

## **Philip Morris research on precursors to the modern e-cigarette since 1990**

By Lauren M Dutra, Rachel Grana and Stanton A Glantz

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**“Phillip Morris developed e-cigarettes to provide a product for health-concerned smokers and smokers facing increased restrictions on smoking in public. Researchers and policymakers should recognize that PM developed e-cigarette technology to evade tobacco control regulations.”**

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## **FDA**

<https://www.fda.gov/tobaccoproducts/labeling/productsingredientscomponents/ucm456610.htm#references>

### **Statistics about E-Cigarette Use**

- **More than 3 million middle and high school students were current users of e-cigarettes in 2015, up from an estimated 2.46 million in 2014.**<sup>1,2</sup>
- **Sixteen percent of high school and 5.3 percent of middle school students were current users of e-cigarettes in 2015, making e-cigarettes the most commonly used tobacco product among youth for the second consecutive year.**<sup>1</sup>
- **During 2011-2015, e-cigarette use rose from 1.5 percent to 16.0 percent among high school students and from 0.6 percent to 5.3 percent among middle school students.**<sup>1</sup>
- **In 2013-2014, 81% of current youth e-cigarette users cited the availability of appealing flavors as the primary reason for use.**<sup>3</sup>
- **In 2014, 12.6% of U.S. adults had ever tried an e-cigarette, and about 3.7% of adults used e-cigarettes daily or some days.**<sup>4</sup>

### **References**

1. 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): 361-367.
2. Centers for Disease Control and Prevention. Tobacco Product Use Among Middle and High School Students - United States, 2011 -2014. *Morbidity and Mortality Weekly Report* 2015; 64: 381-5.
3. Villanti AC, Johnson AL, Ambrose BK, et al. Use of flavored tobacco products among U.S. youth and adults; findings from the first wave of the PATH Study (2013-2014).
4. Schoenborn CA, Gindi RM. Electronic cigarette use among adults: United States, 2014. NCHS data brief, no. 217. Hyattsville, MD: National Center for Health Statistics, 2015.



## FACTS

# E-Cigarettes and Public Health The Next Generation of Cigarettes

### OVERVIEW

Smoking kills more than 480,000 Americans a year and remains one of the most preventable causes of death and disease in the U.S.<sup>1,2</sup> The American Heart Association, in partnership with leading public health organizations, has worked tirelessly to prevent smoking deaths by supporting tobacco cessation and prevention. An estimated 8 million premature deaths have been avoided since the 1960s<sup>1</sup> and youth smoking rates have been cut in half since the early 2000s.<sup>2</sup>

These historical efforts stand in the crossfire of public health concerns, however, as tobacco companies try to capture a new generation of smokers with electronic cigarettes (e-cigarettes). In May 2016, the Food and Drug Administration (FDA) finalized a rule extending its regulatory authority to cover all tobacco products, including vaporizers, vape pens, hookah pens, e-cigarettes, e-pipes, and all other Electronic Nicotine Delivery Systems (ENDS).<sup>2b</sup> The FDA now regulates the manufacture, import, packaging, labeling, advertising, promotion, sale, and distribution of ENDS.<sup>2b</sup> This includes components and parts of ENDS, but excludes accessories.<sup>2b</sup> Thus, tobacco use in any form, including e-cigarettes, can be harmful.<sup>2b</sup>

### E-CIGARETTES AT A GLANCE

E-cigarettes are battery-operated devices that deliver nicotine, flavors, and other chemicals to the user in an aerosol.<sup>3,11</sup> An e-cigarette mimics smoking without combustion where the user inhales aerosol instead of

smoke. Some small studies on specific types of e-cigarette liquids suggested that they produce less of certain air toxins compared with regular cigarettes.<sup>4,5</sup> Proponents use this to support their claims that e-cigarettes provide a healthier option than conventional smoking.

