**2. Use Standards**

Where a Vape Shop is allowed as a limited use, it must satisfy the following standards:

- a. Access to the Vape Shop must be prohibited to any person under the age of 21 years old.
- b. The Vape Shop must be located a minimum of 0.5 miles from any property on which a middle school or high school is located as a principal use.

c. A Vape Shop may continue as a nonconforming use if a middle or high school is established within 0.5 miles of a Vape Shop after the Vape Shop was established.

d. In the IL and IM zones, a Vape Shop may occupy a maximum of 35% of the mapped FAR on the subject site.

**3. Amortization period**

To provide for a reasonable period of amortization and to prevent unreasonable economic loss, any Vape Shop existing on {effective date} which does not conform to the requirements of this section may continue to operate for 24 months following the effective date of the amendment. On or after that date, a Vape Shop may continue in operation only if it meets the requirements of Section 59.3.5.11E.

\* \* \*

**Sec. 4. Effective date.** This ordinance becomes effective 90 days after the date of Council adoption.

This is a correct copy of Council action.

---

Mary Anne Paradise  
Acting Clerk of the Council

## ATTACHMENT 2

Bill No. 29-19  
Concerning: Health and Sanitation –  
Electronic Cigarettes - Distribution  
Revised: 9/4/2019 Draft No. 1  
Introduced: September 17, 2019  
Expires: March 17, 2019  
Enacted: \_\_\_\_\_  
Executive: \_\_\_\_\_  
Effective: \_\_\_\_\_  
Sunset Date: None  
Ch. \_\_\_\_\_, Laws of Mont. Co. \_\_\_\_\_

### COUNTY COUNCIL FOR MONTGOMERY COUNTY, MARYLAND

---

Lead Sponsor: Councilmembers Alborno and Rice  
Co-Sponsors: Councilmember Jawando, Council President Navarro, Councilmembers Hucker,  
Riemer, and Friedson, Council Vice President Katz, and Councilmember Glass

---

**AN ACT** to:

- (1) prohibit an electronic smoking devices manufacturer from distributing electronic cigarettes to retail stores within a certain distance of certain schools; and
- (2) generally amend County law regarding smoking, electronic cigarettes, and health and sanitation.

By amending

Montgomery County Code  
Chapter 24, Health and Sanitation  
Section 24-15

<b>Boldface</b>	<i>Heading or defined term.</i>
<u>Underlining</u>	<i>Added to existing law by original bill.</i>
<b>[Single boldface brackets]</b>	<i>Deleted from existing law by original bill.</i>
<u>Double underlining</u>	<i>Added by amendment.</i>
<b>[[Double boldface brackets]]</b>	<i>Deleted from existing law or the bill by amendment.</i>
* * *	<i>Existing law unaffected by bill.</i>

*The County Council for Montgomery County, Maryland approves the following Act:*

**Sec. 1. Section 24-15 is amended as follows:**

**[24-15] 24-16 — 24-21. Reserved.**

**24-15. Distribution of electronic cigarettes near certain schools.**

(a) Definition. In this Section, the following words have the meanings indicated:

Distribute means to:

(1) give away, sell, deliver, dispense, or issue;

(2) offer to give away, sell, deliver, dispense, or issue; or

(3) cause or hire any person to give away, sell, deliver, dispense, or issue or offer to give away, sell, deliver, dispense, or issue.

Manufacturer means an electronic smoking devices manufacturer as defined in Section 16.7-101 of the Business Regulations Article of the Maryland Code.

(b) Unlawful distribution. A manufacturer must not distribute any electronic cigarette to any retail store within 0.5 miles of any middle school or high school in the County.

*Approved:*

---

Nancy Navarro, President, County Council

Date

*Approved:*

---

Marc Elrich, County Executive

Date

*This is a correct copy of Council action.*

---

Mary Anne Paradise, Acting Clerk of the Council

Date

Bill No. 31-19  
 Concerning: Health and Sanitation --  
Electronic Cigarettes -- Distribution,  
Use, and Possession  
 Revised: 9/17/2019 Draft No. 2  
 Introduced: September 24, 2019  
 Expires: March 24, 2021  
 Enacted: \_\_\_\_\_  
 Executive: \_\_\_\_\_  
 Effective: \_\_\_\_\_  
 Sunset Date: None  
 Ch. \_\_\_\_\_, Laws of Mont. Co. \_\_\_\_\_

## COUNTY COUNCIL FOR MONTGOMERY COUNTY, MARYLAND

---

Lead Sponsors: Councilmembers Hucker and Albornoz

---

### AN ACT to:

- (1) prohibit the distribution of any tobacco product, coupon redeemable for a tobacco product, cigarette rolling paper, or electronic cigarette to any individual under 21 except under certain circumstances;
- (2) prohibit an individual under 21 from using or possessing a tobacco product or electronic cigarette except under certain circumstances; and
- (2) generally amend County law regarding smoking, electronic cigarettes, and health and sanitation.

### By amending

Montgomery County Code  
 Chapter 24, Health and Sanitation  
 Sections 24-9, 24-11, and 24-13

<b>Boldface</b>	<i>Heading or defined term.</i>
<u>Underlining</u>	<i>Added to existing law by original bill.</i>
[Single boldface brackets]	<i>Deleted from existing law by original bill.</i>
<u>Double underlining</u>	<i>Added by amendment.</i>
[[Double boldface brackets]]	<i>Deleted from existing law or the bill by amendment.</i>
* * *	<i>Existing law unaffected by bill.</i>

*The County Council for Montgomery County, Maryland approves the following Act:*

**Sec. 1. Sections 24-9, 24-11, and 24-13 are amended as follows:**

**24-9. [Smoking] Definitions; smoking and using electronic cigarettes in public places.**

(a) *Definitions.* In this Article, the following words and phrases have the meanings indicated:

\* \* \*

*Electronic cigarette* means any product containing or delivering nicotine or any other substance intended for human consumption that can be used by a person to simulate smoking through inhalation of vapor or aerosol from the product. The term includes any such device, whether manufactured, distributed, marketed, or sold as an e-cigarette, e-cigar, e-pipe, e-hookah, or vape pen, or under any other product name or descriptor. *Electronic cigarette* includes any component, part, or accessory of an electronic cigarette, whether or not sold separately, that is used during the operation of the electronic cigarette, but does not include any battery or battery charger that is sold separately.

\* \* \*

**24-11. Distribution of tobacco products and electronic cigarettes to [minors] certain persons.**

(a) *Definitions.* In this Section the following words have the meanings indicated.

[(1) *Tobacco product* means any substance containing tobacco, including cigarettes, cigars, smoking tobacco, snuff, or smokeless tobacco.]

[(2)] *Distribute* means to:

**[(A)] (1)** give away, sell, deliver, dispense, or issue;

~~[(B)]~~ (2) offer to give away, sell, deliver, dispense, or issue; or

28                   [(C)] (3) cause or hire any person to give away, sell, deliver,  
29                                   dispense, or issue or offer to give away, sell, deliver,  
30                                   dispense, or issue.

31                   Electronic cigarette has the same meaning as in Section 24-9.

32                   Tobacco product means any substance containing tobacco, including  
33                   cigarettes, cigars, smoking tobacco, snuff, or smokeless tobacco.

34                   (b) *Unlawful distribution.*

35                   (1) A person engaged in the business of selling or otherwise  
36                   distributing tobacco products for commercial purposes must not{:

37                   (i)] distribute any tobacco product, cigarette rolling paper,  
38                                   coupon redeemable for any tobacco product, or electronic  
39                                   cigarette to [a minor] an individual under 21 years old,  
40                                   unless:

41                   (A) the [minor] individual is acting solely as the agent of the  
42                                   minor's employer who is engaged in the business of  
43                                   distributing tobacco products; or

44                   (B) the individual is:

45                                   (i) at least 18 years of age;

46                                   (ii) is an active duty member of the military; and

47                                   (iii) presents a valid military identification.

48                   [(ii) distribute cigarette rolling papers to a minor; or

49                   (iii) distribute to a minor a coupon redeemable for any tobacco  
50                                   product.]

51                   (2) A person, who is not a person described under paragraph (b)(1),  
52                                   must not[:]

53                   [(i)] buy for, [or] sell to, or deliver to [a minor] an individual  
54                                   under 21 years old any tobacco product, cigarette rolling

55 papers, or electronic cigarette[; or], unless the individual  
 56 under 21 years old is:

57 (A) at least 18 years of age;

58 (B) is an active duty member of the military; and

59 (C) presents a valid military identification.

60 [(ii) deliver or sell to a minor cigarette rolling papers.]

61 (c) Subsection (b) does not apply to the distribution of a coupon which is  
 62 redeemable for any tobacco product when the coupon is contained in a  
 63 newspaper, a magazine, or any other type of publication in which the  
 64 coupon is incidental to the primary purpose of the publication, or sent  
 65 through the mail.

66 (d) A person has not violated this Section if:

67 (1) that person examined a driver's license, military identification, or  
 68 another valid identification issued by an employer, a government  
 69 entity, or an institution of higher education; and

70 (2) that license or other identification positively identified the buyer or  
 71 recipient of a tobacco product or electronic cigarette as at least [18]  
 72 21 years old or is at least 18 years old and has a valid military  
 73 identification.

74 (e) If [a minor] an individual under 21 years old bought a tobacco product or  
 75 electronic cigarette from a vending machine, this Section does not apply  
 76 to the owner of the vending machine or any other person with control  
 77 over the vending machine.

78 (f) A person who violates this Section is liable for a civil violation. The  
 79 maximum civil fine is \$1000 for a first offense and \$1000 for each  
 80 subsequent offense.

81 **24-13. Use and possession of tobacco products or electronic cigarettes by [minors]**  
82 **certain persons prohibited.**

83 A person under [18] 21 years old must not use or possess a tobacco product or  
84 an electronic cigarette unless that person is:

- 85 (a) at least 18 years of age;  
86 (b) is an active duty member of the military; and  
87 (c) presents a valid military identification.

## LEGISLATIVE REQUEST REPORT

Bill 31-19

*Health and Sanitation – Electronic Cigarettes – Distribution, Use, and Possession*

<b>DESCRIPTION:</b>	Bill 31-19 would update County law prohibiting the distribution of tobacco products, cigarette rolling paper, or coupons redeemable for tobacco to people under 21 (or 18 with military ID), extend the distribution prohibition to electronic cigarettes, and prohibit the use and possession of tobacco products and electronic cigarettes for people under 21 (or 18 with military ID).
<b>PROBLEM:</b>	State law, set to become effective October 1, raises the age to purchase tobacco products and electronic cigarettes to 21 (or 18 with military ID). This same law repeals provisions related to the use and possession of tobacco products. There is therefore a void in the law.
<b>GOALS AND OBJECTIVES:</b>	To update County law to reflect state law changes and provide an enforcement mechanism for young people using and possessing tobacco products and electronic cigarettes.
<b>COORDINATION:</b>	Health and Human Services
<b>FISCAL IMPACT:</b>	To be requested.
<b>ECONOMIC IMPACT:</b>	To be requested.
<b>EVALUATION:</b>	Not applicable.
<b>EXPERIENCE ELSEWHERE:</b>	Not applicable.
<b>SOURCE OF INFORMATION:</b>	Amanda Mihill, Legislative Attorney (240) 777-7815
<b>APPLICATION WITHIN MUNICIPALITIES:</b>	To be researched.
<b>PENALTIES:</b>	Not applicable.

6

Bill No. 32-19  
 Concerning: Health and Sanitation  
Flavored Electronic Cigarettes  
 Revised: 9/25/2019 Draft No. 4  
 Introduced: October 1, 2019  
 Expires: April 1, 2021  
 Enacted: \_\_\_\_\_  
 Executive: \_\_\_\_\_  
 Effective: \_\_\_\_\_  
 Sunset Date: None  
 Ch. \_\_\_\_\_, Laws of Mont. Co. \_\_\_\_\_

## COUNTY COUNCIL FOR MONTGOMERY COUNTY, MARYLAND

---

Lead Sponsors: Councilmembers Riemer and Alborno  
 Co-Sponsor: Hucker

---

**AN ACT** to:

- (1) prohibit an electronic smoking devices manufacturer from distributing flavored electronic cigarettes to certain retail stores in the County; and
- (2) generally amend County law regarding smoking, electronic cigarettes, and health and sanitation.

By amending

Montgomery County Code  
 Chapter 24, Health and Sanitation  
 Section 24-15

<b>Boldface</b>	<i>Heading or defined term.</i>
<u>Underlining</u>	<i>Added to existing law by original bill.</i>
[Single boldface brackets]	<i>Deleted from existing law by original bill.</i>
<u>Double underlining</u>	<i>Added by amendment.</i>
[[Double boldface brackets]]	<i>Deleted from existing law or the bill by amendment.</i>
* * *	<i>Existing law unaffected by bill.</i>

*The County Council for Montgomery County, Maryland approves the following Act:*

1           Sec. 1. Section 24-15 is amended as follows:

2   [24-15] 24-16 — 24-21. Reserved.

3   24-15. Distribution of flavored electronic cigarettes.

4           (a) Definition. In this Section, the following words have the meanings  
5           indicated:

6           Characterizing flavor means a distinguishing taste or aroma, other than  
7           the taste or aroma of tobacco, imparted either before or during use of an  
8           electronic cigarette or component part. Characterizing flavor includes  
9           any taste or aroma relating to any fruit, mint, menthol, wintergreen,  
10          chocolate, vanilla, honey, candy, cocoa, dessert, alcoholic beverage, herb,  
11          or spice. However, an electronic cigarette is not deemed to have a  
12          characterizing flavor solely because of the use of additives or flavorings  
13          or the provision of ingredient information.

14          Constituent means any ingredient, substance, chemical, or compound,  
15          other than nicotine, tobacco, water, or reconstituted tobacco sheet, that is  
16          added by the manufacturer to an electronic cigarette during the  
17          processing, manufacture or packing of the electronic cigarette.

18          Distribute means to:

19           (1) give away, sell, deliver, dispense, or issue;

20           (2) offer to give away, sell, deliver, dispense, or issue; or

21           (3) cause or hire any person to give away, sell, deliver, dispense, or  
22           issue or offer to give away, sell, deliver, dispense, or issue.

23          Flavored electronic cigarette means any electronic cigarette or any  
24          component part thereof that contains a constituent that imparts a  
25          characterizing flavor.

26           Manufacturer means an electronic smoking devices manufacturer as  
 27           defined in Section 16.7-101 of the Business Regulations Article of the  
 28           Maryland Code.  
 29           (b) Unlawful distribution. A manufacturer must not distribute any flavored  
 30           electronic cigarette to any retail store within 1.0 mile of any elementary,  
 31           middle, or high school, library, park, playground, or recreational facility  
 32           in the County.

33   *Approved:*

34

\_\_\_\_\_  
 Nancy Navarro, President, County Council

\_\_\_\_\_  
 Date

35   *Approved:*

36

\_\_\_\_\_  
 Marc Elrich, County Executive

\_\_\_\_\_  
 Date

37   *This is a correct copy of Council action.*

38

\_\_\_\_\_  
 Mary Anne Paradise, Acting Clerk of the Council

\_\_\_\_\_  
 Date

Resolution No.:

Introduced:

October 1, 2019

Adopted:

**COUNTY COUNCIL  
FOR MONTGOMERY COUNTY, MARYLAND  
SITTING AS THE MONTGOMERY COUNTY BOARD OF HEALTH**

---

Lead Sponsors: Councilmembers Riemer and Alborno  
Co-Sponsor Councilmember Hucker

---

**SUBJECT:** Resolution to adopt Bill 32-19, Health and Sanitation – Flavored Electronic Cigarettes

**Background**

1. County Code §2-65, as amended, provides that the County Council is, and may act as, the County Board of Health, and in that capacity may adopt any regulation which a local Board of Health is authorized to adopt under state law.
2. Maryland Code Health-General Article §3-202 authorizes the County Board of Health to adopt rules and regulations regarding any nuisance or cause of disease in the County.
3. On {DATE}, the Council held a public hearing on this regulation. As required by law, each municipality in the County and the public were properly notified of this hearing.
4. On {DATE}, the County Council enacted Bill 32-19, Health and Sanitation – Flavored Electronic Cigarettes. Bill 32-19 prohibited the distribution of flavored electronic cigarettes to retail stores in the County.
5. The County Council, sitting as the Board of Health, finds after reviewing the evidence in the record that prohibiting the distribution of flavored electronic cigarettes to retail stores as required by this Regulation is necessary to protect the health of County residents.

**Action**

The County Council for Montgomery County, Maryland, sitting as the County Board of Health, approves the following resolution:

1. The provisions of Section 24-15 of the Montgomery County Code, entitled "Distribution of flavored electronic cigarettes." as added by Bill 32-19, Health and Sanitation – Flavored Electronic Cigarettes, are adopted as a Board of Health regulation. A copy of Bill 32-19 is attached to this resolution.
2. This resolution takes effect 90 days after adoption.

This is a correct copy of Council action.

---

Mary Anne Paradise,  
Acting Clerk of the Council

F:\LAW\Resolutions\Board Of Health\Flavored E-Cig\Board Of Health Regulation.Docx

## LEGISLATIVE REQUEST REPORT

Bill 32-19

*Health and Sanitation – Flavored Electronic Cigarettes*

<b>DESCRIPTION:</b>	Bill 32-19 would prohibit an electronic smoking devices manufacturer from distributing flavored electronic cigarettes to certain retail stores in the County.
<b>PROBLEM:</b>	There is a rapid rise in e-cigarette use among youth and the associated health concerns.
<b>GOALS AND OBJECTIVES:</b>	To reduce access to e-cigarette products for County youth.
<b>COORDINATION:</b>	Health and Human Services
<b>FISCAL IMPACT:</b>	To be requested
<b>ECONOMIC IMPACT:</b>	To be requested
<b>EVALUATION:</b>	To be researched
<b>EXPERIENCE ELSEWHERE:</b>	To be researched
<b>SOURCE OF INFORMATION:</b>	Amanda Mihill, Legislative Attorney (240) 777-7815
<b>APPLICATION WITHIN MUNICIPALITIES:</b>	To be researched.
<b>PENALTIES:</b>	Class C violation

# **E-Cigarette Use Among Youth and Young Adults**

A Report of the Surgeon General  
**Executive Summary**



U.S. Department of Health and Human Services

# E-Cigarette Use Among Youth and Young Adults

---

A Report of the Surgeon General

## Executive Summary

2016

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Office of the Surgeon General  
Rockville, MD



#### **Suggested Citation**

U.S. Department of Health and Human Services. *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General—Executive Summary*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.

#### **For more information**

For more information about the Surgeon General's report, visit [www.surgeongeneral.gov](http://www.surgeongeneral.gov). To download copies of this document, go to [www.cdc.gov/tobacco](http://www.cdc.gov/tobacco).

To order copies of this document, go to [www.cdc.gov/tobacco](http://www.cdc.gov/tobacco) and click on Publications Catalog or call 1-800-CDC-INFO (1-800-232-4636); TTY: 1-888-232-6348.

