

## VAPING RISKS, BEHAVIORS AND POLICY RESPONSES: A VIEW FROM LOS ANGELES COUNTY

MARCH 2020

*Vaping\** is an emerging public health issue of concern. Given the recent national outbreak of vaping-related lung illness and death, and rising rates of *e-cigarette* use among youth, it is important for LA County residents to be informed about these two distinct but related issues so that they can take appropriate precautions. This brief report summarizes what we know about vaping including: 1) the current vaping-related illness outbreak, 2) the history of vaping products and regulations in the US, 3) vaping health effects, 4) trends in youth vaping behaviors, and 5) strategies for reducing potential harms to public health. The report ends with a set of recommendations based on the information presented.

### E-Cigarette, or Vaping, Product Use Associated Lung Injury (EVALI)

From March 31, 2019 to February 18, 2020, the US Centers for Disease Control and Prevention (CDC) reported 2,807 hospitalizations<sup>†</sup> and 68 deaths attributable to *e-cigarette*, or *vaping*, product use associated lung injury (EVALI).<sup>1,\*</sup> Of the individuals affected, 15% were younger than age 18, 37% were 18-24, 24% were 25-34, and 24% were 35 or older.<sup>1,‡</sup> Thirty-seven cases of EVALI and one death have been reported in Los Angeles (LA) County.<sup>2</sup>

Nationwide, 82% of patients hospitalized with EVALI reported vaping *THC* (33% exclusively) and 57% reported vaping *nicotine* (14% exclusively).<sup>1,‡</sup> In California, 83% of hospitalized patients reported vaping *THC* and 46% reported vaping *nicotine* (9% exclusively).<sup>3,‡</sup> Most of these patients reported using illicit sources<sup>§</sup> to obtain their *THC* vaping products; however, six licensed dispensaries were also reported as sources.<sup>3,‡</sup> All but one LA County patient reported vaping both *THC* and *nicotine* products; one reported vaping flavored liquids only.<sup>2</sup>

\* The first instance of a word or phrase that is defined in **Box 1** will be italicized. Numbered references can be found in Appendix A at the end of the brief.

† The CDC is only reporting hospitalized EVALI cases and EVALI deaths regardless of hospitalization status. | ‡ Of EVALI patients with data available.

§ Illicit sources - Buying from unlicensed cannabis retailers, social contacts, or other illicit vendors who sold their products on the street.

### Box 1: Definitions

**Combustible Cigarette:** A traditional cigarette that delivers nicotine to the lungs through inhaled smoke.

**E-Cigarette:** A battery-powered device that heats a liquid, typically containing nicotine, into a vapor, so it can be inhaled into the lungs. Also referred to as an electronic cigarette, electronic nicotine delivery system (ENDS), vape, or vaping device.

*Closed System* - Uses replaceable vape cartridges.

*Disposable System* - Entire device is thrown away after use.

*Open System* - Uses e-liquids and can be refilled (depicted in **Figure 1** infographic).

### E-Cigarette, or Vaping, Associated Lung Injury (EVALI)

**Case Definition:** 1) A patient vaped and/or dabbled a substance in the 90 days prior to symptom onset; 2) pulmonary infiltrate is present in the patient's lungs; 3) pulmonary infection was ruled out as a cause for the injury; and 4) there is no evidence in the patient's medical record of other plausible diagnoses.<sup>4</sup>

*Dabbing* - Heating a concentrated substance, typically cannabis hash oil, to inhale it as a vapor.

*Pulmonary infiltrate* - A substance denser than air, e.g. oil, pus, blood or protein, found in the lungs.

**Nicotine:** A highly addictive chemical found in both combustible and electronic cigarettes.

**Nicotine Salts:** A nicotine formulation, used in the newest generation of e-cigarette products, that allows for higher concentrations of nicotine in smaller amounts of e-liquid and produces a vapor that is easier to inhale.

### Strong Tobacco Retail Licensing (TRL) Ordinances:

These include 1) an annual tobacco licensing requirement for all stores that sell tobacco products; 2) a well-funded enforcement plan that includes compliance checks (usually funded by license fees); 3) assurance that violations of any local, state or federal tobacco laws also violate the terms of the local license; and 4) deterrents for violations, including fines and suspension or revocation of the license. More recently, jurisdictions with strong TRLs have begun including e-cigarettes in tobacco product definitions, so they are subject to the same rules as combustible cigarettes.<sup>5</sup>

**Tetrahydrocannabinol (THC):** The principal psychoactive component in cannabis.

**Vaping:** Using an e-cigarette to heat and inhale vaporized substances, including nicotine, cannabis (THC or CBD), synthetic cannabinoids, flavorings, or other substances.

**Vitamin E Acetate:** A thick, pale yellow liquid additive that may interfere with lung function. It has been found in vaping products of EVALI patients, and is now listed as a "chemical of concern" strongly associated with EVALI.