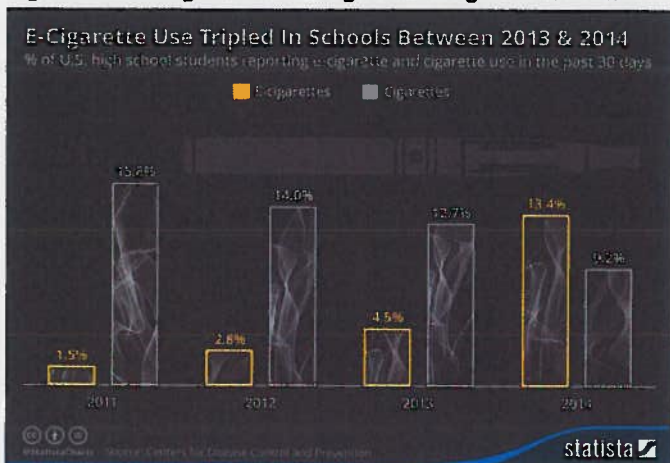
Opponents point out that e-cigarettes could fuel and promote nicotine addiction, however, and its acceptance has the potential of re-normalizing smoking behavior.<sup>3</sup> The use of e-cigarettes may also serve as a gateway drug to other harmful substances for youth and young adults.<sup>3</sup> Although some e-cigarettes are marketed as a smoking cessation aid, there is no conclusive scientific evidence supporting this claim.<sup>3</sup> A recent study reported that almost 20% of smokers who try e-cigarettes go on to become regular users.<sup>6</sup> Particularly alarming is the rise of e-cigarette use by high school youth (Figure 1).

### USER PROFILE

Survey research has painted a broad picture of the typical e-cigarette user:

- Non-Hispanic whites, current smokers, young adults, and those with a higher education and higher income perceive e-cigarettes as less harmful than combustible tobacco products and are more likely to use them.<sup>3,7,8</sup>
- A study by the Centers for Disease Control and Prevention found that seventy-six percent of current adolescent users of e-cigarettes also smoke conventional cigarettes.<sup>9</sup>
- In 2011, about 3-7% of adults reported having used e-cigarettes at least once.<sup>10</sup>
- E-cigarette use is higher among adolescents who previously or currently smoke conventional cigarettes, as well as among those who intend to quit.<sup>11</sup>

Figure 1: Use of Cigarettes and E-Cigarettes in High School Youth



### THE IMPACT ON YOUTH

The rise of the manufacturing and marketing of e-cigarettes has had a particular influence on U.S. youth:

- In 2014, an estimated 4.6 million middle and high school students currently used any tobacco product, of which an estimated 2.4 million used e-cigarettes.<sup>12</sup>
- The percentage of U.S. high school students who used electronic e-cigarettes tripled from 2013 to 2014, from 4.5% to 13.4%.<sup>12</sup>
- Since the CDC started collecting data on e-cigarettes in 2011, the current use of e-cigarettes has surpassed current use of every other tobacco product overall, including conventional cigarettes.<sup>13</sup>

## FACT SHEET: E-Cigarettes and Public Health

- E-cigarette use is associated with increased intentions to smoke cigarettes.<sup>14,15</sup>
- Adolescents view e-cigarettes and other noncombustible tobacco products as accessible and convenient, especially in places where smoking cigarettes is not allowed.<sup>16</sup>
- Although e-cigarettes were introduced just over a decade ago, there are currently more than 466 brands.<sup>3</sup>
- Wells Fargo has predicted that sales margins for e-cigarettes could grow to \$10 billion by 2017, surpassing conventional cigarette sales margins.<sup>25</sup>
- In 2014, More than 16 million children lived in states where they could buy e-cigarettes legally.<sup>17</sup>
- E-cigarettes are being marketed to children and adolescents via celebrities and appealing flavors.<sup>18</sup>
- Ads often appear on social media sites and YouTube.<sup>19</sup>
- Of youth who ever used tobacco products in 2014, 81% of e-cigarette users reported that their first tobacco product was flavored.<sup>24</sup>