Use of trade names is for identification only and does not constitute endorsement by the Department of Health and Human Services. Any recommendations expressed by nongovernmental individuals or organizations do not necessarily represent the views or opinions of the U.S. Department of Health and Human Services.

**Message from Sylvia Burwell**  
*Secretary, U.S. Department of Health and Human Services*

The mission of the Department of Health and Human Services is to enhance and protect the health and well-being of all Americans. This report confirms that the use of electronic cigarettes (or e-cigarettes) is growing rapidly among American youth and young adults. While these products are novel, we know they contain harmful ingredients that are dangerous to youth. Important strides have been made over the past several decades in reducing conventional cigarette smoking among youth and young adults. We must make sure this progress is not compromised by the initiation and use of new tobacco products, such as e-cigarettes. That work is already underway.

To protect young people from initiating or continuing the use of e-cigarettes, actions must be taken at the federal, state, and local levels. At the federal level, the U.S. Food and Drug Administration (FDA)—under authority granted to it by Congress under the *Family Smoking Prevention and Tobacco Control Act of 2009*—took a historic step to protect America's youth from the harmful effects of using e-cigarettes by extending its regulatory authority over the manufacturing, distribution, and marketing of e-cigarettes. Through such action, FDA now requires minimum age restrictions to prevent sales to minors and prohibits sales through vending machines (in any facility that admits youth), and will require products to carry a nicotine warning.

We have more to do to help protect Americans from the dangers of tobacco and nicotine, especially our youth. As cigarette smoking among those under 18 has fallen, the use of other nicotine products, including e-cigarettes, has taken a drastic leap. All of this is creating a new generation of Americans who are at risk of nicotine addiction.

The findings from this report reinforce the need to support evidence-based programs to prevent youth and young adults from using tobacco in any form, including e-cigarettes. The health and well-being of our nation's young people depend on it.

## Foreword

Tobacco use among youth and young adults in any form, including e-cigarettes, is not safe. In recent years, e-cigarette use by youth and young adults has increased at an alarming rate. E-cigarettes are now the most commonly used tobacco product among youth in the United States. This timely report highlights the rapidly changing patterns of e-cigarette use among youth and young adults, assesses what we know about the health effects of using these products, and describes strategies that tobacco companies use to recruit our nation's youth and young adults to try and continue using e-cigarettes. The report also outlines interventions that can be adopted to minimize the harm these products cause to our nation's youth.

E-cigarettes are tobacco products that deliver nicotine. Nicotine is a highly addictive substance, and many of today's youth who are using e-cigarettes could become tomorrow's cigarette smokers. Nicotine exposure can also harm brain development in ways that may affect the health and mental health of our kids.

E-cigarette use among youth and young adults is associated with the use of other tobacco products, including conventional cigarettes. Because most tobacco use is established during adolescence, actions to prevent our nation's young people from the potential of a lifetime of nicotine addiction are critical.

E-cigarette companies appear to be using many of the advertising tactics the tobacco industry used to persuade a new generation of young people to use their products. Companies are promoting their products through television and radio advertisements that use celebrities, sexual content, and claims of independence to glamorize these addictive products and make them appealing to young people.

Comprehensive tobacco control and prevention strategies for youth and young adults should address all tobacco products, including e-cigarettes. Further reductions in tobacco use and initiation among youth and young adults are achievable by regulating the manufacturing, distribution, marketing, and sales of all tobacco products—including e-cigarettes, and particularly to children—and combining those approaches with other proven strategies. These strategies include funding tobacco control programs at levels recommended by the Centers for Disease Control and Prevention (CDC); increasing prices of tobacco products; implementing and enforcing comprehensive smokefree laws; and sustaining hard-hitting media campaigns, such as CDC's *Tips from Former Smokers* that encourages smokers to quit for good, and FDA's *Real Cost* that is aimed at preventing youth from trying tobacco and reducing the number of youth who move from experimenting to regular use. We can implement these cost-effective, evidence-based, life-saving strategies now. Together with additional effort and support, we can protect the health of our nation's young people.

Thomas R. Frieden, M.D., M.P.H.  
Director  
Centers for Disease Control and Prevention

## **Preface**

*from the Surgeon General*

E-cigarette use among U.S. youth and young adults is now a major public health concern. E-cigarette use has increased considerably in recent years, growing an astounding 900% among high school students from 2011 to 2015. These products are now the most commonly used form of tobacco among youth in the United States, surpassing conventional tobacco products, including cigarettes, cigars, chewing tobacco, and hookahs. Most e-cigarettes contain nicotine, which can cause addiction and can harm the developing adolescent brain.

Compared with older adults, the brain of youth and young adults is more vulnerable to the negative consequences of nicotine exposure. The effects include addiction, priming for use of other addictive substances, reduced impulse control, deficits in attention and cognition, and mood disorders. Furthermore, fetal exposure to nicotine during pregnancy can result in multiple adverse consequences, including sudden infant death syndrome, altered corpus callosum, auditory processing deficits, effects on behaviors and obesity, and deficits in attention and cognition. Ingestion of e-cigarette liquids containing nicotine can also cause acute toxicity and possibly death if the contents of refill cartridges or bottles containing nicotine are consumed.

This report highlights what we know and do not know about e-cigarettes. Gaps in scientific evidence do exist, and this report is being issued while these products and their patterns of use continue to change quickly. For example, the health effects and potentially harmful doses of heated and aerosolized constituents of e-cigarette liquids—including solvents, flavorants, and toxicants—are not completely understood. However, although e-cigarettes generally emit fewer toxicants than combustible tobacco products, we know that aerosol from e-cigarettes is not harmless.

Although we continue to learn more about e-cigarettes with each passing day, we currently know enough to take action to protect our nation's young people from being harmed by these products. Previous reports of the Surgeon General have established that nearly all habitual tobacco use begins during youth and young adulthood. To prevent and reduce the use of e-cigarettes by youth and young adults, we must work together as a society. We must implement proven prevention and education strategies. Health care providers, parents, teachers, and other caregivers should advise youth about the dangers of nicotine and discourage tobacco use in any form, including e-cigarettes. They can set a positive example by being tobacco-free and encouraging those who already use these products to quit. Free help is available at 1-800-QUIT-NOW or <http://www.smokefree.gov>. Preventing tobacco use in any form among youth and young adults is critical to ending the tobacco epidemic in the United States.

Vivek H. Murthy, M.D., M.B.A.  
U.S. Surgeon General

## Overview

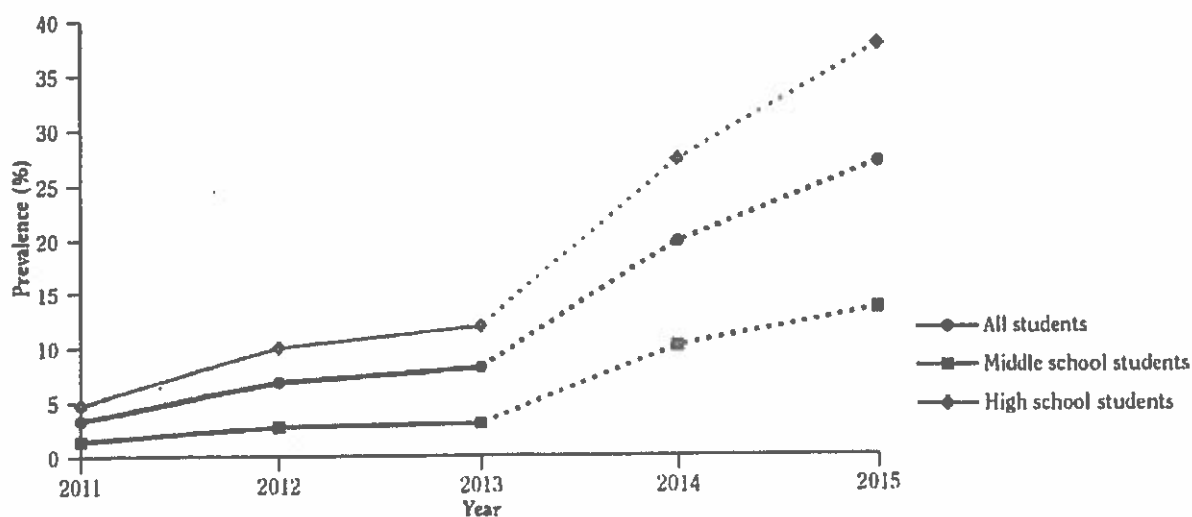
Although conventional cigarette smoking has declined markedly over the past several decades among youth and young adults in the United States (U.S. Department of Health and Human Services [USDHHS] 2012), there have been substantial increases in the use of emerging tobacco products among these populations in recent years (Centers for Disease Control and Prevention [CDC] 2015, 2016). Among these increases there has been a dramatic rise in electronic cigarette (e-cigarette) use among youth and young adults (Figures 1, 2, and 3). It is crucial that the progress made in reducing conventional cigarette smoking among youth and young adults not be compromised by the initiation and use of e-cigarettes. This Surgeon General's report focuses on the history, epidemiology, and health effects of e-cigarette use among youth and young adults; the companies involved with marketing and promoting these products; and existing and proposed public health policies regarding the use of these products by youth and young adults.

E-cigarettes include a diverse group of devices that allow users to inhale an aerosol, which typically contains nicotine, flavorings, and other additives. E-cigarettes are tobacco products and are regulated as such under the

*Federal Food, Drug, and Cosmetic Act*, as amended by the *Family Smoking Prevention and Tobacco Control Act of 2009*. E-cigarettes vary widely in design and appearance, but generally operate in a similar manner and are composed of similar components (Figure 4). A key challenge for surveillance of the products and understanding their patterns of use is the diverse and nonstandard nomenclature for the devices (Alexander et al. 2016). These devices are referred to, by the companies themselves, and by consumers, as "e-cigarettes," "e-cigs," "cigalikes," "e-hookahs," "mods," "vape pens," "vapes," and "tank systems." This report employs the term "e-cigarette" to represent all of the diverse products in this rapidly diversifying product category.

This report focuses on research conducted among youth and young adults because of the implications of e-cigarette use in these populations, particularly the potential for future public health problems. Understanding e-cigarette use among young people is critical because previous research suggests that about 9 in 10 adult smokers first try conventional cigarettes during adolescence (USDHHS 2012). Similarly, youth e-cigarette experimentation and use could also extend into adulthood; ongoing

**Figure 1 Trends in ever e-cigarette use<sup>a</sup> among U.S. middle and high school students; National Youth Tobacco Survey (NYTS) 2011–2015**

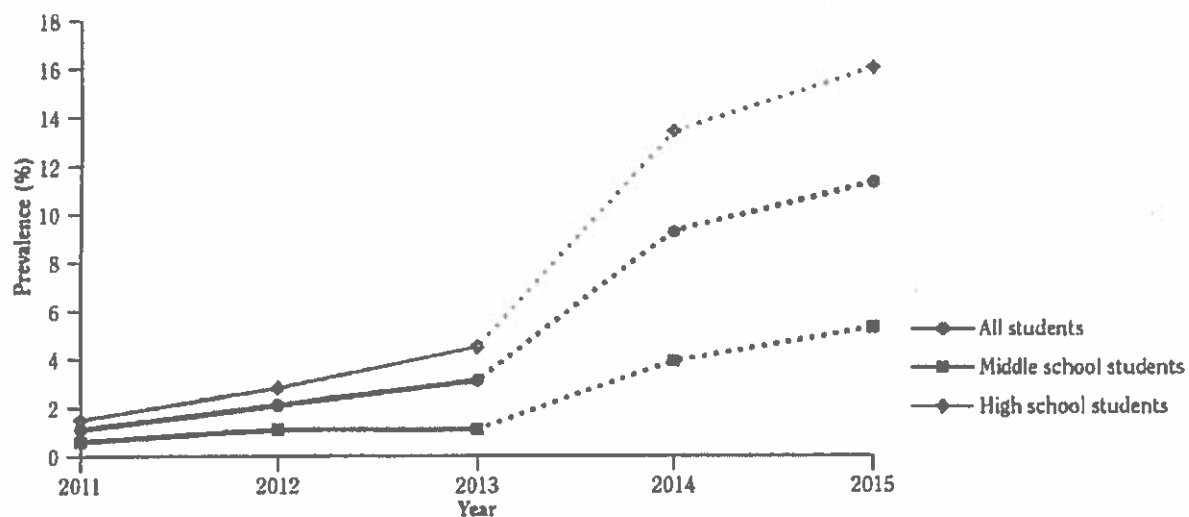


Source: Centers for Disease Control and Prevention 2013, 2014; unpublished data (data: NYTS 2015).

Note: In 2014, modifications were made to the e-cigarette measure to enhance its accuracy, which may limit the comparability of this estimate to those collected in previous years. The dotted lines from 2013 to 2015 represent these differences.

<sup>a</sup>Includes those who responded "yes" to the following question: "Have you ever used an electronic cigarette or e-cigarette, even once or twice?"

**Figure 2** Trends in past-30-day e-cigarette use<sup>a</sup> among U.S. middle and high school students; National Youth Tobacco Survey (NYTS) 2011–2015

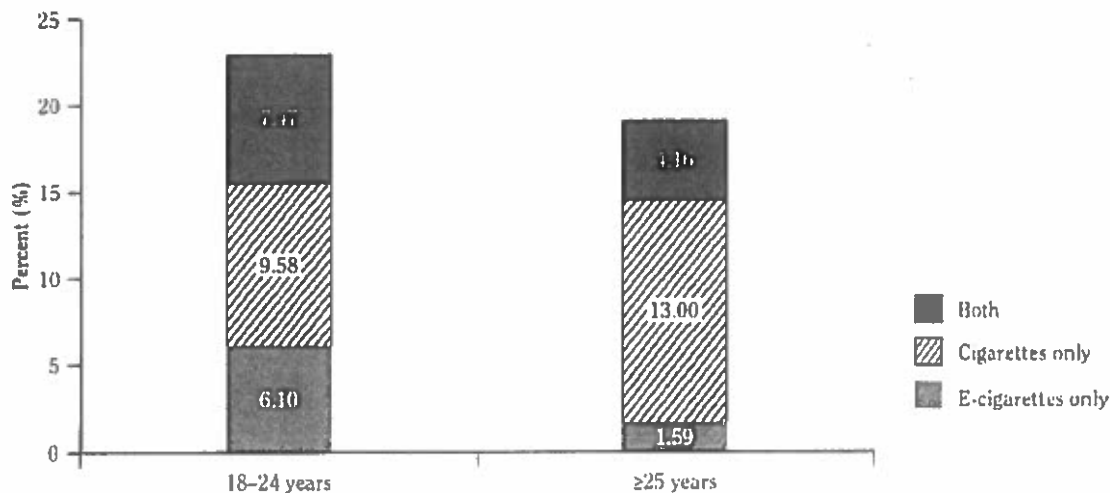


Source: Centers for Disease Control and Prevention 2013, 2014; unpublished data (data: NYTS 2015).

Note: In 2014, modifications were made to the e-cigarette measure to enhance its accuracy, which may limit the comparability of this estimate to those collected in previous years. The dotted lines from 2013 to 2015 represent these differences.

<sup>a</sup>Includes those who selected "1 or more" for the following question: "During the last 30 days, on how many days did you use electronic cigarettes or e-cigarettes?"

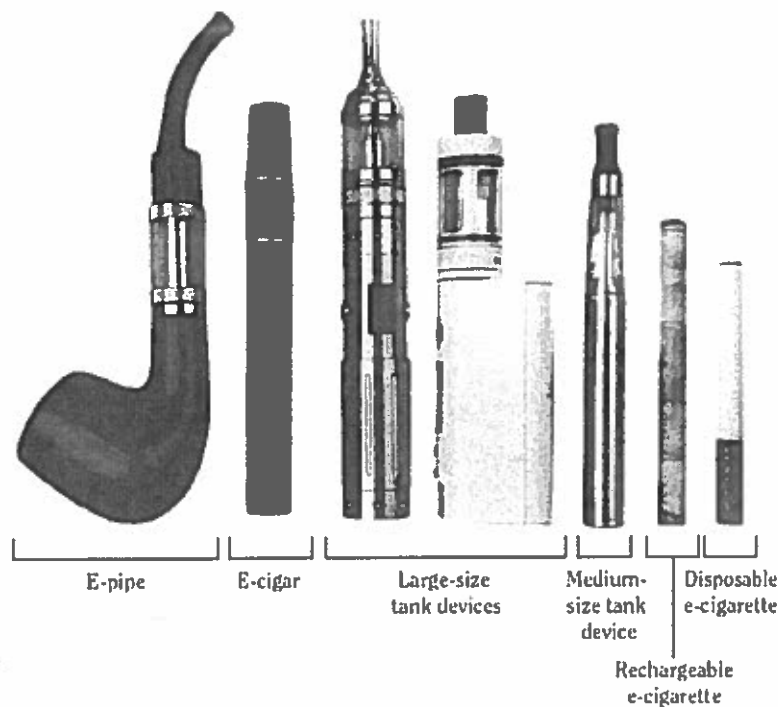
**Figure 3** Percentage of young adults who currently use e-cigarettes<sup>a</sup> and conventional cigarettes; National Adult Tobacco Survey (NATS) 2013–2014



Source: Centers for Disease Control and Prevention, unpublished data (data: NATS 2013–2014).

<sup>a</sup>Current e-cigarette use was defined as those who reported they had heard of e-cigarettes and had tried e-cigarettes, and reported using e-cigarettes every day, some days, or rarely at the time of the interview.

Figure 4 Diversity of e-cigarette products



Source: Photo by Mandie Mills, CDC.

research should examine the long-term trajectories of e-cigarette use that begins in youth. The first Surgeon General's report on the health consequences of smoking was published in 1964; of the subsequent reports, those published in 1994 and 2012 focused solely on youth and young adults (USDHHS 1994, 2012). Most recently, the 2012 report documented the evidence regarding tobacco use among youth and young adults, concluding that declines in conventional cigarette smoking had slowed and that decreases in the use of smokeless tobacco had stalled. That report also found that the tobacco industry's advertising and promotional activities are causal to the onset of smoking in youth and young adults and the continuation of such use as adults (USDHHS 2012). However, that report was prepared before e-cigarettes were as widely promoted and used in the United States as they are now. Therefore, this 2016 report documents the scientific literature on these new products within the context of youth

and young adults. This report also looks to the future by examining the potential impact of e-cigarette use among youth and young adults, while also summarizing the research on current use, health consequences, and marketing as it applies to youth and young adults.

Evidence for this report was gathered from scientific research that included one or more of three age groups. These age groups included young adolescents (11–13 years of age), adolescents (14–17 years of age), and young adults (18–24 years of age). Some studies refer to the younger groups more generally as *youth*. Despite important issues related to e-cigarette use in the general adult populations, clinical and otherwise (e.g., their potential for use in quitting conventional smoking), that literature is generally not included in this report unless it also discusses youth and young adults (Farsalinos and Polosa 2014; Franck et al. 2014; Grana et al. 2014a).