The CDC has established *vitamin E acetate* in THC vaping products as strongly linked to the EVALI outbreak, though there is not yet enough evidence to rule out other potential chemicals of concern or non-THC vaping products.<sup>1,6-7</sup> In a study of 51 EVALI patients across 16 states, vitamin E acetate was found in the lung samples of 48 patients (94%). Forty-seven reported THC use and/or had THC present in lung samples (including 9 samples from patients who reported no THC product use).<sup>7</sup>

Five states with legal adult-use cannabis have banned vitamin E acetate in the manufacturing of cannabis products and required testing for it.<sup>8-12</sup> One of these states, Michigan, has issued recalls of more than 77,000 THC vape cartridges that were found to contain vitamin E acetate during lab testing.<sup>13-16</sup> In December 2019, California's Bureau of Cannabis Control (BCC) seized more than 10,000 illegal THC vape pens from unlicensed dispensaries in Los Angeles. Of a random sample of seized vape pens, 75% contained cutting agents including (but not limited to) vitamin E acetate.<sup>17</sup> As of this brief's publication, California has not banned the use of vitamin E acetate in legal cannabis products and has not required that it be tested for under current lab testing regulations.<sup>18</sup>

### History of E-Cigarettes in the United States

**Table 1** (page 3) outlines e-cigarettes' marketing and regulation history in the US. The US had no national age restriction on sales of these products and no product safety review requirements from the first documented shipment in August 2006 until the FDA's enactment of a rule regulating e-cigarettes as nicotine products in August 2016.<sup>19-20</sup> From 2010 until the FDA's 2016 ruling, 45 states and 5 territories enacted laws requiring individuals to be 18 or older in order to purchase e-cigarettes, but enforcement of these laws has varied.<sup>21</sup>

The 2016 FDA ruling allowed manufacturers to keep their current products on the market while they were being reviewed for compliance with new safety standards, but all products would have had to meet these standards by August 8, 2019. In 2017, the new FDA commissioner

eliminated the August 2019 deadline for review and further delayed the deadline for application submission to 2022. On August 17, 2019, nine days after the FDA's original review deadline, the CDC announced an investigation into 94 cases of pulmonary injury suspected of being linked to vaping.<sup>22</sup>

### Health Effects of E-Cigarette Use

Though the first commercially successful e-cigarette was invented in 2003, their lack of regulation in the US has led to wide variation in what these products contain, making it challenging to study their health effects.<sup>23</sup> **Figure 1** (page 4) displays an overview of the evidence on known and unknown health effects of e-cigarette use, as presented in a 2018 National Academies review of published research.<sup>24</sup>

There is substantial evidence that nicotine intake from e-cigarettes can be comparable to nicotine intake from cigarettes (also called *combustible cigarettes*), but is highly variable depending on the product. In fact, newer vaping devices with *nicotine salts* allow for even higher levels of nicotine intake than cigarettes do. As with cigarettes, the use of e-cigarettes leads to symptoms of nicotine dependence (i.e., addiction). There is also evidence that young people who use e-cigarettes are at greater risk of beginning to use cigarettes than those who don't use e-cigarettes.

E-cigarette vapor contains other potentially toxic substances besides nicotine. The number, quantity and characteristics of these substances may vary by product, but exposure to them is typically lower from e-cigarettes than from cigarettes. Nevertheless, components of e-cigarette vapor can damage blood vessels and cause oxidative stress, making the person using an e-cigarette more susceptible to disease. The effects of long-term exposure to e-cigarettes are still being studied, but there is emerging evidence (published since the National Academies review) that former or current e-cigarette use can contribute to respiratory diseases such as asthma, chronic obstructive pulmonary disease, or chronic bronchitis later in life.<sup>25</sup>