## THE ASSOCIATION ADVOCATES

E-cigarettes remain widely unregulated with the potential health effects unknown, especially in long-term users. Approximately half of all tobacco-related adverse event reports in the late 1980s in the U.S. concern e-cigarettes. Further, the first adverse report for e-cigarettes was submitted in 2008.<sup>20</sup> From late 2010 through early 2014, there was an increase in the number of calls to poison control centers due e-cigarette exposure which can include exposure to the nicotine refill liquids.<sup>21</sup> Thus, the American Heart Association supports regulations on e-cigarettes and advocates for:

- Increasing e-cigarettes tax to influence youth purchasing decisions, while retaining or increasing combustible differentials by raising taxes on combustibles.
- Banning the use of characterizing flavors other than tobacco or menthol; characterizing flavors should only be allowed if manufacturers can prove that flavored tobacco products do not appeal to youth and that the flavors are safe and have been tested for toxicity and teratogenicity.
- Including e-cigarettes in smoke-free laws that also prohibit the sale and marketing of tobacco to minors.
- Addressing the consequence of product, price, place and promotion of e-cigarettes (4Ps of marketing)
- Educating healthcare workers to adequately counsel their patients regarding comprehensive tobacco cessation strategies.
- Incorporating e-cigarette use into screening questions at clinical visits and worksite/community health screenings.
- Increasing or maintaining surveillance on the prevalence of e-cigarette use in adults, children, and adolescents.
- Continuing research and surveillance on the short, medium, and long-term physiological effects of e-cigarette nicotine, propylene glycol and glycerol, flavorings and other ingredients.

## AREAS FOR FURTHER RESEARCH

The American Heart Association supports findings from the CDC, which identifies e-cigarettes as a potential gateway to smoking conventional cigarettes. Further, it recognizes current trends of using e-cigarettes with other tobacco

products as a public health concern. More research is needed, however, in the following areas to better assess the effects of e-cigarette use:

- Identifying acute and chronic adverse health effects of e-cigarettes.
- Assessing the health effects of second or third hand exposure to e-cigarette vapor and constituents.
- Evaluating the efficacy of e-cigarettes as a smoking and nicotine cessation modality.
- Ascertaining the addictive potential of e-cigarettes and their pattern of use and withdrawal symptoms.
- Evaluating the public health consequences of the millions of dollars tobacco companies spend on e-cigarette advertising (\$115.3 million in 2014).<sup>22</sup>
- Examining cultural, social and economic factors that promote, sustain or discourage e-cigarette use.
- Identifying and monitoring e-cigarette manufacturing practices, e-cigarette constituents, the variation between different brands, pharmacokinetics, and modes of delivery.
- Identifying how often e-cigarettes are being used for the delivery of other drugs and medications.
- Determining whether or not youth experimentation with e-cigarettes results in nicotine addiction and the later transition to use of conventional cigarettes.

<sup>1</sup> Holford, TR, Meza, R, Warner, KE, Metcalk, C, Jeon, J, Moolgavkar, SE, & Levy, DT. (2014). Tobacco control and the reduction in smoking-related premature deaths in the United States, 1964-2012. *Journal of the American Medical Association*, 311(2), 164-171

<sup>2</sup> Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Turner MB on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. (2015). Heart disease and stroke statistics—2016 update: A report from the American Heart Association. *Circulation* 2016, 131, e68-677

<sup>3</sup> Bhattacharya, A, Whittle, LP, Ribisl, KM, Bullen, C, Chaloupka, F, Piana, MB, et al. Benowitz, N. (2014). Electronic cigarettes a policy statement from the American Heart Association. *Circulation*, 130(16), 1418-1436

<sup>4</sup> McAloney, TR, Haynes, PK, Zhao, J, & Babin, S. (2012). Comparison of the effects of e-cigarette vapor and cigarette smoke on indoor air quality. *Inhalation Toxicology*, 24(12), 850-857

<sup>5</sup> Farsalinas, KB, Kangsun, G, Alifanachini, B, Ripsamonti, E, Bocchietto, E, Todeschi, S, & Voudria, V. (2013). Comparison of the cytotoxic potential of cigarette smoke and electronic cigarette vapor extract on cultured myocardial cells. *International Journal of Environmental Research and Public Health*, 10(10), 5146-5162.