## Organization of the Report

---

Chapter 1 ("Introduction, Conclusions, and Historical Background Relative to E-Cigarettes") presents a brief introduction to the report and includes its major conclusions, followed by the conclusions of each chapter, the historical background of e-cigarettes, descriptions of the products, a review of the marketing and promotional activities of e-cigarette companies, and the current status of regulations from the U.S. Food and Drug Administration (FDA). Chapter 2 ("Patterns of E-Cigarette Use Among U.S. Youth and Young Adults") describes the epidemiology of e-cigarette use, including current (i.e., past 30 day) use; ever use; co-occurrence of using e-cigarettes with other tobacco products, like cigarettes; and psychosocial factors associated with using e-cigarettes. This chapter relies on data from the most recent nationally representative studies available at the time this report was prepared. Chapter 3 ("Health Effects of E-Cigarette Use Among U.S. Youth and Young Adults") documents potential adverse health effects caused by direct exposure to aerosolized nicotine, flavorants, chemicals, and other particulates of e-cigarettes, secondhand environmental exposure to e-cigarette aerosol, and exposure to the surface-deposited aerosol contaminants. Literature regarding harmful consequences of close contact with malfunctioning e-cigarette devices and ingestion of the nicotine-containing liquids are also explored. Chapter 4 ("Activities of the E-Cigarette

Companies") describes e-cigarette companies' influences on e-cigarette use and considers manufacturing and price; the impact of price on sales and use; the rapid changes in the industry, particularly the e-cigarette companies; and the marketing and promotion of e-cigarettes. Chapter 5 ("E-Cigarette Policy and Practice Implications") discusses the implications for policy and practice at the national, state, and local levels. The report ends with a Call to Action to stakeholders—including policymakers, public health practitioners and clinicians, researchers, and the public—to work to prevent harms from e-cigarette use and secondhand aerosol exposure among youth and young adults.

Because of the recency of research related to e-cigarettes (particularly in contrast with decades of research on conventional cigarette smoking) and since this report focuses on a vulnerable population for tobacco use (youth and young adults), the "precautionary principle" is employed to guide actions to address e-cigarette use among youth and young adults. This principle supports intervention to avoid possible health risks when the potential risks remain uncertain and have been, as yet, partially undefined (Bialous and Sarma 2014; Saitta et al. 2014; Hagopian et al. 2015).

The following is a brief summary of the report's Major Conclusions, each chapter, and their subsequent chapter conclusions.

## Major Conclusions

---

1. E-cigarettes are a rapidly emerging and diversified product class. These devices typically deliver nicotine, flavorings, and other additives to users via an inhaled aerosol. These devices are referred to by a variety of names, including "e-cigs," "e-hookahs," "mods," "vape pens," "vapes," and "tank systems."
2. E-cigarette use among youth and young adults has become a public health concern. In 2014, current use of e-cigarettes by young adults 18–24 years of age surpassed that of adults 25 years of age and older.
3. E-cigarettes are now the most commonly used tobacco product among youth, surpassing conventional cigarettes in 2014. E-cigarette use is strongly associated with the use of other tobacco products among youth and young adults, including combustible tobacco products.
4. The use of products containing nicotine poses dangers to youth, pregnant women, and fetuses. The use of products containing nicotine in any form among youth, including in e-cigarettes, is unsafe.
5. E-cigarette aerosol is not harmless. It can contain harmful and potentially harmful constituents, including nicotine. Nicotine exposure during adolescence can cause addiction and can harm the developing adolescent brain.
6. E-cigarettes are marketed by promoting flavors and using a wide variety of media channels and approaches that have been used in the past for marketing conventional tobacco products to youth and young adults.

7. Action can be taken at the national, state, local, tribal, and territorial levels to address e-cigarette use among youth and young adults. Actions could include incorporating e-cigarettes into smokefree policies,

preventing access to e-cigarettes by youth, price and tax policies, retail licensure, regulation of e-cigarette marketing likely to attract youth, and educational initiatives targeting youth and young adults.

## Chapter 1. Introduction, Conclusions, and Historical Background Relative to E-Cigarettes

Chapter 1 presents the major conclusions of this Surgeon General's report and the conclusions of each chapter. E-cigarettes are presented within their historical context, with an overview of the components of these devices and the types of products. In May 2016, FDA published its final rule deeming e-cigarettes, among other products, to be subject to regulation under the *Federal Food, Drug, and Cosmetic Act*, as amended by the *Family Smoking Prevention and Tobacco Control Act* (*Federal Register* 2016). Chapter 1 outlines the current status of federal regulation of e-cigarettes, particularly as they relate to youth and young adults. The need to protect this population from initiating or continuing the use of tobacco products forms a strong basis for the need to regulate e-cigarettes at the local, state, and national levels, both now and in the future.

### Conclusions

1. E-cigarettes are devices that typically deliver nicotine, flavorings, and other additives to users via an inhaled aerosol. These devices are referred to by a variety of names, including "e-cigs," "e-hookahs," "mods," "vape pens," "vapes," and "tank systems."
2. E-cigarettes represent an evolution in a long history of tobacco products in the United States, including conventional cigarettes.
3. In May 2016, the Food and Drug Administration issued the deeming rule, exercising its regulatory authority over e-cigarettes as a tobacco product.

## Chapter 2. Patterns of E-Cigarette Use Among U.S. Youth and Young Adults

Among youth and young adults, rates of ever and past-30-day use of e-cigarettes have increased since the earliest e-cigarette surveillance efforts in 2011. According to the National Youth Tobacco Survey (NYTS), both ever use and past-30-day use of e-cigarettes have increased greatly among youth from 2011 to 2015 (Figures 1 and 2) (CDC 2013; Ambrose et al. 2014; Lippert 2015). Among young adults (18–24 years of age), the prevalence of ever use more than doubled from 2013 to 2014 (Figure 3; National Adult Tobacco Survey [NATS], 2013–2014, unpublished data). Figures 5 and 6 compare the prevalence of ever and current e-cigarette use among middle school students, high school students, young adults (18–24 years of age), and adults (≥25 years of age). Data for 2015 were not available for young adults and adults at the time this report was prepared; however, these trends are alarming and warrant continued surveillance.

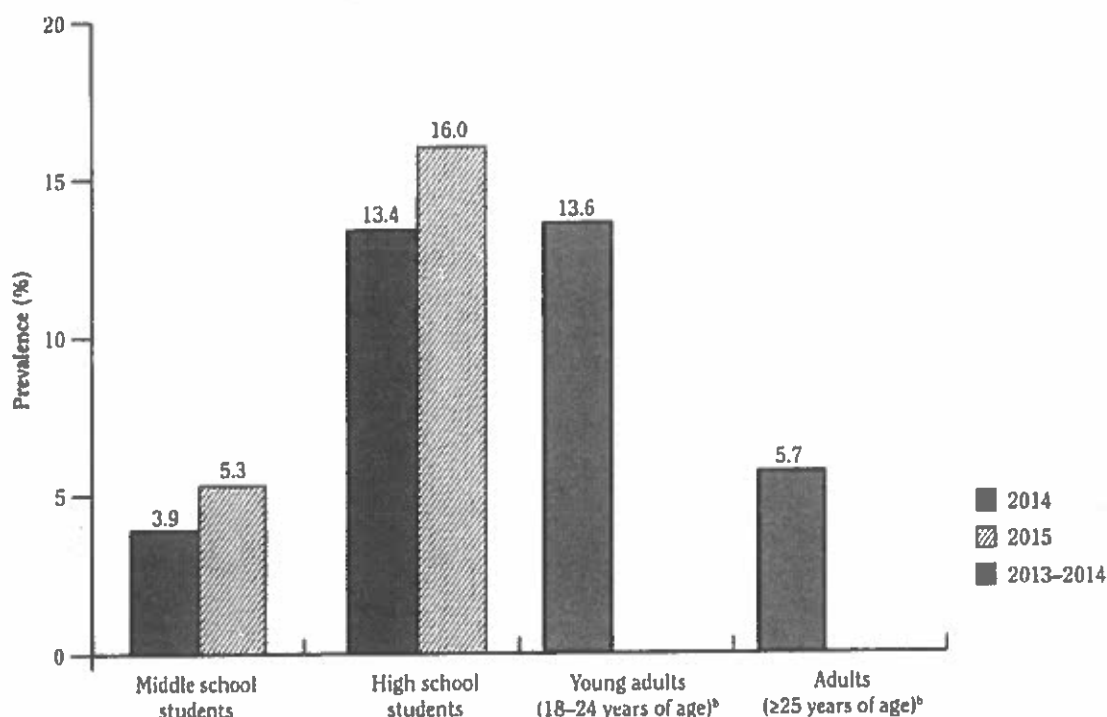
Among youth, e-cigarette use increases with age and is highest among Hispanics and Whites (Tables 2.1a,

2.1b).<sup>1</sup> Among young adults, e-cigarette use is higher among males than females and lowest among Blacks and those with a college education (Table 2.4a). Continued research is necessary to monitor patterns of e-cigarette use across population groups by gender, age, race/ethnicity, and education, as well as sociodemographic characteristics for which disparities in tobacco use have previously been noted, including geography (e.g., subnational data at the state or local levels), sexual orientation and gender identity (e.g., lesbian, gay, bisexual, and transgender), disability/limitation, and socioeconomic status (e.g., household income, poverty status) (CDC 2014; Johnson et al. 2016).

According to data from the Monitoring the Future (MTF) study, in 2015, among youth, past-30-day exclusive use of e-cigarettes (6.7%, 10.4%, and 10.4% in 8th, 10th, and 12th grades, respectively) is more common than exclusive use of conventional cigarettes (1.4%, 2.2%, and 5.3% in those grades) or dual use of e-cigarettes and

<sup>1</sup>All tables that are cross-referenced in this Executive Summary can be found in the full report

**Figure 5** Percentage of middle school students, high school students, young adults (18–24 years of age), and adults (≥25 years of age) who currently<sup>a</sup> use e-cigarettes



Source: Centers for Disease Control and Prevention, unpublished data (NYTS 2014, 2015; data: NATS 2013–2014).

<sup>a</sup>For middle school and high school students (NYTS 2014, 2015), current use included those who reported using e-cigarettes on 1 or more days in the past 30 days. For young adults and adults (NATS 2013–2014), current use included those who reported they had heard of, tried, and used e-cigarettes every day, some days, or rarely at the time of the interview.

<sup>b</sup>2013–2014 NATS data for young adults and adults were the latest data available when this Surgeon General's report was prepared.

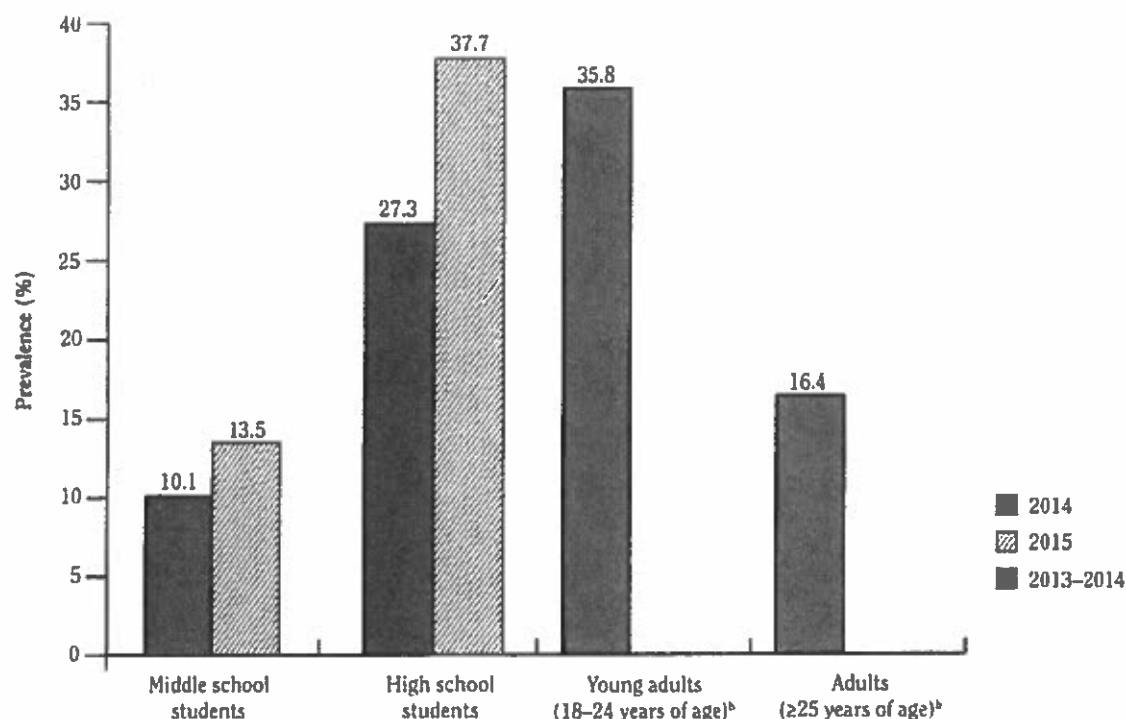
conventional cigarettes (2.4%, 3.5%, and 5.8%) (Figure 7). However, among young adults 18–24 years of age, exclusive use of conventional cigarettes surpasses exclusive use of e-cigarettes and dual use of both products, according to data from the NATS (Figure 3; Table 2.8b). In 2013–2014, 9.6% of young adults were exclusive past-30-day conventional cigarette smokers, compared to 6.1% who were exclusive past-30-day e-cigarette users, and 7.5% who were past-30-day dual users.

Five longitudinal studies to date (Leventhal et al. 2015; Primack et al. 2015; Wills et al. 2016; Barrington-Trimis et al. 2016; Unger et al. 2016) suggest that e-cigarette use is related to the onset of other tobacco product use among youth and young adults, including cigarette smoking and other combustible tobacco product use (e.g., cigar and hookah use). However, these studies are limited in their ability to distinguish experimental

conventional cigarette smokers from regular conventional cigarette smokers at follow-up. Therefore, more studies are needed to elucidate the nature of any true causal relationship between e-cigarette and combustible tobacco product use. Additionally, investigation of whether e-cigarette use is related to other types of substance use (e.g., marijuana, alcohol) might help distinguish the extent to which e-cigarette use may precede or follow other forms of substance use in the context of the common liability/vulnerability model (Vanyukov et al. 2012).

The most commonly cited reasons that youth and young adults report using e-cigarettes include curiosity (Schmidt et al. 2014; Biener and Hargraves 2015; Biener et al. 2015; Kong et al. 2015; McDonald and Ling 2015; Suris et al. 2015; Sutfin et al. 2015), flavorings/taste (Ambrose et al. 2015; University of Michigan 2015), use as a less harmful/less toxic alternative to conventional cigarettes

**Figure 6** Percentage of middle school students, high school students, young adults (18–24 years of age), and adults (≥25 years of age) who have ever<sup>a</sup> used e-cigarettes



Source: Centers for Disease Control and Prevention, unpublished data (NYTS 2014, 2015; data: NATS 2013–2014).

<sup>a</sup>For middle school and high school students (NYTS 2014, 2015), ever use included those who reported using an e-cigarette, even once or twice. For young adults and adults (NATS 2013–2014), ever use included those who reported they had heard of and tried e-cigarettes.

<sup>b</sup>2013–2014 NATS data for young adults and adults were the latest data available when this Surgeon General's report was prepared.

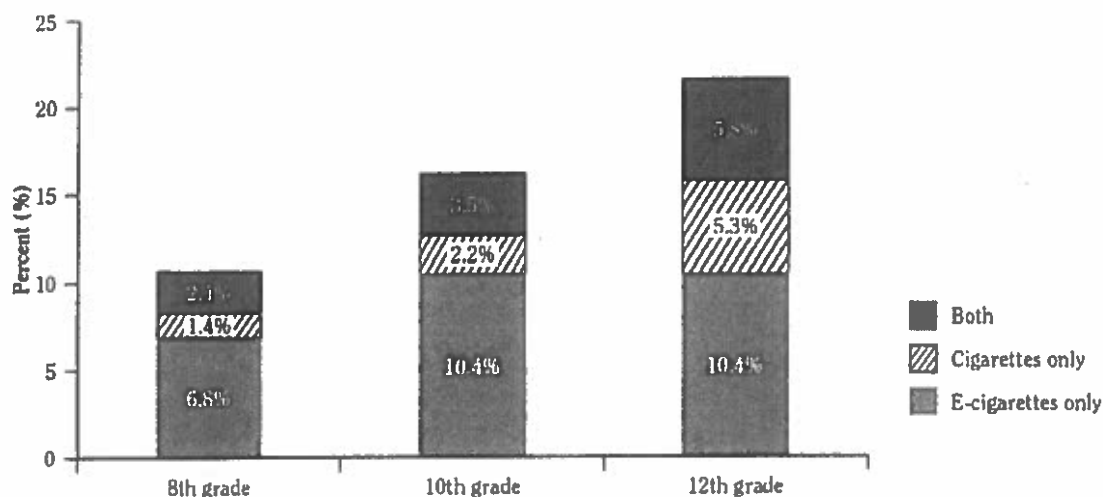
(Peters et al. 2013; Tucker et al. 2014; Ambrose et al. 2015; Kong et al. 2015; McDonald and Ling 2015; Sutfin et al. 2015), and avoidance of indoor smoking restrictions or disturbing people with secondhand smoke from conventional cigarettes (Tucker et al. 2014; Ambrose et al. 2015; Kong et al. 2015; McDonald and Ling 2015; Suris et al. 2015; Sutfin et al. 2015). Using e-cigarettes as an aid to conventional cigarette smoking reduction/cessation (Li et al. 2013; Schmidt et al. 2014; Tucker et al. 2014) does not appear to be a primary reason for use among youth and young adults. Youth and young adult smokers cite lack of satisfaction (Kong et al. 2015), poor taste (Pepper et al. 2014; Kong et al. 2015), and cost (Pepper et al. 2014; Kong et al. 2015) as reasons for discontinuing e-cigarette use. Additional research is needed to examine how reasons for use, including the appeal of flavored e-cigarettes, are

causally related to the onset and progression of e-cigarette use among youth and young adults.

## Conclusions

1. Among middle and high school students, both ever and past-30-day e-cigarette use have more than tripled since 2011. Among young adults 18–24 years of age, ever e-cigarette use more than doubled from 2013 to 2014 following a period of relative stability from 2011 to 2013.
2. The most recent data available show that the prevalence of past-30-day use of e-cigarettes was similar among high school students (16% in 2015, 13.4% in 2014) and young adults 18–24 years of age (13.6%

**Figure 7** Percentage of students in grades 8, 10, and 12 who used e-cigarettes and cigarettes in the past 30 days; Monitoring the Future (MTF) 2015



Source: University of Michigan, Institute for Social Research, unpublished data (data: MTF 2015).

Note: Questions on e-cigarette use were asked on four of six questionnaire forms. Data presented here are based on those four forms only.

in 2013–2014) compared to middle school students (5.3% in 2015, 3.9% in 2014) and adults 25 years of age and older (5.7% in 2013–2014).