**TABLE 1: Timeline of E-Cigarettes/Electronic Nicotine Delivery Systems (ENDS) in the US**

|             |  |  |
|-------------|--|--|
| 1960s-1990s | Cigarette companies work on 'heat-not-burn' devices & ENDS | Several companies develop electronic nicotine delivery systems (ENDS) that do not burn tobacco, but merely heat it, attempting to reduce harm from smoking. None of these products are successful commercially. One company continues research into the 90s but shelves the idea due to concerns over the FDA expanding its regulatory authority to cover e-cigarettes. A subsidiary eventually releases an ENDS in 2013. <sup>26</sup>  |
| 2003        | Modern ENDS patented in China                              | After his father's death from lung cancer, a pharmacist invents what we now know of as the modern e-cigarette/ENDS. It is first marketed in China under the name <i>Ruyan</i> . <sup>23</sup>  |
| Aug 2006    | First known ENDS shipped to US                             | A US Customs and Border Protection tariff classification document dated August 22, 2006 marks the first known e-cigarette shipment from China to the US. <sup>19</sup>   |
| Apr 2009    | FDA halts an ENDS shipment to US                           | The FDA first attempts to establish regulations on e-cigarettes as drug delivery devices under the Food, Drug & Cosmetic Act. Some ENDS companies respond with a lawsuit. <sup>27</sup>  |
| Jan 2010    | Judge strikes down FDA's decision                          | A federal district court rules that any nicotine-containing devices marketed for non-therapeutic purposes must be regulated as tobacco products, not drug delivery devices. <sup>28</sup>  |
| Apr 2011    | FDA announces new plan to regulate ENDSs                   | The FDA announces that it will soon begin regulating e-cigarettes as tobacco products, including: a nationwide ban on ENDS sales to individuals under 18; requiring ENDS manufacturers to list their e-liquids' ingredients and put health warnings on products and ads; establishing an FDA review for new products; and only marketing products as less risky than cigarettes if FDA confirms that the evidence supports the claim. <sup>23,29</sup>   |
| Jun 2015    | JUUL Labs introduces first nicotine salts e-cigarette      | JUUL Labs, founded as a part of Pax Labs in May 2015, announces the release of a small ENDS that uses <i>nicotine salts</i> from leaf tobacco; it boasts a higher nicotine concentration and a vapor that is easier to inhale than its competitors'. By the end of 2017, JUUL Labs becomes an independent company selling the most popular e-cigarette in the US. <sup>30-31</sup>   |
| Aug 2016    | FDA enacts regulations announced in 2011                   | Ten years after the first ENDS shipment to the US, the FDA bans their sale to minors and begins age restriction compliance checks nationwide. The FDA allows manufacturers to keep their current products on the market for two years while they work on and submit their applications. They may also keep those products on the market for one additional year while the FDA performs its reviews. All products must be reviewed and meet FDA safety standards by August 8, 2019 in order to be sold to the public. <sup>20</sup> |
| Jul 2017    | Enactment of some ENDS rules further delayed               | The new FDA commissioner announces a plan to reduce tobacco deaths in the US, but also eliminates the FDA's August 2019 deadline for review of all e-cigarette products and delays the deadline for submission of application paperwork until 2022. These policy changes allow untested e-cigarette products to stay on the market longer. <sup>32-33</sup>  |
| Nov 2018    | National data shows a 78% increase in teen vaping          | CDC's 2017-18 National Youth Tobacco Survey shows that 20.8% of high school students had vaped one or more times in the past 30 days, a 78% increase from 2016-17. <sup>34</sup>   |
| May 2019    | Judge orders FDA to begin ENDS reviews                     | A federal district court sides with public health groups suing the FDA, stating that the agency must begin reviewing thousands of ENDSs and e-liquids on the US market. <sup>35</sup>  |
| Jul 2019    | Court orders ENDS review deadline                          | A US district court orders that applications for all "new" tobacco products that were on the market as of August 8, 2016, must be filed with the FDA by May 12, 2020. <sup>36</sup>  |
| Aug 2019    | CDC announces EVALI investigation                          | On August 17, the CDC announces an investigation of 94 possible cases of vaping-associated pulmonary injury (VAPI) - later renamed EVALI - in 14 states. <sup>1,22</sup>   |
| Dec 2019    | Age to purchase all nicotine products raised to 21         | On December 20, the US President signs the 2020 fiscal year spending bill into law; this includes a measure that prohibits the sale of all nicotine products, including e-cigarettes, to individuals under 21 years old nationwide. <sup>37</sup>  |
| Jan 2020    | Partial flavor ban announced by FDA                        | On January 2, the FDA announces a policy that affirms its priority to enforce against the manufacture, distribution or sale of flavored cartridge-based ENDS products (except menthol and tobacco); this does not include flavored e-liquids used in <i>open systems</i> , or flavored disposable vapes. The FDA is now reviewing manufacturers' applications trying to prove that their products are not a public health risk; currently banned products could re-enter the market if the FDA approves them. <sup>38</sup>        |

**FIGURE 1: Health Effects of E-Cigarettes, National Academies, 2018<sup>24</sup>**

What We Know:  
Conclusive or  
Substantial Evidence

1. Nicotine intake from e-cigarette devices can be comparable to nicotine in combustible cigarettes, though it depends on how the device is operated and what e-liquids are used.
2. Most e-cigarette products contain and emit potentially toxic substances in addition to nicotine; exposure to most of these is significantly lower than combustible cigarettes, but also depends on how the device is operated and what e-liquids are used.
3. Vaping causes negative short-term effects - including increased heart rate, oxidative stress, and damage to cells that line blood vessels - that may result in longer term adverse health effects.
4. E-cigarette aerosols contain potentially toxic metals, which could come from the e-cigarette's metallic coil used to heat the e-liquid, other parts of the device, or the e-liquid itself.
5. E-cigarette use results in nicotine dependence symptoms.
6. E-cigarette use increases the risk of ever using combustible cigarettes among youth and young adults.

What We May Know:  
Moderate Evidence

1. The variation in e-cigarette characteristics - such as nicotine concentration, flavoring, device type, and brand - is an important determinant of risk and severity of potential e-cigarette dependence.
2. Blood pressure increases shortly after nicotine intake from e-cigarettes.
3. Increased coughing and wheezing occur in adolescents who use e-cigarettes, and an increase in asthma exacerbations is associated with e-cigarette use.
4. Among youth and young adults who ever use combustible cigarettes, and also use e-cigarettes, the frequency and intensity of further combustible cigarette use is increased.
5. Secondhand exposure to nicotine and particulates is lower from e-cigarettes than combustible cigarettes.