<sup>6</sup> Kravikova, E, Novak, J, West, O, Kmetova, A, & Hajek, P. (2013). Do e-cigarettes have the potential to compete with conventional cigarettes? *Chest*, 144(5), 1609-1614.

<sup>7</sup> Pearson, JL, Richardson, A, Niaura, RB, Vallone, DM, & Abrams, DB. (2012). E-cigarette awareness, use, and harm perceptions in US adults. *American Journal of Public Health*, 102(9), 1759-1766.

<sup>8</sup> Adkinson, SH, O'Connor, BJ, Bansal-Travers, M, Hyland, A, Borland, R, Yong, HH, & Fong, GT. (2013). Electronic nicotine delivery systems: international tobacco control four-country survey. *American Journal of Preventive Medicine*, 44(3), 207-215.

<sup>9</sup> Centers for Disease Control and Prevention. (2013). *E-cigarette Use More Than Doubles among U.S. Middle and High School students from 2011-2012*. Retrieved from <http://www.cdc.gov/media/releases/2013/s0925-e-cigarette-use.html>

<sup>10</sup> King, BA, Allen, S, Promoff, G, Aranzola, R, & Dube, SR. (2013). Awareness and ever-use of electronic cigarettes among US adults, 2010-2011. *Nicotine & Tobacco Research*, 15(9), 1623-1627.

<sup>11</sup> Dunn, LM, & Glantz, SA. (2014). Electronic cigarettes and conventional cigarette use among US adolescents: a cross-sectional study. *Journal of the American Medical Association Pediatrics*.

<sup>12</sup> Centers for Disease Control and Prevention. (2015). Notes from the field: electronic cigarette use among middle and high school students—United States, 2013-2014. *MMWR. Morbidity and mortality weekly report*, April 17, 2015 64(14):381-385

<sup>13</sup> Monitoring the Future Study: Trends in Prevalence of Various Drugs (2015) CDC website <https://www.drugabuse.gov/trends-statistics/monitoring-future/monitoring-future-study-trends-in-prevalence-various-drugs>

Accessed on April 27, 2016.

<sup>14</sup> Bunnell, RE, Agosta, TI, Aranzola, R, Appelberg, BJ, Chubbola, BS, Corey, CO & King, BA. (2014). Intentions to smoke cigarettes among never-smoking US middle and high school electronic cigarette users. *National Youth Tobacco Survey, 2011-2013. Nicotine & Tobacco Research*, ntn166.

<sup>15</sup> Wilda, T, A., Knight, R., Williams, R. J., Pagnano, L., & Sargent, J. D. (2015). Risk factors for exclusive e-cigarette use and dual e-cigarette use and tobacco use in adolescents. *Pediatrics*, 135(1), e43-e51.

<sup>16</sup> Choi, K, Fabian, L, Motay, N, Corbett, A, & Forster, J. (2012). Young adults' favorable perceptions of snus, dissolvable tobacco products, and electronic cigarettes: findings from a focus group study. *American Journal of Public Health*, 102(11), 2088-2093.

<sup>17</sup> Marynak, K, Holmes, CB, King, BA, Promoff, G, Bunnell, R, & McAfee, T. (2014). State laws prohibiting sales to minors and indoor use of electronic nicotine delivery systems—United States, November 2014. *MMWR. Morbidity and Mortality Weekly Report*, 63(49), 1145-1150.

<sup>18</sup> Choi, K, Fabian, L, Motay, N, Corbett, A, Forster, J. Young adults' favorable perceptions of snus, dissolvable tobacco products, and electronic cigarettes: findings from a focus group study. *Am J Public Health* 2012;102:2088-2093.

<sup>19</sup> Pech, HJ, Kim, B, Hirve, T, & Huh, TY. (2013). Reduced harm or another gateway to smoking? Source, message, and information characteristics of e-cigarette videos on YouTube. *Journal of Health Communication*, (ahead-of-print), 1-16.