3. Exclusive, past-30-day use of e-cigarettes among 8th-, 10th-, and 12th-grade students (6.8%, 10.4%, and 10.4%, respectively) exceeded exclusive, past-30-day use of conventional cigarettes in 2015 (1.4%, 2.2%, and 5.3%, respectively). In contrast—in 2013–2014 among young adults 18–24 years of age—exclusive, past-30-day use of conventional cigarettes (9.6%) exceeded exclusive, past-30-day use of e-cigarettes (6.1%). For both age groups, dual use of these products is common.
4. E-cigarette use is strongly associated with the use of other tobacco products among youth and young adults, particularly the use of combustible tobacco products. For example, in 2015, 58.8% of high school students who were current users of combustible tobacco products were also current users of e-cigarettes.
5. Among youth—older students, Hispanics, and Whites are more likely to use e-cigarettes than younger students and Blacks. Among young adults—males, Hispanics, Whites, and those with lower levels of education are more likely to use e-cigarettes than females, Blacks, and those with higher levels of education.
6. The most commonly cited reasons for using e-cigarettes among both youth and young adults are curiosity, flavoring/taste, and low perceived harm compared to other tobacco products. The use of e-cigarettes as an aid to quit conventional cigarettes is not reported as a primary reason for use among youth and young adults.
7. Flavored e-cigarette use among young adult current users (18–24 years of age) exceeds that of older adult current users (25 years of age and older). Moreover, among youth who have ever tried an e-cigarette, a majority used a flavored product the first time they tried an e-cigarette.
8. E-cigarette products can be used as a delivery system for cannabinoids and potentially for other illicit drugs. More specific surveillance measures are needed to assess the use of drugs other than nicotine in e-cigarettes.

## Chapter 3. Health Effects of E-Cigarette Use Among U.S. Youth and Young Adults

There is little doubt that the use of e-cigarettes by youth and young adults represents self-administration of the drug nicotine, and this self-administration of nicotine puts youth at risk for addiction and many related harmful consequences. Animal research indicates adolescent brains are particularly sensitive to nicotine's effects, such that subsequent self-administration is more likely, and that same literature indicates that this age group is at risk for a constellation of nicotine-induced neural and behavioral alterations (Table A3.1-4 in Appendix 3.1). Studies of the effects of maternal smoking of conventional cigarettes during pregnancy, coupled with preclinical literature (e.g., animal studies) examining the effects of administration of nicotine during pregnancy, suggest that e-cigarette use by mothers during pregnancy could present a wide variety of risks to fetal, infant, and child brain development.

Users of e-cigarettes risk respiratory exposure to a variety of aerosolized chemicals, including solvents and flavorants added intentionally to e-liquids, adulterants added unintentionally, and other toxicants produced during the heating/aerosolization process (see the section on "Effects of the Inhalation of Aerosol Constituents Other than Nicotine" in Chapter 3). The health impacts of frequent exposure to the toxicants in e-cigarette aerosol are not well understood, though several are known carcinogens. The detection and level of these carcinogens depend on several factors, including the concentration of the e-liquid and the strength of the heating device. Although adults report using e-cigarettes as a cessation device, the evidence supporting the effectiveness of e-cigarettes as an aid for quitting conventional cigarettes remains unproven (Bullen et al. 2013; Caponnetto et al. 2013; Grana et al. 2014b) and nonexistent among youth (Bullen et al. 2013; Caponnetto et al. 2013; Grana et al. 2014b).

Further research is warranted to focus on the characteristics of e-cigarette devices, the constituents of e-liquids, and the user behaviors that can influence the yield of nicotine and other toxicants (Shihadeh and Eissenberg 2015). This close focus includes providing details of devices (e.g., voltage of the power supply, heating element resistance) and components of e-liquids (e.g., propylene glycol, vegetable glycerin, other additives), and measuring user puff topography. Standardization of procedures for producing and delivering the aerosol is likely a necessary component of at least some in vivo and in vitro work. Preclinical work examining the effects of e-cigarette aerosols is a clear research need and, again, the standardization of procedures for production and delivery of the

aerosol is necessary. To enhance relevance, the parameters of aerosol production should span the range of those seen with humans (Shihadeh and Eissenberg 2011).

The huge variety of products of different origin and design, the rapid appearance of new products, and the varied ways in which consumers use these products make the development of standard measurement conditions challenging (Famele et al. 2015). Accordingly, more research is needed to understand how different design features relate to potential toxicity—for example, how various compounds in e-cigarettes are affected by heating, changes in chemical composition, or pH; to what extent these compounds are absorbed into the bloodstream; and how additives to the e-liquid affect the bioavailability of these compounds, among other considerations. Research is also needed to understand whether potential health risks may be ameliorated by changes in product engineering.

## Conclusions

1. Nicotine exposure during adolescence can cause addiction and can harm the developing adolescent brain.
2. Nicotine can cross the placenta and has known effects on fetal and postnatal development. Therefore, nicotine delivered by e-cigarettes during pregnancy can result in multiple adverse consequences, including sudden infant death syndrome, and could result in altered corpus callosum, deficits in auditory processing, and obesity.
3. E-cigarettes can expose users to several chemicals, including nicotine, carbonyl compounds, and volatile organic compounds, known to have adverse health effects. The health effects and potentially harmful doses of heated and aerosolized constituents of e-cigarette liquids, including solvents, flavorants, and toxicants, are not completely understood.
4. E-cigarette aerosol is not harmless "water vapor," although it generally contains fewer toxicants than combustible tobacco products.
5. Ingestion of e-cigarette liquids containing nicotine can cause acute toxicity and possibly death if the contents of refill cartridges or bottles containing nicotine are consumed.

## Chapter 4. Activities of the E-Cigarette Companies

---

Although the e-cigarette marketplace is complicated by the differences in brands that are owned by tobacco companies versus independent brands, e-cigarette companies continue to change and influence the manufacturing, price, marketing and promotion, and distribution of e-cigarette products and accessories. The e-cigarette market continues to grow, with projected sales of \$3.5 billion in 2015. Consolidation of e-cigarette companies has been rapid, with the first major merger taking place in 2012. These mergers and acquisitions are likely to continue, but the rate of consolidation may slow down as sales of “cigalikes” (products that resemble cigarettes) have recently decelerated, and “vape shops” could have the potential to influence the e-cigarette marketplace based on the current structure of the marketplace and regulatory landscape. Chapter 4 shows that many of the marketing techniques used by e-cigarette companies are similar to those used by the tobacco industry for conventional cigarettes, and that awareness by youth and young adults of this marketing, and their levels of exposure to it, is high. Further, tracking marketing expenditures and product sales is difficult because of the rapidly changing venues, including “vape shops,” use of social media and online advertising, and limited regulation of marketing.

### Conclusions

1. The e-cigarette market has grown and changed rapidly, with notable increases in total sales of e-cigarette products, types of products, consolidation of companies, marketing expenses, and sales channels.
2. Prices of e-cigarette products are inversely related to sales volume: as prices have declined, sales have sharply increased.
3. E-cigarette products are marketed in a wide variety of channels that have broad reach among youth and young adults, including television, point-of-sale, magazines, promotional activities, radio, and the Internet.
4. Themes in e-cigarette marketing, including sexual content and customer satisfaction, are parallel to themes and techniques that have been found to be appealing to youth and young adults in conventional cigarette advertising and promotion.

## Chapter 5. E-Cigarette Policy and Practice Implications

---

Chapters 1–4 document the particular challenges posed by the rapid emergence and dynamic nature of e-cigarette use among youth and young adults. The principles and strategies articulated in the 2014 Surgeon General’s report and prior reports are also relevant to e-cigarettes. The 2014 report was written not long after the use of e-cigarettes began to surge dramatically; that report emphasized the need for rapid elimination of conventional cigarettes and other combustible tobacco products, but did not discuss strategies to minimize adverse effects among youth and young adults (USDHHS 2014). Building on this foundation, Chapter 5 sets out an evidence-based strategy for the future. It describes recommendations related to e-cigarettes that can be taken at the state and local levels to address e-cigarette use among youth and young adults, such as:

- Incorporating e-cigarettes into smokefree policies;
- Preventing access to e-cigarettes by youth;

- Significant increases in tax and price;
- Retail licensure;
- Regulation of e-cigarette marketing that is likely to attract youth and young adults, to the extent feasible under the law; and
- Educational initiatives targeting this population.

### Conclusions

1. The dynamic nature of the e-cigarette landscape calls for expansion and enhancement of tobacco-related surveillance to include (a) tracking patterns of use in priority populations; (b) monitoring the characteristics of the retail market; (c) examining policies at the national, state, local, tribal, and territorial levels; (d) examining the channels and messaging for marketing e-cigarettes in order to more

- fully understand the impact future regulations could have; and (e) searching for sentinel health events in youth and young adult e-cigarette users, while longer-term health consequences are tracked.
2. Strategic, comprehensive research is critical to identify and characterize the potential health risks from e-cigarette use, particularly among youth and young adults.
  3. The adoption of public health strategies that are precautionary to protect youth and young adults from adverse effects related to e-cigarettes is justified.
  4. A broad program of behavioral, communications, and educational research is crucial to assess how youth perceive e-cigarettes and associated marketing messages, and to determine what kinds of tobacco control communication strategies and channels are most effective.
  5. Health professionals represent an important channel for education about e-cigarettes, particularly for youth and young adults.
  6. Diverse actions, modeled after evidence-based tobacco control strategies, can be taken at the state, local, tribal, and territorial levels to address e-cigarette use among youth and young adults, including incorporating e-cigarettes into smoke-free policies; preventing the access of youth to e-cigarettes; price and tax policies; retail licensure; regulation of e-cigarette marketing that is likely to attract youth and young adults, to the extent feasible under the law; and educational initiatives targeting youth and young adults. Among others, research focused on policy, economics, and the e-cigarette industry will aid in the development and implementation of evidence-based strategies and best practices.

## The Call to Action

---

Finally, the Call to Action is issued to accelerate policies and approaches that can reduce the public health threat posed by e-cigarette use among young people. It offers a list of goals and evidence-based strategies designed to reduce the public health threat posed by e-cigarette use among youth and young adults.

### Goal 1. First, Do No Harm

- **Strategy 1A.** Implement a comprehensive strategy to address e-cigarettes that will avoid adverse consequences and give careful consideration to the risks for youth and young adults. This can be done by including e-cigarettes in policies and programs related to conventional cigarette smoking at the national, state, local, tribal, and territorial levels.
- **Strategy 1B.** Provide consistent and evidence-based messages about the health risks of e-cigarette use and exposure to secondhand aerosol from e-cigarettes.

### Goal 2. Provide Information About the Dangers of E-Cigarette Use Among Youth and Young Adults

- **Strategy 2A.** Educate parents, teachers, coaches, and other influencers of youth about the risks of e-cigarette use among youth and young adults.
- **Strategy 2B.** Educate health professionals about the risks of e-cigarette use among youth and young adults.

### Goal 3. Continue to Regulate E-Cigarettes at the Federal Level to Protect Public Health

- **Strategy 3A.** Implement FDA regulatory authority over the manufacturing, marketing, and distribution of e-cigarettes.
- **Strategy 3B.** Reinforce other federal agencies as they implement programs and policies to address e-cigarettes.

## Goal 4. Promote Programs and Policies at the State and Local Levels to Prevent E-Cigarette Use Among Youth and Young Adults

- **Strategy 4A.** State, local, tribal, and territorial governments should implement population-level strategies to reduce e-cigarette use among youth and young adults, such as including e-cigarettes in smokefree indoor air policies, restricting youth access to e-cigarettes in retail settings, licensing retailers, and establishing specific package requirements.
- **Strategy 4B.** Coordinate, evaluate, and share best practices from state and local entities that have implemented programs and policies to address e-cigarette use among youth and young adults.

## Goal 5. Curb Advertising and Marketing that Encourages Youth and Young Adults to Use E-Cigarettes

- **Strategy 5A.** Curb e-cigarette advertising and marketing that are likely to attract youth and young adults.
- **Strategy 5B.** Urge the e-cigarette companies to stop advertising and marketing that encourages and glamorizes e-cigarette use among youth and young adults.

## Goal 6. Expand Surveillance, Research, and Evaluation Related to E-Cigarettes

- **Strategy 6A.** Improve the quality, timeliness, and scope of e-cigarette surveillance, research, and evaluation.
- **Strategy 6B.** Address surveillance, research, and evaluation gaps related to e-cigarettes.

## Summary

---

We know a great deal about what works to effectively prevent tobacco use among young people (USDHHS 2012). Now we must apply these strategies to e-cigarettes—and continue to apply them to other tobacco products. To achieve success, we must work together, aligning and coordinating efforts across a wide range of stakeholders, including individuals and families; public health professionals and

clinicians; federal, state, local, tribal, and territorial governments; public health agencies; and researchers. We must protect our nation's young people from a lifetime of nicotine addiction and associated problems by immediately addressing e-cigarettes as an urgent public health problem. Now is the time to take action.

## References

- Alexander JP, Coleman BN, Johnson SE, Tesseman GK, Tworek C, Dickinson DM. Smoke and vapor: exploring the terminology landscape among electronic cigarette users. *Tobacco Regulation Science* 2016;2(3):201–13.
- Ambrose BK, Day HR, Rostron B, Conway KP, Borek N, Hyland A, Villanti AC. Flavored tobacco product use among U.S. youth aged 12–17 years, 2013–2014. *JAMA: the Journal of the American Medical Association* 2015;314(17):1871–3.
- Ambrose BK, Rostron BL, Johnson SE, Portnoy DB, Apelberg BJ, Kaufman AR, Choiniere CJ. Perceptions of the relative harm of cigarettes and e-cigarettes among U.S. youth. *American Journal of Preventive Medicine* 2014;47(2 Suppl 1):S53–60.
- Barrington-Trimis JL, Urman R, Berhane K, Unger JB, Cruz TB, Pentz MA, Samet JM, Leventhal AM, McConnell R. E-cigarettes and future cigarette use. *Pediatrics* 2016;138(1):e20160379.
- Bialous SA, Sarma L. Electronic cigarettes and smoking cessation: a quandary? *Lancet* 2014;383(9915):407–8.
- Biener L, Hargraves JL. A longitudinal study of electronic cigarette use among a population-based sample of adult smokers: association with smoking cessation and motivation to quit. *Nicotine & Tobacco Research* 2015;17(2):127–33.
- Biener L, Song E, Sutfin EL, Spangler J, Wolfson M. Electronic cigarette trial and use among young adults: reasons for trial and cessation of vaping. *International Journal of Environmental Research and Public Health* 2015;12(12):16019–26.
- Bullen C, Howe C, Laugesen M, McRobbie H, Parag V, Williman J, Walker N. Electronic cigarettes for smoking cessation: a randomised controlled trial. *Lancet* 2013;382(9905):1629–37.
- Caponnetto P, Campagna D, Cibella F, Morjaria JB, Caruso M, Russo C, Polosa R. Efficiency and Safety of an eElectronic cigAreTte (ECLAT) as tobacco cigarettes substitute: a prospective 12-month randomized control design study. *PloS One* 2013;8(6):e66317.
- Centers for Disease Control and Prevention. Notes from the field: electronic cigarette use among middle and high school students—United States, 2011–2012. *Morbidity and Mortality Weekly Report* 2013;62(35):729–30.
- Centers for Disease Control and Prevention. Tobacco product use among adults—United States, 2012–2013. *Morbidity and Mortality Weekly Report* 2014;63(25):542–7.
- Centers for Disease Control and Prevention. Tobacco use among middle and high school students—United States, 2011–2014. *Morbidity and Mortality Weekly Report* 2015;64(14):381–5.
- Centers for Disease Control and Prevention. Tobacco use among middle and high school students—United States, 2011–2015. *Morbidity and Mortality Weekly Report* 2016;65(14):361–7.
- Famele M, Ferranti C, Abenavoli C, Palleschi L, Mancinelli R, Draisci R. The chemical components of electronic cigarette cartridges and refill fluids: review of analytical methods. *Nicotine & Tobacco Research* 2015;17(3):271–9.
- Farsalinos KE, Polosa R. Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review. *Therapeutic Advances in Drug Safety* 2014;5(2):67–86.
- Federal Register. U.S. Department of Health and Human Services, Food and Drug Administration. Deeming Tobacco Products To Be Subject to the Federal Food, Drug, and Cosmetic Act, as Amended by the Family Smoking Prevention and Tobacco Control Act; Restrictions on the Sale and Distribution of Tobacco Products and Required Warning Statements for Tobacco Products. 81 *Fed. Reg.* 28974 (2016); <<https://federalregister.gov/a/2016-10685>>; accessed: May 16, 2016.
- Franck C, Budlovsky T, Windle SB, Filion KB, Eisenberg MJ. Electronic cigarettes in North America: history, use, and implications for smoking cessation. *Circulation* 2014;129(19):1945–52.
- Grana RA, Benowitz N, Glantz SA. E-cigarettes: a scientific review. *Circulation* 2014a;129(19):1972–86.
- Grana RA, Popova L, Ling PM. A longitudinal analysis of electronic cigarette use and smoking cessation. *JAMA Internal Medicine* 2014b;174(5):812–3.
- Hagopian A, Halperin A, Atwater P, Fradkin N, Gilroy JH, Medeiros E. *E-Cigarettes: Evidence and Policy Options for Washington State*. Seattle (WA): University of Washington, School of Public Health, Department of Health Services, January 2015; <<http://www.governor.wa.gov/sites/default/files/documents/E-CigWhitePaper.PDF>>; accessed: October 20, 2015.
- Johnson SE, Holder-Hayes E, Tessman GK, King BA, Alexander T, Zhao X. Tobacco product use among sexual minority adults: findings from the 2012–2013 National Adult Tobacco Survey. *American Journal of Preventive Medicine* 2016;50(4):e91–e100.
- Kong C, Morean ME, Cavallo DA, Camenga DR, Krishnan-Sarin S. Reasons for electronic cigarette experimentation and discontinuation among adolescents