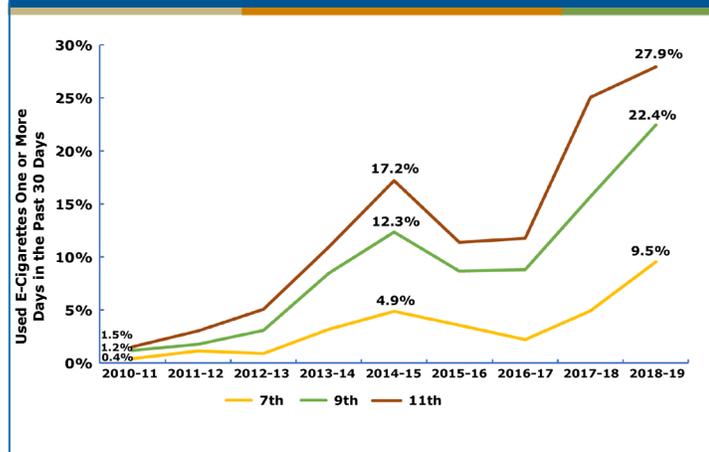
What We Don't Know  
Yet: Limited,  
Insufficient or No  
Available Evidence

1. Whether e-cigarette use affects pregnancy outcomes or fetal development.
2. Whether e-cigarette use is associated with long-term changes in heart rate, blood pressure, or cardiac function.
3. Whether long-term e-cigarette use increases cancer risk.
4. Whether e-cigarettes are effective as smoking cessation aids - on their own, compared with no treatment, or compared to FDA-approved smoking cessation treatments.
5. Whether the number of metals in e-cigarettes is greater than in combustible cigarettes (except cadmium, which is markedly lower in e-cigarettes).

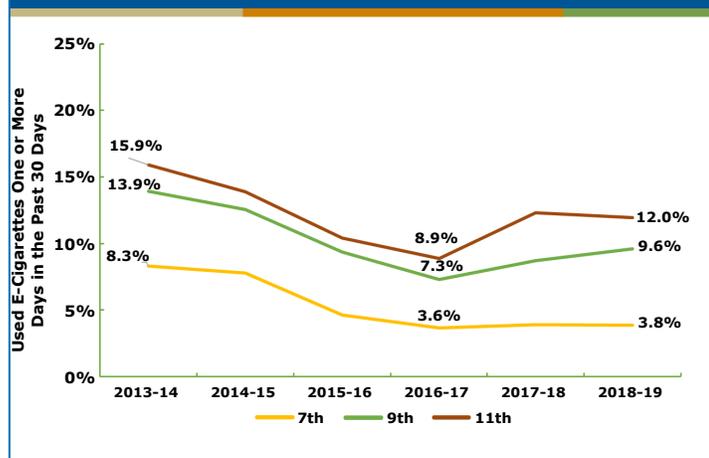
## Youth Vaping Trends in the United States

In 2011, the National Youth Tobacco Survey (NYTS), a classroom-based survey of middle and high school students, became the first national survey to ask about

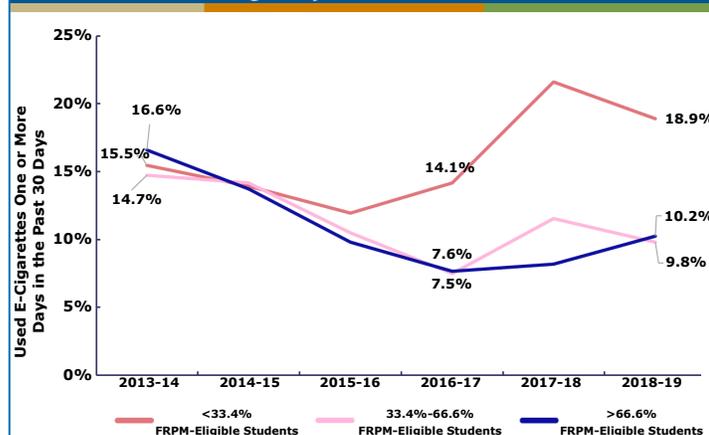
**FIGURE 2: National Trends in Past 30-Day Youth E-Cigarette Use, NYTS, 2010-11 to 2018-19<sup>39</sup>**



**FIGURE 3: Los Angeles County (LAC) Trends in Past 30-Day Youth E-Cigarette Use, CHKS, 2013-14 to 2018-19<sup>40</sup>**



**FIGURE 4: LAC Trends in Past 30-Day 11<sup>th</sup> Grade E-Cigarette Use by School-Level Free & Reduced Price Meal (FRPM) Eligibility, CHKS, 2013-14 to 2018-19<sup>40-41</sup>**



youth e-cigarette use.<sup>39</sup> Figure 2 displays trends in past 30-day e-cigarette use among 7<sup>th</sup>, 9<sup>th</sup> and 11<sup>th</sup> grade students. From 2010-11 to 2014-15, the percentage of 11<sup>th</sup> graders who used e-cigarettes increased from 1.5% to 17.2%, despite state and territory bans on underage sales.

Youth vaping rates appeared to decrease in 2015-16, possibly because that was the school year during which the FDA restricted e-cigarette sales to those 18 or older. However, by 2017-18, the percentage of youth who vaped had exceeded 2015-16 levels. In 2017-18 and 2018-19, more than one in four 11<sup>th</sup> graders had vaped in the past 30 days (25.1% and 27.9%, respectively). In 2018-19 almost one in four 9<sup>th</sup> graders (22.4%) and about one in ten 7<sup>th</sup> graders (9.5%) had vaped in the past 30 days.

## Youth Vaping Trends in Los Angeles County

Vaping trends for LA County youth are based on a different data source than those for the US. LA County data are from the California Healthy Kids Survey (CHKS), a classroom-based survey of 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup> and 11<sup>th</sup> grade students that is mandated in public schools funded by the California Tobacco Use Prevention and Education (TUPE) Program.<sup>40,§</sup> The CHKS began including questions on youth vaping behaviors in 2013-14.

Figure 3 shows that in 2013-14, the percentages of LA County 7<sup>th</sup>, 9<sup>th</sup> and 11<sup>th</sup> graders who vaped (8.3%, 13.9%, and 15.9%) were higher than the national percentages for that school year (3.2%, 8.5% and 11.0%). However, while youth vaping rates did not begin decreasing nationally until 2015-16, they were already decreasing in LA County by 2014-15. Differences in youth vaping rates in LA County with those in the US may be due, in part, to differences in the characteristics of schools participating in the two surveys. For instance, the NYTS includes representative samples of public and private schools (including charter schools), while the CHKS is administered primarily in public, non-charter schools.

Figure 4 compares CHKS vaping rates across subgroups of schools by a measure of school income level - the proportion of enrolled students who met eligibility criteria

<sup>§</sup> The CHKS is administered in about 75% of LA County school districts. About 75% of those districts administer the survey annually; the rest administer it every other year.

for state-subsidized free or reduced-price meals (FRPM). Schools with the highest percentages of students eligible for FRPM are the lowest-income schools. CHKS trend data suggest that 11<sup>th</sup> graders in the highest-income schools were most likely to use e-cigarettes beginning

in 2015-16. By 2017-18, vaping rates in those highest-income schools appeared to increase to levels comparable to national rates. In contrast, vaping rates in the lowest-income schools decreased and remained relatively low.<sup>40-41</sup>

In addition to potential socioeconomic differences between the two survey populations, there are other reasons why students participating in the CHKS may be less likely to use tobacco products than those in the NYTS. First, a recent study showed that students in TUPE-funded schools had significantly lower odds of using tobacco products, including e-cigarettes, than those in non-TUPE-funded schools, suggesting a preventive effect of exposure to TUPE funded tobacco education programming.<sup>58</sup> Approximately 25% of California school districts are not required to administer the CHKS because they do not receive TUPE funding. Second, lower rates of youth vaping in LA County versus the nation may be due to state and local anti-tobacco policies and regulations in California. These are among the strongest in the nation and are summarized in **Box 2**.

Recent dramatic increases in national youth vaping trends, and similar increases in some LA County schools, may be due to the increasing popularity and market share of e-cigarette devices containing nicotine salts, which allow users to inhale higher concentrations of nicotine from smaller amounts of e-liquid. In 2018-19, 59.1% of current US high school e-cigarette users in the US reported using JUUL nicotine salts devices.<sup>59</sup> The company expected to make \$3.4 billion by the end of 2019.<sup>60</sup>

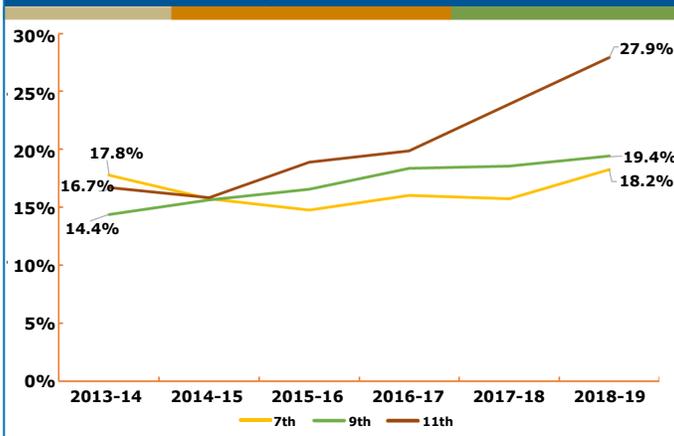
**Figure 5** (next page) shows that among LA County public school students who vaped in the past 30 days, the proportion of 9<sup>th</sup> and 11<sup>th</sup> graders who vaped daily or almost daily increased steadily from 2013-14 to 2018-19. This trend, in combination with what we know about changes in e-cigarette technology and sales, suggests that increasingly addictive e-cigarette products are converting greater proportions of experimental e-cigarette users into habitual ones. In 2018-19, more than one in four 11<sup>th</sup> grade vapers in LA County reported use patterns suggesting nicotine dependence.