- and young adults. *Nicotine & Tobacco Research* 2015;17(7):847–54.
- Leventhal AM, Strong DR, Kirkpatrick MG, Unger JB, Sussman S, Riggs NR, Stone MD, Khoddam R, Samet JM, Audrain-McGovern J. Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *JAMA: the Journal of the American Medical Association* 2015;314(7):700–7.
- Li J, Bullen C, Newcombe R, Walker N, Walton D. The use and acceptability of electronic cigarettes among New Zealand smokers. *New Zealand Medical Journal* 2013;126(1375):48–57.
- Lippert AM. Do adolescent smokers use e-cigarettes to help them quit? The sociodemographic correlates and cessation motivations of U.S. adolescent e-cigarette use. *American Journal of Health Promotion* 2015;29(6):374–9.
- McDonald EA, Ling PM. One of several ‘toys’ for smoking: young adult experiences with electronic cigarettes in New York City. *Tobacco Control* 2015;24(6):588–93.
- Pepper JK, Ribisl KM, Emery SL, Brewer NT. Reasons for starting and stopping electronic cigarette use. *International Journal of Environmental Research and Public Health* 2014;11(10):10345–61.
- Peters RJ Jr, Meshack A, Lin MT, Hill M, Abughosh S. The social norms and beliefs of teenage male electronic cigarette use. *Journal of Ethnicity in Substance Abuse* 2013;12(4):300–7.
- Primack BA, Soneji S, Stoolmiller M, Fine MJ, Sargent JD. Progression to traditional cigarette smoking after electronic cigarette use among U.S. adolescents and young adults. *JAMA Pediatrics* 2015:1–7.
- Saitta D, Ferro GA, Polosa R. Achieving appropriate regulations for electronic cigarettes. *Therapeutic Advances in Chronic Disease* 2014;5(2):50–61.
- Schmidt L, Reidmohr A, Harwell TS, Helgersson SD. Prevalence and reasons for initiating use of electronic cigarettes among adults in Montana, 2013. *Preventing Chronic Disease* 2014;11:E204.
- Shihadeh A, Eissenberg T. Electronic cigarette effectiveness and abuse liability: predicting and regulating nicotine flux. *Nicotine & Tobacco Research* 2015;17(2):158–62.
- Shihadeh AL, Eissenberg TE. Significance of smoking machine toxicant yields to blood-level exposure in water pipe tobacco smokers. *Cancer Epidemiology, Biomarkers and Prevention* 2011;20(11):2457–60.
- Suris JC, Berchtold A, Akre C. Reasons to use e-cigarettes and associations with other substances among adolescents in Switzerland. *Drug and Alcohol Dependence* 2015;153:140–4.
- Sutfin EL, Reboussin BA, Debinski B, Wagoner KG, Spangler J, Wolfson M. The impact of trying electronic cigarettes on cigarette smoking by college students: a prospective analysis. *American Journal of Public Health* 2015;105(8):e83–e89.
- Tucker JS, Shadel WG, Golinelli D, Ewing B. Alternative tobacco product use and smoking cessation among homeless youth in Los Angeles County. *Nicotine & Tobacco Research* 2014;16(11):1522–6.
- U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta (GA): U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 1994.
- U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Atlanta (GA): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2012.
- U.S. Department of Health and Human Services. *Smoking—50 Years of Progress: A Report of the Surgeon General*. Atlanta (GA): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.
- Unger JB, Soto DW, Leventhal A. E-cigarette use and subsequent cigarette and marijuana use among Hispanic young adults. *Drug and Alcohol Dependence* 2016;163(1):261–4.
- University of Michigan. Most youth use ecigarettes for novelty, flavors—not to quit smoking (press release), 2015; <[http://www.monitoringthefuture.org/pressreleases/15ecigpr\\_complete.pdf](http://www.monitoringthefuture.org/pressreleases/15ecigpr_complete.pdf)>; accessed: January 25, 2015.
- Vanyukov MM, Tarter RE, Kirillova GP, Kirisci L, Reynolds MD, Kreek MJ, Conway KP, Maher BS, Iacono WG, Bierut L, et al. Common liability to addiction and “gateway hypothesis”: theoretical, empirical and evolutionary perspective. *Drug and Alcohol Dependence* 2012;123(Suppl 1):S3–S17.
- Wills TA, Knight R, Sargent JD, Gibbons FX, Pagano I, Williams RJ. Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii. *Tobacco Control* 2016.



# E-Cigarette Use Among Youth and Young Adults

A Report of the Surgeon General

## Fact Sheet

This Surgeon General's report comprehensively reviews the public health issue of e-cigarettes and their impact on U.S. youth and young adults. Studies highlighted in the report cover young adolescents (11-14 years of age); adolescents (15-17 years of age); and/or young adults (18-25 years of age). Scientific evidence contained in this report supports the following facts:

**E-cigarettes are a rapidly emerging and diversified product class. These devices typically deliver nicotine, flavorings, and other additives to users via an inhaled aerosol. These devices are referred to by a variety of names, including "e-cigs," "e-hookahs," "mods," "vape pens," "vapes," and "tank systems."**

E-cigarettes are battery-powered devices that heat a liquid into an aerosol that the user inhales.

The liquid usually has nicotine, which comes from tobacco; flavoring; and other additives.

E-cigarette products can also be used as a delivery system for marijuana and other illicit drugs.

**E-cigarettes are now the most commonly used tobacco product among youth, surpassing conventional cigarettes in 2014. E-cigarette use is strongly associated with the use of other tobacco products among youth and young adults, including cigarettes and other burned tobacco products.**

In 2015, more than 3 million youth in middle and high school, including about 1 of every 6 high school students, used e-cigarettes in the past month. More than a quarter of youth in middle and high school have tried e-cigarettes.

Among high school students, e-cigarette use is higher among males, whites, and Hispanics than among females and African-Americans. There is a strong association between the use of e-cigarettes, cigarettes, and the use of other burned tobacco products by young people. In 2015, for example, nearly 6 of 10 high school cigarette smokers also used e-cigarettes.

Research has found that youth who use a tobacco product, such as e-cigarettes, are more likely to go on to use other tobacco products like cigarettes.

**E-cigarette use among youth and young adults has become a public health concern. In 2014, current use of e-cigarettes by young adults 18-24 years of age surpassed that of adults 25 years of age and older.**

Among young adults 18-24 years of age, e-cigarette use more than doubled from 2013 to 2014. As of 2014, more than one-third of young adults had tried e-cigarettes.

The most recent data available show that the prevalence of past 30-day use of e-cigarettes was 13.6% among young adults (2014) and 16.0% among high school students (2015).

The most recent data available show that the prevalence of past 30-day use of e-cigarettes is similar among middle school students (5.3%) and adults 25 years of age and older (5.7%).

Among young adults, e-cigarette use is higher among males, whites and Hispanics, and those with less education.

**The use of products containing nicotine poses dangers to youth, pregnant women, and fetuses. The use of products containing nicotine in any form among youth, including in e-cigarettes, is unsafe.**

Many e-cigarettes contain nicotine, which is highly addictive.

The brain is the last organ in the human body to develop fully. Brain development continues until the early to mid-20s. Nicotine exposure during periods of significant brain development, such as adolescence, can disrupt the growth of brain circuits that control attention, learning, and susceptibility to addiction.

The effects of nicotine exposure during youth and young adulthood can be long-lasting and can include lower impulse control and mood disorders.

The nicotine in e-cigarettes and other tobacco products can prime young brains for addiction to other drugs, such as cocaine and methamphetamine.

Nicotine can cross the placenta and affect fetal and postnatal development. Nicotine exposure during pregnancy can result in multiple adverse consequences, including sudden infant death syndrome (SIDS).

Ingestion of e-cigarette liquids containing nicotine can cause acute toxicity and possible death if the contents of refill cartridges or bottles containing nicotine are consumed.

**E-cigarette aerosol is not harmless. It can contain harmful and potentially harmful constituents including nicotine. Nicotine exposure during adolescence can cause addiction and can harm the developing adolescent brain.**

The constituents of e-cigarette liquids can include solvents, flavorants, and toxicants.

The aerosol created by e-cigarettes can contain ingredients that are harmful and potentially harmful to the public's health, including: nicotine; ultrafine particles; flavorings such as diacetyl, a chemical linked to serious lung disease; volatile organic compounds such as benzene, which is found in car exhaust; and heavy metals, such as nickel, tin, and lead.

**E-cigarettes are marketed by promoting flavors and using a wide variety of media channels and approaches that have been used in the past for marketing conventional tobacco products to youth and young adults.**

E-cigarettes are an estimated \$3.5 billion business in the United States. In 2014, e-cigarette manufacturers spent \$125 million on advertising their products in the U.S.

In 2014, more than 7 of 10 middle and high school students said they had seen e-cigarette advertising. Retail stores were the most frequent source of this advertising, followed by the internet, TV and movies, and magazines and newspapers.

The 2012 Surgeon General's Report on tobacco use among youth and young adults found that tobacco product advertising causes young people to start using tobacco products. Much of today's e-cigarette advertising uses approaches and themes similar to those that were used to promote conventional tobacco products.

E-cigarettes are available in a wide variety of flavors, including many that are especially appealing to youth. More than 85% of e-cigarette users ages 12-17 use flavored e-cigarettes, and flavors are the leading reason for youth use. More than 9 of 10 young adult e-cigarette users said they use e-cigarettes flavored to taste like menthol, alcohol, fruit, chocolate, or other sweets.

**Action can be taken at the national, state, local, tribal and territorial levels to address e-cigarette use among youth and young adults. Actions could include incorporating e-cigarettes into smokefree policies, preventing access to e-cigarettes by youth, price and tax policies, retail licensure, regulation of e-cigarette marketing likely to attract youth, and educational initiatives targeting youth and young adults.**

The Food and Drug Administration (FDA) now regulates the manufacturing, importing, packaging, labeling, advertising, promotion, sale, and distribution of e-cigarettes.

In August 2016, FDA began enforcing a ban on vending machine sales unless in adult-only facilities and a ban on free samples and sales to minors.

Parents, teachers, health care providers, and others who influence youth and young adults can advise and inform them of the dangers of nicotine, discourage youth tobacco use in any form, including e-cigarettes, and set a positive example by being tobacco-free themselves.

**Citation:** U.S. Department of Health and Human Services. *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General—Executive Summary*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016

**Website:** [e-cigarettes.surgeongeneral.gov](http://e-cigarettes.surgeongeneral.gov)

# Surgeon General's Advisory on E-cigarette Use Among Youth

*I, Surgeon General of the United States Public Health Service, VADM Jerome Adams, am emphasizing the importance of protecting our children from a lifetime of nicotine addiction and associated health risks by immediately addressing the epidemic of youth e-cigarette use. The recent surge in e-cigarette use among youth, which has been fueled by new types of e-cigarettes that have recently entered the market, is a cause for great concern. We must take action now to protect the health of our nation's young people.*

**KNOW THE RISKS. TAKE ACTION. PROTECT OUR KIDS.**

## The E-cigarette Epidemic Among Youth

Considerable progress has been made in reducing cigarette smoking among our nation's youth.<sup>1</sup> However, the tobacco product landscape continues to evolve to include a variety of tobacco products, including smoked, smokeless, and electronic products, such as e-cigarettes.<sup>2</sup> E-cigarettes are designed to deliver nicotine, flavorings, and other additives to the user via an inhaled aerosol.<sup>2</sup>

E-cigarettes entered the U.S. marketplace around 2007, and since 2014, they have been the most commonly used tobacco product among U.S. youth.<sup>2</sup> E-cigarette use among U.S. middle and high school students increased 900% during 2011-2015, before declining for the first time during 2015-2017.<sup>3</sup> However, current e-cigarette use increased 78% among high school students during the past year, from 11.7% in 2017 to 20.8% in 2018.<sup>4</sup> In 2018, more than 3.6 million U.S. youth, including 1 in 5 high school students and 1 in 20 middle school students, currently use e-cigarettes.<sup>4</sup>

E-cigarette aerosol is not harmless.<sup>2</sup> Most e-cigarettes contain nicotine – the addictive drug in regular cigarettes, cigars, and other tobacco products.<sup>2</sup> Nicotine exposure during adolescence can harm the developing brain – which continues to develop until about age 25.<sup>2</sup> Nicotine exposure during adolescence can impact learning, memory, and attention.<sup>1,2</sup> Using nicotine in adolescence can also increase risk for future addiction to other drugs.<sup>1,2</sup> In addition to nicotine, the aerosol that users inhale and exhale from e-cigarettes can potentially expose both themselves and bystanders to other harmful substances, including heavy metals, volatile organic compounds, and ultrafine particles that can be inhaled deeply into the lungs.<sup>2</sup>

Many e-cigarettes also come in kid-friendly flavors. In addition to making e-cigarettes more appealing to young people,<sup>5</sup> some of the chemicals used to make certain flavors may also have health risks.<sup>2</sup> E-cigarettes can also be used to deliver other drugs, including marijuana.<sup>2</sup> In 2016, one-third of U.S. middle and high school students who ever used e-cigarettes had used marijuana in e-cigarettes.<sup>6</sup>

For adults, e-cigarettes may have the potential to reduce risk for current smokers if they completely transition from cigarettes to e-cigarettes; however, a majority of adults who use e-cigarettes also smoke cigarettes.<sup>7</sup> For youth, the use of multiple tobacco products puts youth at even greater risk for addiction and tobacco-related harms.<sup>1,2</sup> Moreover, a 2018 National Academy of Sciences, Engineering, and Medicine report concluded that there was moderate evidence that e-cigarette use increases the frequency and intensity of cigarette smoking in the future.<sup>7</sup> But any e-cigarette use among young people is unsafe, even if they do not progress to future cigarette smoking.<sup>2</sup>

## E-cigarettes Come in Many Shapes and Sizes

E-cigarettes are a rapidly changing product class, and are known by many different names, including “e-cigs,” “e-hookahs,” “mods,” and “vape pens.”<sup>2</sup> Recently, a new type of e-cigarette has become increasingly popular among our nation's youth due to its minimal exhaled aerosol, reduced odor, and small size, making it easy to conceal.<sup>8</sup> Many of these new e-cigarettes look like a USB flash drive, among other shapes. One of the most commonly sold

USB flash drive shaped e-cigarettes is JUUL, which experienced a 600% surge in sales during 2016-2017, giving it the greatest market share of any e-cigarette in the U.S. by the end of 2017.<sup>9</sup> Other companies are now also starting to sell e-cigarettes that look like USB flash drives.

All JUUL e-cigarettes have a high level of nicotine. A typical JUUL cartridge, or "pod," contains about as much nicotine as a pack of 20 regular cigarettes.<sup>10</sup> These products also use nicotine salts, which allow particularly high levels of nicotine to be inhaled more easily and with less irritation than the free-base nicotine that has traditionally been used in tobacco products, including e-cigarettes. This is of particular concern for young people, because it could make it easier for them to initiate the use of nicotine through these products and also could make it easier to progress to regular e-cigarette use and nicotine dependence. However, despite these risks, approximately two-thirds of JUUL users aged 15-24 do not know that JUUL always contains nicotine.<sup>11</sup>

## You Can Take Action

We must take aggressive steps to protect our children from these highly potent products that risk exposing a new generation of young people to nicotine.<sup>2,7</sup> The bad news is that e-cigarette use has become an epidemic among our nation's young people. However, the good news is that we know what works to effectively protect our kids from all forms of tobacco product use, including e-cigarettes.<sup>1,2,12</sup> We must now apply these strategies to e-cigarettes, including USB flash drive shaped products such as JUUL. To achieve success, we must work together, aligning and coordinating efforts across both old and new partners at the national, state, and local levels. Everyone can play an important role in protecting our nation's young people from the risks of e-cigarettes.

## Information for Parents

- **You have an important role to play in addressing this public health epidemic.**
- Learn about the different shapes and types of e-cigarettes and the risks of all forms of e-cigarette use for young people at <https://e-cigarettes.surgeongeneral.gov/>.
- Set a good example by being tobacco-free. If you use tobacco products, it's never too late to quit. Talk to a healthcare professional about quitting all forms of tobacco product use. For free help, visit [smokefree.gov](https://smokefree.gov) or call 1-800-QUIT-NOW.
- Adopt tobacco-free rules, including e-cigarettes, in your home and vehicle.
- Talk to your child or teen about why e-cigarettes are harmful for them. It's never too late.
- Get the Surgeon General's tip sheet for parents, [Talk With Your Teen About E-cigarettes](https://e-cigarettes.surgeongeneral.gov/), at <https://e-cigarettes.surgeongeneral.gov/>. Start the conversation early with children about why e-cigarettes, including JUUL, are harmful for them.
- Let your child know that you want them to stay away from all tobacco products, including e-cigarettes, because they are not safe for them. Seek help and get involved.
  - Set up an appointment with your child's health care provider so that they can hear from a medical professional about the health risks of tobacco products, including e-cigarettes.
  - Speak with your child's teacher and school administrator about enforcement of tobacco-free school policies and tobacco prevention curriculum.
  - Encourage your child to learn the facts and get tips for quitting tobacco products at [Teen.smokefree.gov](https://Teen.smokefree.gov).

## Information for Teachers

- **You have an important role to play in addressing this public health epidemic.**
- Learn about the different shapes and types of e-cigarettes and the risks of all forms of e-cigarette use, including JUUL, for young people at <https://e-cigarettes.surgeongeneral.gov/>.
- Develop, implement, and enforce tobacco-free school policies and prevention programs that are free from tobacco industry influence, and that address all types of tobacco products, including e-cigarettes.

- Engage your students in discussions about the dangers of e-cigarette use. To help you, the Food and Drug Administration (FDA), and Scholastic, developed free resources for teachers. These materials can be found at [www.scholastic.com/youthvapingrisks](http://www.scholastic.com/youthvapingrisks).

## Information for Health Professionals

- **You have an important role to play in addressing this public health epidemic.**
- Learn about the different shapes and types of e-cigarettes and the risks of all forms of e-cigarette use, including JUUL, for young people at <https://e-cigarettes.surgeongeneral.gov/>.
- Ask about e-cigarettes, including small, discreet devices such as JUUL, when screening patients for the use of any tobacco products.
- Educate patients about the risks of all forms of tobacco product use, including e-cigarettes, for young people.
- Encourage patients to quit. For free help, patients can visit [smokefree.gov](http://smokefree.gov) or call 1-800-QUIT-NOW.

## Information for States, Communities, Tribes, and Territories

- **You have an important role to play in addressing this public health epidemic.**
- Implement evidence-based population-level strategies to reduce e-cigarette use among young people, such as including e-cigarettes in smoke-free indoor air policies, restricting young peoples' access to e-cigarettes in retail settings, licensing retailers, implementing price policies, and developing educational initiatives targeting young people.
- Implement strategies to curb e-cigarette advertising and marketing that are appealing to young people.
- Implement strategies to reduce access to flavored tobacco products by young people.

KNOW THE RISKS. TAKE ACTION. PROTECT OUR KIDS.

## References

1. Office of the Surgeon General. *The Health Consequences of Smoking-50 Years of Progress: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention (US), National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014. <https://www.surgeongeneral.gov/library/reports/50-years-of-progress/full-report.pdf>.
2. Office of the Surgeon General. *E-cigarette Use among Youth and Young Adults: A Report of the Surgeon General*. Washington, DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2016. [https://www.cdc.gov/tobacco/data\\_statistics/sgr/e-cigarettes/pdfs/2016\\_sgr\\_entire\\_report\\_508.pdf](https://www.cdc.gov/tobacco/data_statistics/sgr/e-cigarettes/pdfs/2016_sgr_entire_report_508.pdf).
3. Wang TW, Gentzke A, Sharapova S, et al. Tobacco Use Among Middle and High School Students - United States, 2011-2017. *MMWR Morbidity and Mortality Weekly Report*. 2018;67(22):629-633.
4. Cullen KA, Ambrose BK, Gentzke AS, Apelberg BJ, Jamal A, King BA. Notes from the Field: Increase in use of electronic cigarettes and any tobacco product among middle and high school students — United States, 2011-2018. *MMWR Morbidity & Mortality Weekly Report* 2018; 67(45):1276-1277.
5. Ambrose BK, Day HR, Rostron B, et al. Flavored Tobacco Product Use Among US Youth Aged 12-17 Years, 2013-2014. *Jama*. 2015;314(17):1871-1873.
6. Trivers KF, Phillips E, Gentzke AS, Tynan MA, Neff LJ. Prevalence of Cannabis Use in Electronic Cigarettes Among US Youth. *JAMA pediatrics*. 2018;172(11):1097-1099.
7. National Academies of Sciences, Engineering, and Medicine. 2018. Public Health Consequences of E-Cigarettes. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24952>.
8. Ramamurthi D, Chau C, Jackler RK. JUUL and other stealth vaporisers: hiding the habit from parents and teachers. *Tob Control*. 2018. Epub ahead of print. doi: 10.1136/tobaccocontrol-2018-054455.
9. King BA, Gammon DG, Marynak KL, Rogers T. Electronic Cigarette Sales in the United States, 2013-2017. *Jama*. 2018;320(13):1379-1380.