### Box 2: Nicotine Prevention Policies and Regulations in California and Los Angeles County

- **1988**: CA voters approved Proposition 99, which added a 25 cent cigarette tax.<sup>42,\*</sup> Also during that year, the LA Unified School District began an evidence-based educational program that teaches students how to prevent or quit tobacco use (Lifesaver, aka TUPE).<sup>43-44</sup>
- **1989**: CA established the first comprehensive statewide tobacco control program in the US.<sup>45</sup>
- **1998**: CA voters approved Proposition 10, which added another 50 cent cigarette tax.<sup>46,\*</sup>
- **2010**: CA enacted a ruling that required persons buying e-cigarettes to be 18 years of age or older.<sup>21,47</sup>
- **Early 2014**: The city councils of Long Beach and Los Angeles banned public e-cigarette use.<sup>48-49</sup>
- **Sept 2015**: LA City's Municipal Code was amended to allow strict punishments for tobacco retailers that sell products to minors.<sup>50</sup>
- **June 2016**: CA enacted a Tobacco 21 law, banning retailers from selling any tobacco products, including e-cigarettes, to individuals under the age of 21.<sup>51</sup> It also added e-cigarettes to smoke-free policies. This banned e-cigarette use in public places where smoking cigarettes is banned; required e-cigarettes and e-liquids to be sold in child-resistant packaging; and banned the advertisement of e-cigarettes to minors.<sup>52</sup>
- **Apr 2017**: CA voters approved Proposition 56, which increased the excise cigarette tax to \$2.87 and established a new tax for e-cigarettes.<sup>53,\*</sup>
- **Oct 2018**: The LA County Board of Supervisors voted to ban public e-cigarette use in unincorporated areas of the county, where about a million people live.<sup>54</sup>
- **Sept 2019**: The LA County Board of Supervisors banned the sale of all flavored tobacco products, including e-cigarette liquids, in unincorporated areas of the county and added e-cigarettes to its tobacco retail licensing (TRL) ordinances. Retailers have until May 1, 2020 to comply.<sup>55-56</sup>
- **As of 2019**: Approximately 80% of LA County's population lived in areas with *strong TRL ordinances* that defined e-cigarettes as tobacco products in their *TRLs and/or secondhand smoke policies*.<sup>5,57</sup>

\*The taxes from each of these propositions are earmarked to fund smoking prevention and tobacco-related research programs, early childhood development programs, health care, and physician education, among others.

**FIGURE 5: Los Angeles County Trends in Past 30-Day Youth E-Cigarette Users Who Used Daily or Almost Daily, CHKS, 2013-14 to 2018-19<sup>36</sup>**



### Reasons for Youth Vaping and Sources of Vaping Products

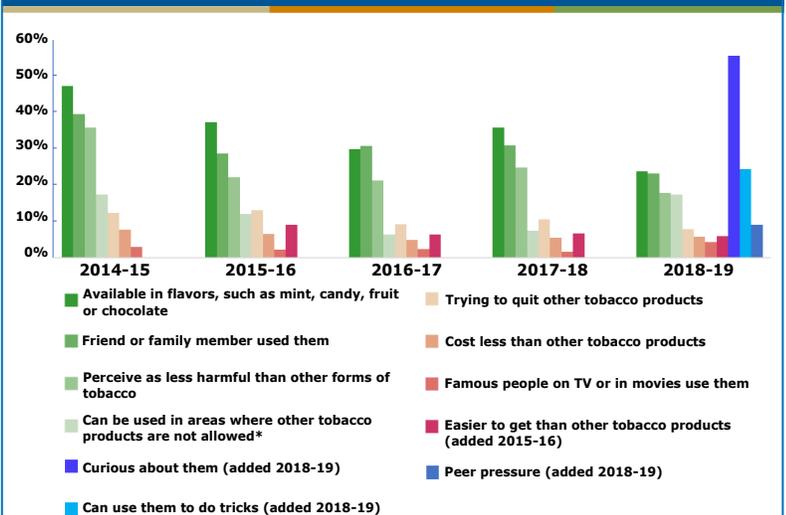
The reasons that young people report for using e-cigarettes, and the sources from which they obtain them, may help inform prevention messaging. **Figure 6** shows national trends in middle and high school students' reports of the reasons that they use e-cigarettes. Besides general curiosity, a response added in 2018-19, the most common reason reported across all years was the availability of flavors. The two other most common reasons were that a friend or family member used them and the perception that e-cigarettes were less harmful than other forms of tobacco. In 2018-19 the ability to "do tricks", another new response added that year, was reported slightly more frequently than the availability of flavors.

"Vape tricks" are typically performed using an e-cigarette with an open tank system, as they produce larger clouds of vapor than closed or disposable systems. Google searches for this term increased in popularity from mid-2013 to a peak in January 2018.<sup>61</sup> On YouTube, the most popular user-submitted vape tricks video had more than 41 million views, and the most popular vape company-submitted video had more than 10 million views. Although YouTube does not allow videos of minors using e-cigarettes, there are currently no age restrictions on viewing videos of adults using e-cigarettes.<sup>62</sup> In 2012,

the US Surgeon General concluded that there was a causal relationship between exposure to cigarette use in movies and smoking initiation by young people.<sup>63</sup> The effects of exposure to e-cigarette videos on social media have yet to be studied.

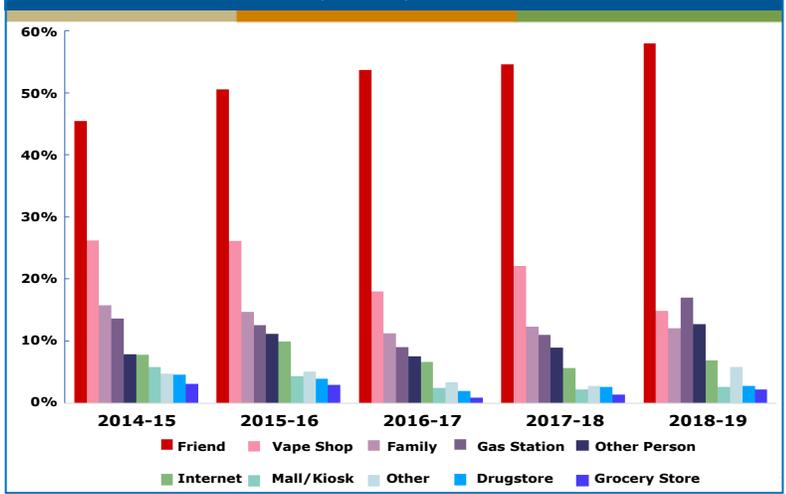
**Figure 7** shows trends in the sources from which e-cigarettes were obtained by middle and high school students. In 2018-19, the top reported source was friends (57.9%), followed by gas stations (17.0%), vape shops (14.8%), family members (12.1%), and other people (12.7%). The percentage of students reporting friends as a source of e-cigarettes has gradually increased from 2014-15 to 2018-19. Vape shops remained the second leading source of e-cigarettes among youth until 2018-19, when they were overtaken by gas stations.

**FIGURE 6: Reasons for E-Cigarette Use Among Middle and High School Students, NYTS, 2014-15 to 2018-19<sup>39</sup>**



\* This response changed in 2018-19 to "I can use them unnoticed at home or school".

**FIGURE 7: Sources of E-Cigarettes Used by Middle and High School Students, NYTS, 2014-15 to 2018-19<sup>39</sup>**



## Compliance Checks as a Deterrent for Underage Nicotine Sales

The most common commercial sources of e-cigarettes obtained by youth nationally are vape shops and gas stations (Figure 7), suggesting that these types of businesses do not always conduct required age verifications. Compliance checks, conducted by government agencies using covert shoppers, are an important regulatory strategy used to decrease accessibility of tobacco products to minors. These checks are conducted at licensed tobacco retailers to determine whether stores verify minimum age requirements by requiring customers to produce a valid ID prior to purchase.

Multiple agencies conduct compliance checks in overlapping areas of California and LA County, and violation rates vary from one agency to another (Table 2). This may be due in part to differences in how retailers are selected for visits, the time of the visits, or the products that covert shoppers attempt to purchase. Among checks performed by the California Department of Public Health’s Young Adult Tobacco Purchase Survey (YATPS) in 2019, the highest violation rates occurred in cafes/donut shops (43%), tobacco shops (31%), and discount stores (25%).<sup>64</sup>

As more jurisdictions include e-cigarettes in their regulatory definitions of tobacco products, they will increasingly include e-cigarette sales in their compliance checks. It will be important to track violation rates by business and product types to tailor strategies for youth prevention in an evolving nicotine retail landscape. The LA County Department of Public Health conducts compliance checks for tobacco retailers in unincorporated parts of the county. Compliance checks in these unincorporated areas will begin including e-cigarettes and all flavored tobacco and e-cigarette products, including menthol, in May 2020.<sup>55</sup> The flavor ban in these areas is now more restrictive than the January 2020 FDA ban, which contained certain key exceptions (see Table 1).

**TABLE 2: Tobacco Product Compliance Check Violation Rates in California and Los Angeles County by Agency\*, 2018-2019**

| Agency                        | CA Geographic Area Covered         | Compliance Checks (Date Range) | Retailer Violation Rate |
|-------------------------------|------------------------------------|--------------------------------|-------------------------|
| FDA <sup>65</sup>             | Statewide                          | 3,874<br>(Jul 2018-Jun 2019)   | 5.2%                    |
| CDPH/<br>SAMHSA <sup>66</sup> | Statewide                          | 776<br>(March-May 2019)        | 17.9%                   |
| CDPH/<br>YATPS <sup>64</sup>  | Statewide                          | 1,448<br>(Jan 2019-Aug 2019)   | 17.9%                   |
| CDPH/<br>STAKE <sup>67</sup>  | Los Angeles, City                  | 700<br>(Jul 2018-Jun 2019)     | 17.8%                   |
| LACDPH <sup>68,†</sup>        | Los Angeles County, Unincorporated | 177<br>(Jan 2019-Oct 2019)     | 23.2%                   |

\*The FDA conducts compliance checks nationwide. CDPH conducts compliance checks statewide through the Substance Abuse and Mental Health Services Administration (SAMHSA) and the Young Adult Tobacco Purchase Survey (YATPS), and at the local level through the Stop Tobacco Access to Kids Enforcement (STAKE) program. The Los Angeles County Department of Public Health (LACDPH) conducts compliance checks in unincorporated Los Angeles County only. Data from other cities in Los Angeles County that conduct local compliance checks were not readily available.