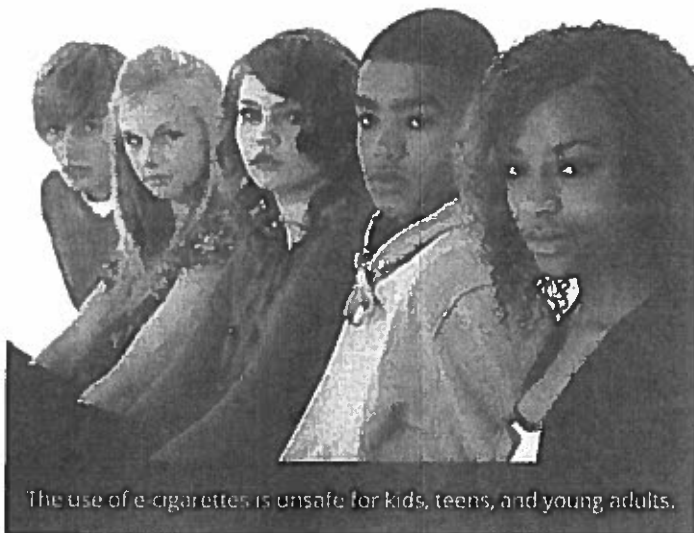
10. Willett JG, Bennett M, Hair EC, et al. Recognition, use and perceptions of JUUL among youth and young adults. *Tob Control*. 2018. Epub ahead of print. doi: 10.1136/tobaccocontrol-2018-054273.
11. Truth Initiative. JUUL e-cigarettes gain popularity among youth, but awareness of nicotine presence remains low. <https://truthinitiative.org/news/juul-e-cigarettes-gain-popularity-among-youth>.
12. US Department of Health and Human Services. *Preventing tobacco use among youth and young adults*. Atlanta, GA: US Department of Health and Human Services, CDC;2012. [https://www.cdc.gov/tobacco/data\\_statistics/sgr/2012/index.htm](https://www.cdc.gov/tobacco/data_statistics/sgr/2012/index.htm).

## Smoking & Tobacco Use

### Quick Facts on the Risks of E-cigarettes for Kids, Teens, and Young Adults

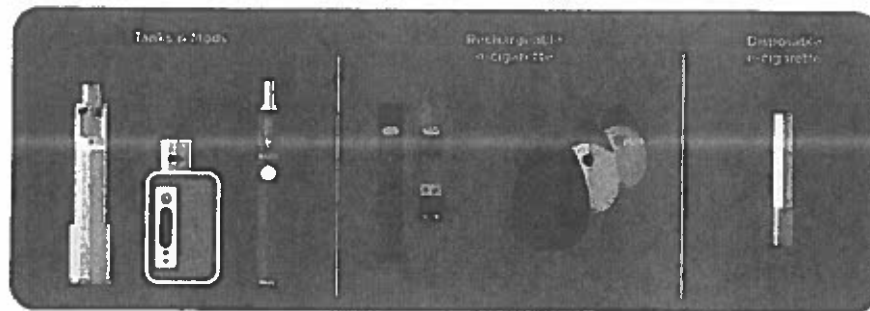
#### What's the Bottom Line on the Risks of E-cigarettes for Kids, Teens, and Young Adults?

- The use of e-cigarettes is unsafe for kids, teens, and young adults.
- Most e-cigarettes contain nicotine. Nicotine is highly addictive and can harm adolescent brain development, which continues into the early to mid-20s.<sup>1</sup>
- E-cigarettes can contain other harmful substances besides nicotine.
- Young people who use e-cigarettes may be more likely to smoke cigarettes in the future.



#### What Are E-cigarettes?

- E-cigarettes are electronic devices that heat a liquid and produce an aerosol, or mix of small particles in the air.
- E-cigarettes come in many shapes and sizes. Most have a battery, a heating element, and a place to hold a liquid.
- Some e-cigarettes look like regular cigarettes, cigars, or pipes. Some look like USB flash drives, pens, and other everyday items. Larger devices such as tank systems, or "mods," do not look like other tobacco products.
- E-cigarettes are known by many different names. They are sometimes called "e-cigs," "e-hookahs," "mods," "vape pens," "vapes," "tank systems," and "electronic nicotine delivery systems (ENDS)."
- Using an e-cigarette is sometimes called "vaping" or "JUULing."

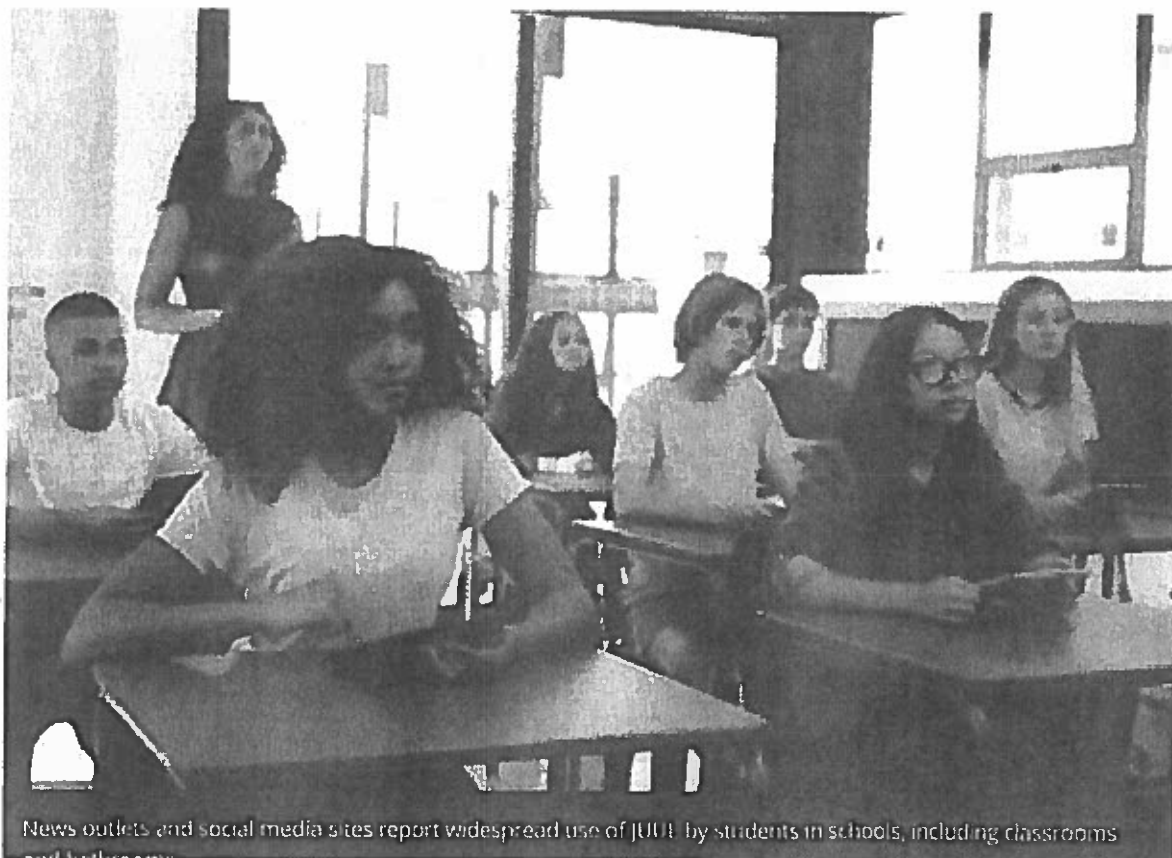


Some e-cigarettes look like regular cigarettes, cigars, or pipes.  
Some look like USB flash drives, pens, and other everyday items.


### How Do E-cigarettes Work?

- E-cigarettes produce an aerosol by heating a liquid that usually contains nicotine, flavorings, and other chemicals that help to make the aerosol.
- The liquid used in e-cigarettes often contains nicotine and flavorings. This liquid is sometimes called "e-juice," "e-liquid," "vape juice," or "vape liquid."
- Users inhale e-cigarette aerosol into their lungs. Bystanders can also breathe in this aerosol when the user exhales it into the air.
- E-cigarette devices can be used to deliver marijuana and other drugs.

### What Is JUUL?



News outlets and social media sites report widespread use of JUUL by students in schools, including classrooms and bathrooms.

- JUUL is a brand of e-cigarette that is shaped like a USB flash drive. Like other e-cigarettes, JUUL is a battery-powered device that heats a nicotine-containing liquid to produce an aerosol that is inhaled.
- All JUUL e-cigarettes have a high level of nicotine. According to the manufacturer, a single JUUL pod contains as much nicotine as a pack of 20 regular cigarettes.<sup>2</sup>
- News outlets and social media sites report widespread use of JUUL by students in schools, including classrooms and bathrooms.
- Although JUUL is currently the top-selling e-cigarette brand in the United States, other companies sell e-cigarettes that look like USB flash drives. Examples include the MarkTen Elite, a nicotine delivery device, and the PAX Era, a marijuana delivery device that looks like JUUL.
- Additional information about USB-shaped e-cigarettes and actions that parents, educators, and health care providers can take to protect kids is available at CDC's Infographic  [PDF – 1.2MB]

## Why Is Nicotine Unsafe for Kids, Teens, and Young Adults?

- Most e-cigarettes contain nicotine—the addictive drug in regular cigarettes, cigars, and other tobacco products.
- Nicotine can harm the developing adolescent brain.<sup>1</sup> The brain keeps developing until about age 25.
- Using nicotine in adolescence can harm the parts of the brain that control attention, learning, mood, and impulse control.<sup>1</sup>
- Each time a new memory is created or a new skill is learned, stronger connections – or synapses – are built between brain cells. Young people's brains build synapses faster than adult brains. Nicotine changes the way these synapses are formed.
- Using nicotine in adolescence may also increase risk for future addiction to other drugs.<sup>1</sup>



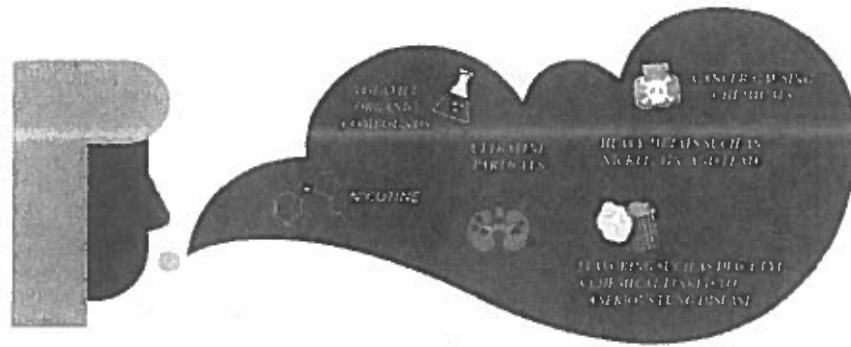
## What Are the Other Risks of E-cigarettes for Kids, Teens, and Young Adults?

- Scientists are still learning about the long-term health effects of e-cigarettes.
- Some of the ingredients in e-cigarette aerosol could also be harmful to the lungs in the long-term. For example, some e-cigarette flavorings may be safe to eat but not to inhale because the gut can process more substances than the lungs.<sup>1</sup>
- Defective e-cigarette batteries have caused some fires and explosions, a few of which have resulted in serious injuries.
- Children and adults have been poisoned by swallowing, breathing, or absorbing e-cigarette liquid through their skin or eyes.

## What Is in E-cigarette Aerosol?

- E-cigarette aerosol is NOT harmless “water vapor.”
- The e-cigarette aerosol that users breathe from the device and exhale can contain harmful and potentially harmful substances, including:
  - Nicotine
  - Ultrafine particles that can be inhaled deep into the lungs
  - Flavoring such as diacetyl, a chemical linked to a serious lung disease
  - Volatile organic compounds
  - Cancer-causing chemicals
  - Heavy metals such as nickel, tin, and lead<sup>1</sup>

- It is difficult for consumers to know what e-cigarette products contain. For example, some e-cigarettes marketed as containing zero percent nicotine have been found to contain nicotine.<sup>3</sup>



## Can Using E-cigarettes Lead to Future Cigarette Smoking Among Kids, Teens, and Young Adults?

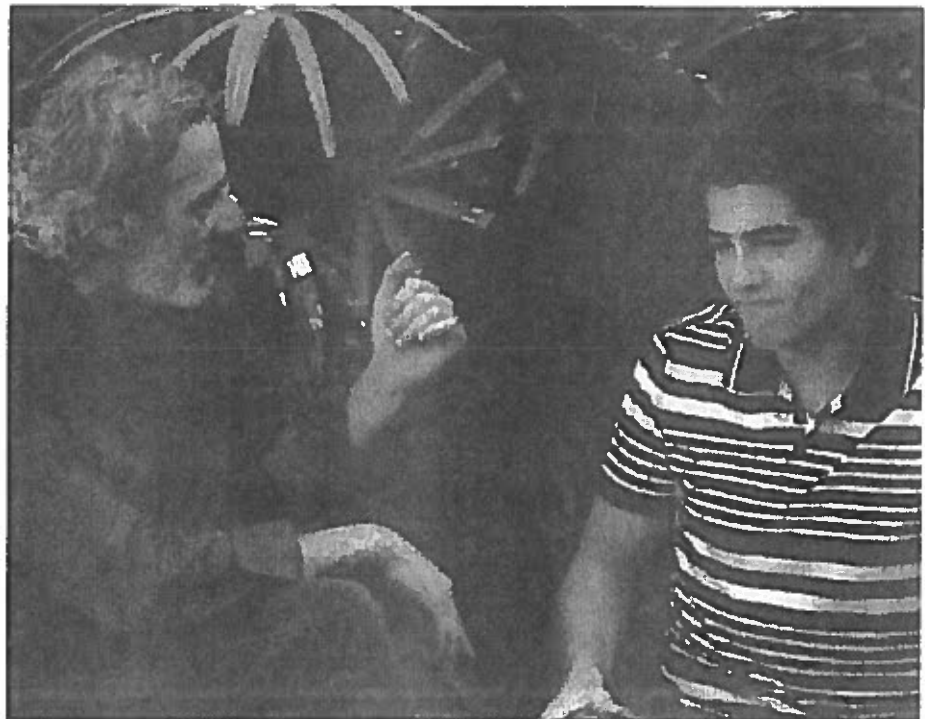
- Many young people who use e-cigarettes also smoke cigarettes.<sup>1</sup> There is some evidence that young people who use e-cigarettes may be more likely to smoke cigarettes in the future.
- Specifically, a 2018 National Academy of Medicine report found that there was some evidence that e-cigarette use increases the frequency and amount of cigarette smoking in the future.<sup>4</sup>
- But e-cigarette use among young people is unsafe, even if they do not progress to future cigarette smoking.

## Aren't E-cigarettes Safer Than Cigarettes?

- E-cigarettes expose users to fewer harmful chemicals than burned cigarettes.<sup>1</sup> But burned cigarettes are extraordinarily dangerous, killing half of all people who smoke long-term.
- The use of any tobacco product, including e-cigarettes, is unsafe for young people.

## What Can I Do to Prevent My Child from Using E-cigarettes or to Help Them Stop?


- Set a good example by being tobacco-free. If you use tobacco, it's never too late to quit. For free help, visit [smokefree.gov](https://smokefree.gov) or call 1-800-QUIT-NOW.
- Talk to your child or teen about why e-cigarettes are harmful for them. It's never too late.
- Get the Talk With Your Teen About E-cigarettes [PDF – 5.2MB] tip sheet for parents. Start the conversation early with children about why e-cigarettes are harmful for them.
- Let your child know








that you want them to stay away from all

tobacco products, including e-cigarettes,

because they are not safe for them. Seek help and get involved.

- Set up an appointment with your child's health care provider so that they can hear from a medical professional about the health risks of tobacco products, including e-cigarettes.
- Speak with your child's teacher and school administrator about enforcement of tobacco-free school grounds policies and tobacco prevention curriculum.
- Encourage your child to learn the facts and get tips for quitting tobacco products at [Teen.smokefree.gov](http://Teen.smokefree.gov) .

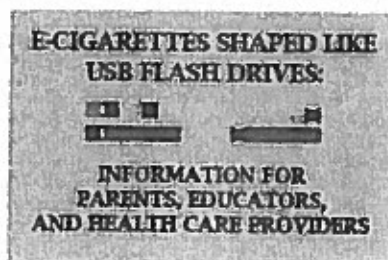
## Where Can I Learn More?

- Surgeon General's Advisory on E-cigarette Use Among Youth
  - Download  [PDF-572 KB] 
- E-cigarettes Shaped Like Flash Drives: Information for Parents, Educators, and Health Care Providers
- Teachers and Parents: That USB Stick Might Be an E-cigarette
- E-cigarettes.surgeongeneral.gov 
  - Information from the Surgeon General on the risks of e-cigarettes for young people, and includes free tools such as a parent tip sheet for talking to teens about e-cigarettes  [PDF - 5.2MB].
- Teen.smokefree.gov 
  - Information for teens who use tobacco products, including tips on how to quit.
- Electronic Cigarettes
  - Basic information about e-cigarettes from CDC's Office on Smoking and Health.

## Resources



E-Cigarette Infographic



E-Cigarette Fact Sheet



Know the Risks: A Youth Guide to E-cigarettes Presentation



Fact Sheet for Parents  
Download the PDF  [PDF 1 MB]  
or order a free hard copy



Fact Sheet for Health  
Care Providers  
[PDF 964 KB]

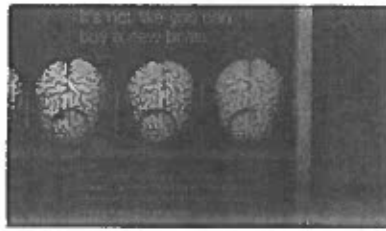


Fact Sheet for Educators  
[PDF - 809 KB]



"One Brain" :30 PSA [MP3-469KB]

"One Brain" PSA Transcript ■  
[PDF - 14KB]



"New Brain" Print Ad

[PDF - 3MB]

## Sources

1. US Department of Health and Human Services. *E-cigarette Use Among Youth and Young Adults: A Report of the Surgeon General* ■ [PDF - 8.47MB]. Atlanta, GA: US Department of Health and Human Services, CDC; 2016. Accessed July 27, 2018.
2. Willett JG, Bennett M, Hair EC, et al Recognition, use and perceptions of JUUL among youth and young adults. *Tobacco Control Published Online First*: 18 April 2018. doi: 10.1136/tobaccocontrol-2018-054273
3. Goniewicz ML, Gupta R, Lee YH, et al. Nicotine levels in electronic cigarette refill solutions: a comparative analysis of products from the United States, Korea, and Poland. *Int J Drug Policy*. 2015;26(6):583-588.
4. National Academies of Sciences, Engineering, and Medicine. 2018. *Public health consequences of e-cigarettes* □ . Washington, DC: The National Academies Press.