†Los Angeles County DPH is the only agency in this table that does not yet include e-cigarettes in its compliance checks.

## Cannabis Vaping and E-Cigarette Use Among LA County Youth

Importantly, while reported EVALI cases have been more closely linked to cannabis vaping than to nicotine vaping, it is difficult to disentangle the effects of these two behaviors because they so frequently occur together. For example, among all middle and high school students participating in the CHKS, 13% reported having ever vaped cannabis in 2018-19. However, among those reporting current e-cigarette use, 84% reported having ever vaped cannabis. Since California prohibits cannabis sales to minors, they may be more likely to obtain cannabis vaping devices from illicit sources whose products have been linked to EVALI.<sup>3</sup> A recent DPH health impact assessment showed that many unlicensed cannabis dispensaries were still operational in LA County as of 2019, and that these dispensaries were more likely than licensed dispensaries to sell unregulated products and products in packaging designed to be attractive to youth.<sup>69</sup>

**Box 3: Recommendations**

- 1. The best way to avoid developing EVALI is to stop using all types of THC and/or nicotine vaping devices. Regardless of their perceived risk of EVALI, people using nicotine vaping devices/e-cigarettes should stop using them.**

While EVALI has been linked to the use of THC vaping devices containing vitamin E acetate, other substances and product sources are under investigation and EVALI may have more than one cause. No current evidence shows that these devices are safe alternatives to smoking cigarettes. Also, the e-liquids used in nicotine vaping devices contain addictive quantities of nicotine, and other health harming toxins in quantities that are highly variable and largely unknown due to a lack of federal regulation. We do not have sufficient evidence of the long-term health effects of e-cigarette use yet, but most evidence to date suggests that their use is harmful to health. Adults using e-cigarettes to help them quit smoking should consult with their health care provider and consider using FDA-approved smoking cessation methods.

*Please see note in Appendix A for a brief discussion of e-cigarette policies in an international context.*

- 2. The California Bureau of Cannabis Control should add vitamin E acetate to the list of chemicals prohibited in the manufacturing of cannabis products and should require all licensed cannabis testing labs to test products for the presence of vitamin E acetate.**
- 3. EVALI prevention messaging to youth in LA County should target those who currently use e-cigarettes since they are more likely to vape THC and may be more likely to obtain THC vaping devices from illicit sources.**

- 4. Youth tobacco prevention messaging should include information about newer vaping devices' increased nicotine content that may increase the potential for addiction.**

Youth should also know that even products sold in licensed vape shops are not yet required to pass safety reviews by the federal government. These messages should reach all youth, but particularly those in higher income schools.

- 5. All cities in LA County should adopt strong tobacco and e-cigarette retail licensing ordinances; include e-cigarettes in their smoke-free policies; and ban flavored nicotine e-liquids, cartridges and disposable devices.**
- 6. Every tobacco/e-cigarette retailer in LA County should receive a tobacco/e-cigarette compliance check for both age verification and flavor ban compliance at least once a year as a term of its licensure.**

If a city or unincorporated area does not have the resources to conduct compliance checks regularly, it should consider increasing its tobacco licensing fee to ensure adequate funding.

- 7. Researchers should study the effects of e-cigarette social media marketing on youth vaping behavior.**

The resulting research may encourage state and local governments to develop policies that limit youth exposure to e-cigarette advertising via social media content.

## Appendix A: Note and References

**NOTE:** Across the world, e-cigarette regulations and product contents vary wildly. The European Union requires quality controls and standardization of e-cigarettes and e-liquids, including reduced nicotine levels and limited flavors.<sup>70-72</sup> Some countries have sweeping bans on all e-cigarette sales and use,<sup>73-75</sup> while others have no regulations or just began regulating or banning them in the past few years.<sup>76-78</sup> In the United Kingdom, under strict regulation, they are used as smoking cessation devices and even sold at some hospitals.<sup>79-81</sup> In the US, e-cigarettes and e-liquids have been largely unregulated and available to the public since 2006.<sup>19</sup> Regulation of these products in the US has been stalled, largely due to lobbying efforts from the tobacco and e-cigarette industries.<sup>20,23,27-29,32-33</sup> E-cigarette manufacturers in the US are now required to submit applications for FDA safety reviews by May 12, 2020; the FDA then has one year to review them.<sup>82</sup> As federal regulations begin to standardize these products' nicotine levels, flavors, and other ingredients, researchers will be able to start gaining a better understanding of the short- and long-term health effects of these devices. Until then, we must draw conclusions from available evidence, which indicates that, in the US, vaping poses a risk to public health and is not a safe alternative to smoking.

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