Page last reviewed March 11, 2019

## 2018 NYTS Data: A Startling Rise in Youth E-cigarette Use

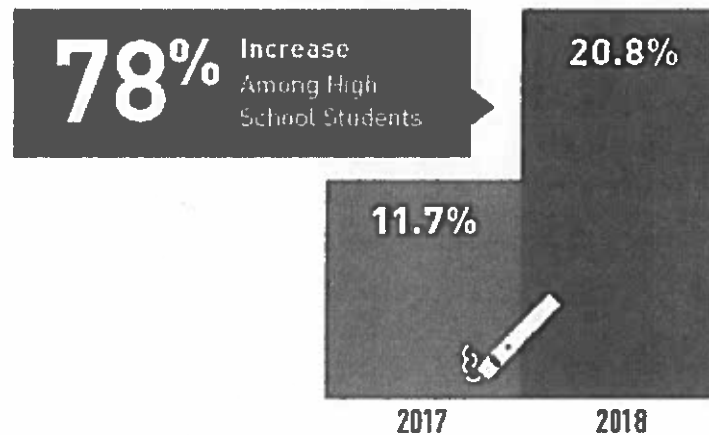
# 2018 NATIONAL YOUTH TOBACCO SURVEY FINDS CAUSE FOR CONCERN



According to 2018 National Youth Tobacco Survey (NYTS) ([https://www.cdc.gov/mmwr/volumes/67/wr/mm6745a5.htm?s\\_cid=mm6745a5\\_w](https://www.cdc.gov/mmwr/volumes/67/wr/mm6745a5.htm?s_cid=mm6745a5_w)) data, current e-cigarette use—or “vaping”—among middle and high school students increased alarmingly between 2017 and 2018, with over 3.6 million kids currently using e-cigarettes in 2018. Each year, the NYTS—a nationally representative survey funded by FDA and CDC—sheds light on the latest rates of tobacco use among both middle and high school students. In recent years, e-cigarettes have become the most commonly used tobacco product by U.S. teens; however, rates of use generally declined between 2015 and 2017. Unfortunately, the 2018 NYTS data show a sharp and startling reversal of overall declines in youth tobacco use from previous years.<sup>1</sup>

### E-cigarette Use among High School Students

## SURGE IN YOUTH CURRENT E-CIGARETTE USE



From 2017 to 2018, current e-cigarette use—defined by use on at least one day in the past 30 days—by high school students increased 78 percent, from 11.7 to 20.8 percent, accounting for a troubling 3.05 million American high school students using e-cigarettes in 2018. In addition, the proportion of current e-cigarette users in high school who reported use on 20 days or more in the past 30-day period increased from 20 percent to 27.7 percent between 2017 and 2018.<sup>1</sup>

### Flavors: A Reason for Use

During the one-year period between 2017 and 2018, among high school students who currently used e-cigarettes, use of flavored e-cigarettes increased as well. Use of any flavored e-cigarette went up among current users from 60.9 percent to 67.8 percent, and menthol use increased from 42.3 percent to 51.2 percent among all current e-cigarette users—including those using multiple products—and from 21.4 percent to 38.1 percent among exclusive e-cigarette users.

Flavors in tobacco products are problematic, as they can be very appealing to youth, and are frequently listed as one of the top three reasons this population uses e-cigarettes.<sup>2,3</sup>

Additionally, kids whose first tobacco product was flavored are more likely to become current tobacco users than those whose first product was tobacco-flavored.<sup>4</sup>

## AMONG HIGH SCHOOL CURRENT E-CIGARETTE USERS — Rise in Use of Flavors

More Used  
Flavored  
E-Cigarettes

68%

in 2018

VS

61% in 2017

## E-cigarette Use Among Middle School Students

### SURGE IN YOUTH CURRENT E-CIGARETTE USE

48%

Increase  
Among Middle  
School Students

3.3%

4.9%

2017

2018

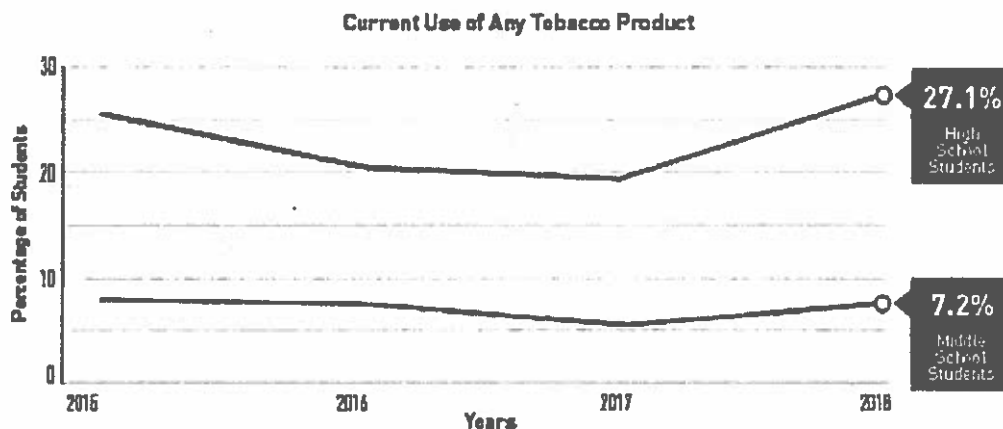
E-cigarette use among middle school students is also on the rise, jumping 48 percent from 2017 to 2018. Today, a total of 4.9 percent of middle school students—or 570,000 kids—are current e-cigarette users.<sup>1</sup>

## What caused this sharp increase in use?

NYTS study authors hypothesize the last year's increase in e-cigarette use among youth could be attributable to use of USB-flash-drive-like e-cigarettes, including JUUL, which have garnered popularity among youth. These products have high nicotine content; appealing flavors; and the ability to be easily concealed and used discreetly.

## Reasons for Concern

### E-CIGARETTE USE SURGE LED TO UPTICK IN OVERALL TOBACCO USE — Reversing Previous Declines



The significant rise in e-cigarette use among both student populations has resulted in overall tobacco product use increases of 38 percent among high school students and 29 percent among middle school students between 2017 and 2018, negating declines seen in the previous few years.<sup>1</sup>

This is a cause for concern because tobacco use is the leading cause of preventable disease and death in the United States and because nearly all tobacco products contain nicotine. As adolescent brains are still developing, nicotine exposure during youth and young adulthood can

change the way the brain works, leading to a lifetime of addiction and, in some cases, causing long-lasting effects such as increased impulsivity and mood disorders.<sup>5</sup> Studies also find teens who use e-cigarettes have an increased risk of trying combustible cigarettes.<sup>6</sup> While completely switching from combustible cigarettes to e-cigarettes may potentially benefit addicted adult smokers' health,<sup>6</sup> no tobacco product—including e-cigarettes—is safe for youth to use.

*FDA is committed to protecting future generations by preventing youth access to tobacco products, curbing marketing of tobacco products aimed at youth, and educating teens about the dangers of using any tobacco product, including e-cigarettes, as well as educating retailers about their key role in protecting youth. Learn more: FDA's Youth Tobacco Prevention Plan (/tobacco-products/youth-and-tobacco/fdas-youth-tobacco-prevention-plan).*

## Additional Resources

- Youth Tobacco Use: Results from the National Youth Tobacco Survey (/tobacco-products/youth-and-tobacco/youth-tobacco-use-results-national-youth-tobacco-survey)
- Statement from FDA Commissioner Scott Gottlieb, M.D., on new data demonstrating rising youth use of tobacco products and the agency's ongoing actions to confront the epidemic of youth e-cigarette use (/news-events/press-announcements/statement-fda-commissioner-scott-gottlieb-md-new-data-demonstrating-rising-youth-use-tobacco)
- Vital Signs: Tobacco Product Use Among Middle and High School Students — United States, 2011–2018 (<https://www.cdc.gov/vitalsigns/youth-tobacco-use/>)
- CDC Press Release: Results from 2018 National Youth Tobacco Survey show dramatic increase in e-cigarette use among youth over past year (<https://www.cdc.gov/media/releases/2019/p0211-youth-tobacco-use-increased.html>)
- CDC MMWR: Use of Electronic Cigarettes and Any Tobacco Product Among Middle and High School Students — United States, 2011–2018 ([https://www.cdc.gov/mmwr/volumes/67/wr/mm6745a5.htm?s\\_cid=mm6745a5\\_w](https://www.cdc.gov/mmwr/volumes/67/wr/mm6745a5.htm?s_cid=mm6745a5_w))
- National Youth Tobacco Survey ([https://www.cdc.gov/tobacco/data\\_statistics/surveys/nyts/index.htm](https://www.cdc.gov/tobacco/data_statistics/surveys/nyts/index.htm))
- Information on regulation of e-cigarettes and other ENDS (/tobacco-products/products-ingredients-components/vaporizers-e-cigarettes-and-other-electronic-nicotine-delivery-systems-ends)
- FDA's Youth Tobacco Prevention Plan (/tobacco-products/youth-and-tobacco/fdas-youth-tobacco-prevention-plan)

- FDA's "The Real Cost" Youth E-Cigarette Prevention Campaign (/tobacco-products/real-cost-campaign)

## References

## Smoking & Tobacco Use

# Outbreak of Lung Illness Associated with Using E-cigarette Products

## Investigation Notice

Posted September 11, 2019 at 3:00pm ET

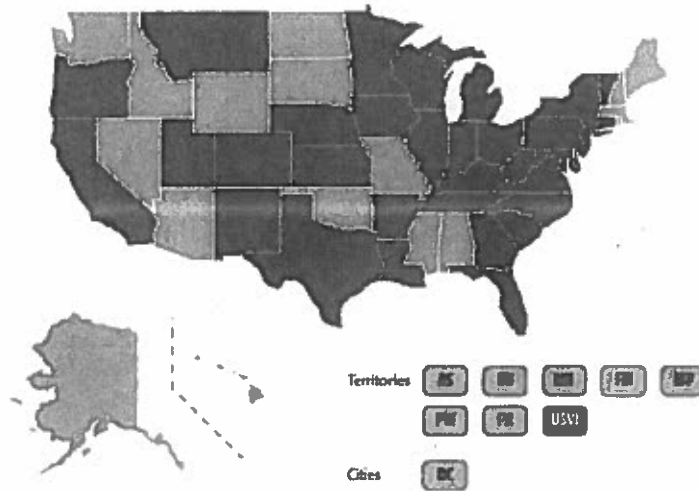
CDC, U.S. Food and Drug Administration (FDA), state and local health departments, and other clinical and public health partners are investigating a multistate outbreak of severe pulmonary disease associated with e-cigarette product (devices, liquids, refill pods, and/or cartridges) use. This investigation is ongoing and has not identified a cause, but all reported cases have a history of using e-cigarette products.

E-cigarettes are devices that deliver an aerosol to the user by heating a liquid that usually contains nicotine, flavorings, and other chemicals. E-cigarettes can also be used to deliver marijuana or other substances.

### Latest Outbreak Information

- As of September 6, 2019, over 450 possible cases of lung illness associated with the use of e-cigarette products have been reported to CDC from the following 33 states and 1 U.S. territory: AR, CA, CO, CT, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, MI, MN, MT, NC, NE, NJ, NM, NY, OH, OR, PA, SC, TN, TX, UT, VA, VT, WI, WV, and the U.S. Virgin Islands. These numbers may change frequently.
- Six deaths have been confirmed in California, Illinois, Indiana, Kansas, Minnesota, and Oregon.
- CDC worked with states to create a case definition to classify cases in a consistent way. State investigators determine if cases are confirmed or probable after examining the medical records of suspected cases and consulting with the clinical care team to exclude other possible causes. Unlike nationally reportable conditions, these cases are requiring clinicians and public health to interview patients to determine product use and individual behaviors.
- CDC will report numbers of confirmed and probable cases once states have finalized their classification of cases.
- We expect that states and clinicians may look back for older cases based on CDC's case definition. States are in the process of classifying current possible cases as well as older cases.
- No evidence of infectious diseases has been identified; therefore lung illnesses are likely associated with a chemical exposure. Initial published reports from the investigation point to clinical similarities among cases. Patients report e-cigarette use and similar symptoms and clinical findings. These align with the CDC health advisory released August 30, 2019.
- The investigation has not identified any specific substance or e-cigarette product that is linked to all cases. Many patients report using e-cigarette products with liquids that contain cannabinoid products, such as tetrahydrocannabinol (THC).
- These investigations are ongoing. CDC will provide updates when more information is available.

### Map of Reported Cases



## Recommendations for the Public

While this investigation is ongoing, consider not using e-cigarette products.

If you do use e-cigarette products and you experience symptoms like those reported in this outbreak, seek medical care promptly. CDC and the FDA will continue to alert the public throughout this investigation.

Regardless of the ongoing investigation:

- Youth and young adults should not use e-cigarette products.
- Women who are pregnant should not use e-cigarette products.
- Adults who do not currently use tobacco products should not start using e-cigarette products.
- If you do use e-cigarette products, you should not buy these products off the street (for example, e-cigarette products with THC or other cannabinoids).
- You should not modify e-cigarette products or add any substances to these products that are not intended by the manufacturer.
- Adult smokers who are attempting to quit should use evidence-based treatments, including counseling and FDA-approved medications. If you need help quitting tobacco products, including e-cigarettes, contact your doctor or other medical provider.

If you are concerned about your health after using an e-cigarette product, you can also call your local poison control center at 1-800-222-1222.

CDC and FDA encourage the public to submit detailed reports of any unexpected health or product issues related to tobacco or e-cigarette products to the FDA via the online Safety Reporting Portal.

## Symptoms of Severe Pulmonary Disease Reported by Some Patients in This Outbreak

- Patients in this investigation have reported symptoms such as:
  - cough, shortness of breath, or chest pain
  - nausea, vomiting, or diarrhea
  - fatigue, fever, or weight loss
- Some patients have reported that their symptoms developed over a few days, while others have reported that their symptoms developed over several weeks. A pulmonary infection does not appear to be causing the symptoms, which have generally not improved with antibiotic treatment alone.

## Recommendations for Healthcare Providers

As this investigation continues, CDC encourages clinicians to report possible cases of e-cigarette-associated pulmonary disease to their local or state health department for further investigation.

If e-cigarette product use is suspected as a possible cause for a patient's lung disease, a detailed history of the substances used, the sources, and the devices used should be obtained, as outlined in the HAN, and efforts should be made to determine if any remaining product, devices, and liquids are available for testing.

## Recommendations for Local and State Public Health Departments

---

CDC encourages local and state health departments to notify CDC about possible cases promptly, and contact CDC for the most recent versions of the surveillance case definitions, reporting guidelines, and case investigation forms.

Local and state public health departments that need data collection tools should email CDC at [eocevent101@cdc.gov](mailto:eocevent101@cdc.gov).

## Investigation Details

---

August 30, 2019

CDC, several states, and federal partners are investigating a multistate outbreak of severe pulmonary disease associated with using e-cigarette products. The investigation is ongoing and has not identified a cause, but all reported cases have indicated use of e-cigarette products.

Based on reports from several states, patients have experienced respiratory symptoms (cough, shortness of breath, or chest pain), and some have also experienced gastrointestinal symptoms (nausea, vomiting, or diarrhea) or non-specific symptoms (fatigue, fever, or weight loss). Some patients have reported that their symptoms developed over a few days, while others have reported that their symptoms developed over several weeks. Some patients have reported gastrointestinal symptoms began before respiratory symptoms. Fever, elevated heart rate, and elevated white blood cell count have been reported, even though no infectious disease has been identified. Many patients sought medical care in ambulatory settings, sometimes over several visits, before they were admitted to the hospital.

Many patients have required medical treatment with supplemental oxygen. Some required assisted ventilation. Some patients have been treated with corticosteroids with demonstrated improvement. Evidence does not suggest an infectious disease is the cause of the severe pulmonary disease. Antibiotic therapy alone has not consistently been associated with clinical improvement.


### Investigation of the Outbreak

CDC, FDA, state and local health departments, and other clinical and public health partners are investigating a multistate outbreak of pulmonary disease associated with e-cigarette product (devices, liquids, refill pods, and/or cartridges) use. This ongoing investigation seeks to identify the exposures, demographic, clinical, and laboratory features and behaviors of patients. All patients have reported e-cigarette product use. Some patients have reported using e-cigarettes containing cannabinoid products, such as THC. To date, the investigation has not identified any single substance or e-cigarette product that has been consistently associated with illness.

State health departments are working with FDA to enable collection of e-cigarette product specimens for testing at the U.S. FDA Forensic Chemistry Center.

## Key Resources

---

- MMWR: Severe Pulmonary Disease Associated with Electronic-Cigarette-Product Use — Interim Guidance
- MMWR: Notes from the Field: Outbreak of Electronic-Cigarette Associated Acute Lipoid Pneumonia—North Carolina, July–August, 2019
- New England Journal of Medicine: Pulmonary Illness Related to E-Cigarette Use in Illinois and Wisconsin — Preliminary Report 

# The Washington Post

*Democracy Dies in Darkness*



## Maryland, Virginia among 22 states reporting incidents of vaping-related illness

By **Laurel Demkovich**

August 28, 2019 at 5:36 p.m. EDT

Maryland and Virginia are among 22 states that are reporting cases of vaping-related illness.

At least one death has been reported, in Illinois.

Maryland announced Wednesday that the Department of Health and the Maryland Poison Center at the University of Maryland School of Pharmacy have identified five individuals who have developed severe lung illness after using e-cigarettes. All required hospitalization, according to a news release.

Virginia has reported three cases as of Monday, two in northern Virginia and one in the southwest part of the state. Health officials also are investigating other potential cases, according to a statement from the state's Department of Health.

D.C. health officials have reported no cases in the District, a Department of Health spokeswoman said.

“The Maryland Department of Health is taking this issue seriously and is working with local health departments, the Centers for Disease Control and Prevention and the Food and Drug Administration to identify anyone who may be experiencing similar symptoms,” Maryland Deputy Secretary for Public Health Frances B. Phillips said in a news release

The Centers for Disease Control and Prevention said 193 potential cases of severe lung illness had been reported as of Aug. 22.

On Aug. 23, an Illinois resident died after being hospitalized with a severe respiratory illness associated with vaping.

Symptoms of the illness include shortness of breath, pain associated with breathing, coughing, fever, nausea, vomiting and diarrhea, according to Maryland health officials.

Anyone who has these symptoms and has a history of e-cigarette use is urged to seek medical attention immediately, said Virginia health officials.

The cause of the illness is not yet known and it has not been linked to any particular device or brand, according to Maryland health officials. Those who reported being ill claimed to use a variety of vaping products, including ones containing marijuana, THC and nicotine.

Since 2014, e-cigarettes have become popular among many middle and high school students without fully knowing their long-term effects. In 2018, more than 3.6 million U.S. middle and high school students had used e-cigarettes in the past 30 days, according to the CDC.

E-cigarettes contain nicotine as well as harmful ingredients and chemicals, all delivered at much higher rates than in cigarettes, according to D.C.'s Tobacco Control Program.

Health departments are encouraging medical providers to ask about history of

recent e-cigarette use or vaping and to report potential cases to their local health departments.

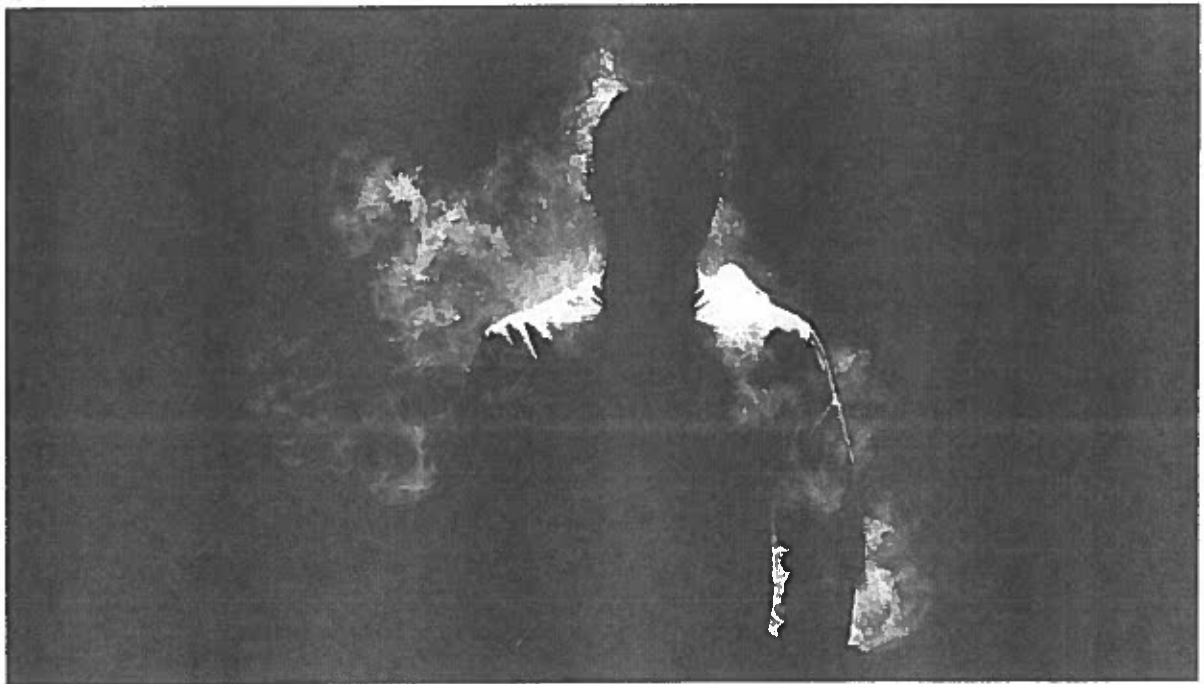
**Laurel Demkovich**

Laurel Demkovich is a cops and courts reporter for the local desk.

# Teen Vaping Linked to More Health Risks

By KATHLEEN RAVEN (MAILTO:KATHLEEN.RAVEN@YALE.EDU) SEPTEMBER 7, 2019

Young people may think that vaping does no harm – and that's a problem.



A popular type of vaping device, called pod mods, look like USB drives and can even be charged via a laptop or USB port. Yale researchers in addiction medicine are concerned that teens may not know that they could be vaping with nicotine, a highly addictive drug.

*Credit: Getty Images*

*[Originally published: September 13, 2018. Updated: September 7, 2019.]*

During a recent media briefing, the Centers for Disease Control and Prevention (CDC) advised people to avoid e-cigarettes while federal and state officials investigate a nationwide outbreak of severe respiratory illnesses associated with the use of e-cigarette, or vaping, products.

“Of course, e-cigarette use is never safe for youth, young adults, or pregnant women,” said CDC’s Dana Meaney-Delman, MD, who is managing the agency’s response to the outbreak.

Federal and state officials have reported hundreds of total possible cases of pulmonary disease and several deaths that may be related to vaping. Patients’ symptoms ranged from cough, chest pain and shortness of breath to fatigue, vomiting, diarrhea, and fever, according to the CDC.

“Based on clinical and laboratory evidence to date, we believe that a chemical exposure is likely associated with these illnesses,” Dr. Meaney-Delman said. “However, and I really want to stress this, more information is needed to determine which specific products or substances are involved.”

As part of their investigations, state health officials have sent samples of products to the Food and Drug Administration (FDA) for analysis. The FDA is evaluating these samples for THC (the high-inducing compound in marijuana), nicotine, Vitamin E acetate, and a range of other chemicals.

Even if or when a potential culprit is identified, Mitch Zeller, director of FDA’s Center for Tobacco Products, cautioned that it will be only “one piece of the puzzle...and it makes all of our ongoing work that much more critical.”

Last year, the U.S. Surgeon General’s office began the work of awareness when the nation’s doctor, Jerome Adams, MD, issued a warning that vaping among youth has reached epidemic levels.

The numbers are startling. More than 3.6 million middle and high school students currently use e-cigarettes, according to the latest National Youth Tobacco Study. Another national study last year found that 11 percent of high school seniors, 8 percent of 10th-graders, and 3.5 percent of eighth-graders vaped with nicotine (/stories/vaping-nicotine-addiction/) during a previous one month period. The worrying part? Young people think vaping is mostly harmless.

To understand vaping, it’s best to start on broad terms. To vape is to inhale vapor created from a liquid heated up inside a device. From there, things quickly get complicated. The devices have many names – vape pens, pod mods, tanks, electronic nicotine delivery devices (ENDS), e-hookahs and e-cigarettes. The liquid they contain also has many monikers – it might be called e-juice, e-liquid, cartridges,

Pods, or oil. Most vape liquids contain a combination of propylene glycol or glycerol – also called glycerin – as a base, and nicotine, marijuana, or flavoring chemicals to produce common or outlandish flavors, from mint to “unicorn puke.” The devices rely on batteries to power heating elements made of various materials that aerosolize the liquid.

What’s more, the San Francisco-based company that sells Juuls – currently the most popular vaping device on the market – offers vape liquid made from nicotine salts found in loose-leaf tobacco instead of the traditional free-base nicotine found in most e-cigarette liquid. This may allow the user to experience a higher – and more addictive – concentration of nicotine, according to an article (<https://www.nejm.org/doi/full/10.1056/NEJMp1805758>) in *The New England Journal of Medicine*.

Since e-cigarettes arrived in the U.S. in 2007, they have been investigated by addiction researchers as possible cessation devices for adults trying to quit combustible, or regular, cigarettes. The Food and Drug Administration (FDA) lists 93 harmful or potentially harmful chemicals found in regular cigarettes, and the National Cancer Institute (NCI) describes cigarettes as having more than 7,000 chemicals in them. E-cigarettes contain fewer chemicals and so the industry has presented them as a healthier alternative to regular cigarettes. But vape liquids can still contain nicotine, a highly addictive drug.

And on one point, Yale health researchers who study the health effects of vaping and e-cigarettes agree: Vape devices have not been proven to help adult smokers quit smoking. Moreover, vaping increases the risk a teen will smoke regular cigarettes later.

“The addiction to nicotine and later conversion to (or dual use with) regular cigarettes are the greatest concerns,” says Roy S. Herbst, MD (/doctors/roy\_herbst/), Yale Medicine’s chief of medical oncology at Yale Cancer Center. He points to two heavyweight organizations, the American Society of Clinical Oncology (ASCO) and the American Association for Cancer Research (AACR), that have issued statements that vaping could be harmful to youth. (Dr. Herbst chairs the AACR Tobacco & Cancer Subcommittee that led the development of the statement.)

The popularity of Juul is worrying to addiction researchers. Juuls arrived late to the e-cigarette market in 2015, about eight years after vaping devices first began appearing in the United States. But the company, called Juul Labs, has surged ahead of competitors. Juul accounted for 72 percent of the e-cigarette market in August 2018, according to news reports. Sleek and slim, with an appearance that mirrors a flash drive, Juul has been established among youth as the vaping tool of choice. Teens even morphed the brand into a verb – juuling – according to widespread news coverage chronicling its rise. “When we ask teens about their vaping or e-cig habits, they don’t even consider juuling to be part of that,” says Suchitra Krishnan-Sarin, PhD, co-leader of the Yale Tobacco Center for Regulatory Science, one of nine centers in the country currently funded by the National Institutes of Health (NIH) and the FDA to foster tobacco regulatory research.

Juul and other vape manufacturers, including Vuse, MarkTen XL, blu, and Logic, came under scrutiny by the FDA for marketing and sales practices that seemed aimed at teens and young adults, according to an announcement the FDA released in September 2018. At the time, the agency asked the companies to submit plans on how they planned to address widespread youth access and use of their products.

“We cannot allow a whole new generation to become addicted to nicotine,” former FDA Commissioner Scott Gottlieb, MD, said in the release.

Surgeon General Adams shared similar concerns, which he outlined in a news conference last year: “The number one reason young people say they try these devices is because they have flavors in them,” Dr. Adams said, noting that e-cigarettes come in kid-friendly flavors.

While it’s possible to buy liquid without nicotine for some e-cigarettes, it’s not possible to do so with popular pod mod devices. According to Juul’s website – in a description that has since been taken down – a single Juulpod contains 40 mg of nicotine, which is similar to “the nicotine yield of a pack of cigarettes.” (The company also sells Juulpods with approximately 23 mg of nicotine.) But researchers explain that it’s difficult to describe a single pod as a “serving.” A person might consume one pod in a week, while another may take only one day.

## A stubborn trend

When potentially risky behaviors experience an uptick in popularity, health researchers are never far behind — gathering data. A Yale study last year found that, among students at three Connecticut public schools, those who used e-cigarettes were more likely to smoke regular cigarettes in the future.

Krishnan-Sarin points to progress that has been made — finally — in recent years to reduce regular cigarette smoking rates among young adults. In her opinion, the significant decline is due to the success of large-scale public health campaigns and a general awareness among youth that cigarettes are harmful to health.

She is concerned that most teens who vape with nicotine don't know the drug can be damaging to their development. "We have a lot of evidence showing that the adolescent brain is extremely sensitive to the effects of nicotine," she says, adding that the brain doesn't stop growing until around age 25. "Studies have shown us that nicotine can interfere with memory and attention processing."

In his imaging studies of adults who use e-cigarettes, Stephen Baldassarri, MD ([/doctors/stephen\\_baldassarri/](/doctors/stephen_baldassarri/)), an internist at Yale Medicine, has begun to gather information on the factors that influence nicotine delivery from e-cigarettes and whether vaping promotes cessation from conventional cigarette smoking. Teens cannot participate in such studies, but "we all agree that e-cigs are not a good thing for youth and nonsmokers," Dr. Baldassarri says.

## How to talk to your kids

Probably the worst thing a parent could do for their child would be to buy an e-cigarette under the misconception that this might prevent them from smoking regular cigarettes, Krishnan-Sarin says. She encourages parents to talk openly and freely about vaping — with the caveat that they provide accurate information. "I think the problem is that parents lose credibility if they say something to try and convince their child, who then finds out that it isn't true," she says.

"Parents should base their information on accurate facts and also encourage their children to read about and understand the science on this issue instead of relying on what their friends and peers tell them."

Dr. Baldassarri suggests explaining the addictive nature of vaping, which would mess with the one thing teens crave the most: independence. "In some ways, when you get addicted to a drug, it's like losing your freedom of choice," he says. "The risk

of losing that freedom might be a persuasive message for kids.”

Deepa Camenga, MD (/doctors/deepa\_camenga/), a pediatrician who is board-certified in addiction medicine, says it’s never too early to begin talking about e-cigarettes in age-appropriate language. “When you are out and about with your children and see an advertisement, for example, take the opportunity to talk about it,” she says. As they grow older, parents can expand on their thoughts and expectations. “It’s also important to give teens and young adults the space to ask questions,” she says.

Patrick O’Connor, MD (/doctors/patrick\_oconnor/), Yale Medicine’s chief of general internal medicine, who has dedicated his career to researching opioid and alcohol drug abuse, points to similarities between epidemic cigarette use in the 1940s and 50s, and e-cigarette use now.

Even as evidence accumulated on the link between lung cancer and cigarette use, doctors didn’t always take time to talk to patients about those risks, he says. “I think it’s a major responsibility of physicians, family medicine doctors, pediatricians, and adolescent medicine practitioners. One of the big deficits in medical education has been to prepare medical students to address these issues with their patients, ask them about their use of these substances, and advise them on the risks,” Dr. O’Connor says. “This is as true for e-cigarette use and vaping as it is for alcohol and other drug use.”

What may be the most important message of all is that e-cigarettes and vaping come with many health unknowns, Dr. O’Connor adds. “You see plumes of what looks like steam coming out of people’s mouths on the street when they are vaping, and I think they assume it’s mostly safe, mostly water. But these liquids used in vaping are filled with all kinds of stuff [like nicotine, marijuana, flavoring agents, chemicals], and we don’t always know what else is in there,” he says.

Surgeon General Adams echoed these concerns in his news conference following the release of his advisory: “Studies show that youth, like my son, have no clue what’s in these products most of the time.”

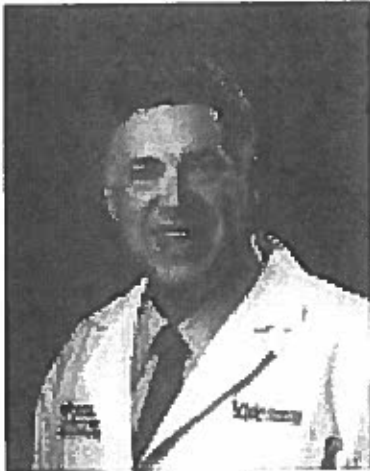
Months after the release of the advisory, Yale researchers found (/stories/vaping-dangers/) that byproducts, called acetals, form when flavoring agents mix with solvents in the liquid. It is not yet known if this has negative effects on the body, but

Sven-Eric Jordt, PhD, one of the study's authors, says he hopes that the FDA will begin to study the short- and long-term effects of inhaled acetals. "We want these companies to be more transparent about what's in their liquids," he says.

*To learn more, go to [Yalemedicine.org](https://www.yalemedicine.org/stories/). (<https://www.yalemedicine.org/stories/>)*

---

## Related Doctors



**Roy S. Herbst (/doctors/roy\_herbst/)**

MEDICAL ONCOLOGY

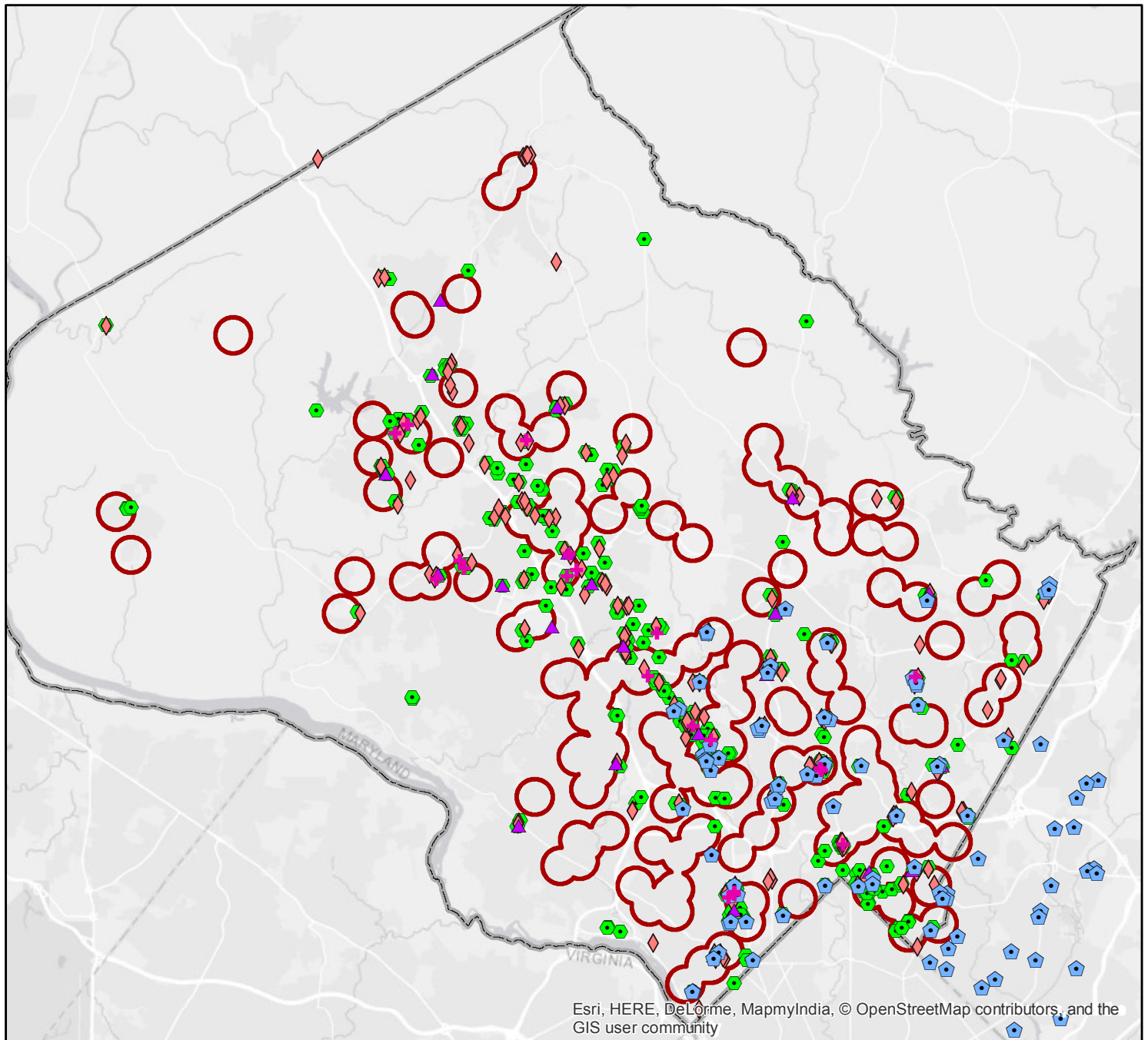
Call 203-200-5864 for an appointment (tel:+1-203-200-5864)



**Stephen Baldassarri (/doctors/stephen\_baldassarri/)**

PULMONARY CRITICAL CARE

## Montgomery County Middle &amp; High School Half Mile buffers



	Number inside school buffer (0.5mile)
Vape Shops	18
Beer & Wine shops	155
Filling Stations	98
Drugstores	33
Liquor Stores	11

- + Vapeshops
- ⬠ Drugstores
- ▲ Liquor\_Store
- ◆ FillingStations
- ⬠ Beer & Wine
- Half Mile Buffer
- Middle and High Schools