<sup>20</sup> Chen, H. (2015). FDA summons of adverse events on electronic cigarettes. *Nicotine & Tobacco Research*, 15(2), 615-616

<sup>21</sup> Christian Steiner, K, Law, R, Taylor, R, McStron, P, Bunnell, R, Wang, B., & Schier, JG. (2014). Notes from the field: calls to poison centers for exposures to electronic cigarettes—United States, September 2010-February 2014. *MMWR. Morbidity and Mortality Weekly Report*, 63(13), 297-299.

<sup>22</sup> Vaporized Youth and Young Adult Exposure to E-Cigarette Marketing: (2015) Truth Initiative website <https://truthinitiative.org/sites/default/files/Vaporized-Youth-and-young-adult-exposure-to-e-cigarette-marketing.pdf>

Accessed on April 27, 2016

<sup>23</sup> MMWR 64(52):1403-8 (January 5, 2016) Retrieved at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6452a3.htm?cid=mm6452a3>

<sup>24</sup> Ambrose B, Day LL, Villanil A, et al. Flavored tobacco product use among US youth aged 12-17 years. 2013-2014. *JAMA. Journal Of The American Medical Association* [serial online]. November 3, 2015;314(17):1871-1873. Available from PayalINFO, Ipswich, MA. Accessed March 2, 2016.

<sup>25</sup> Harney B, Gerben I, Scott A. Equity research: Vapor—Revolutionizing the tobacco industry. San Francisco, CA: Wells Fargo Securities, LLC, Equity Research Department; May 19, 2014.

<sup>26</sup> Vaporized Youth and Young Adult Exposure to E-Cigarette Marketing: (2015) Truth Initiative website <https://truthinitiative.org/sites/default/files/Vaporized-Youth-and-young-adult-exposure-to-e-cigarette-marketing.pdf>

Accessed on April 27, 2016

<sup>27</sup> Vaporized Youth and Young Adult Exposure to E-Cigarette Marketing: (2015) Truth Initiative website <https://truthinitiative.org/sites/default/files/Vaporized-Youth-and-young-adult-exposure-to-e-cigarette-marketing.pdf>

Accessed on April 27, 2016

**RESOLUTION NO. 4787**

**A RESOLUTION IN SUPPORT OF A SMOKE-FREE ALASKA**

**WHEREAS**, tobacco smoke contains more than 7,000 chemicals, including at least 69 of which are known to cause cancer,<sup>1</sup> including formaldehyde, benzene, vinyl chloride, arsenic, ammonia, and hydrogen cyanide,<sup>2</sup> and people who are exposed to secondhand smoke are inhaling many of the same cancer-causing substances and poisons as smokers<sup>3</sup>; and

**WHEREAS**, numerous studies have found that tobacco smoke is a major contributor to indoor air pollution and that breathing secondhand smoke is a cause of disease in healthy nonsmokers,<sup>4</sup> including heart disease, stroke, respiratory disease, and lung cancer<sup>2</sup>; and

**WHEREAS**, the 2006 U.S. Surgeon General's Report, *The Health Consequences of Involuntary Exposure to Tobacco Smoke*, concluded that there is no risk-free level of exposure to secondhand smoke; ventilation and other air cleaning technologies cannot eliminate exposure of nonsmokers to secondhand smoke; and smoke-free workplace policies are the only effective way to eliminate secondhand smoke exposure in the workplace<sup>4</sup>; and

**WHEREAS**, the 2010 U.S. Surgeon General's Report, *How Tobacco Smoke Causes Disease*, determined that even occasional exposure to secondhand smoke is harmful<sup>5</sup>; and

**WHEREAS**, there are serious questions about the safety of inhaling the substances in some e-cigarette aerosol, and e-cigarettes have not been subject to thorough, independent testing, making it difficult for users to be sure of what they are actually inhaling; and

**WHEREAS**, some studies have shown that some e-cigarettes can cause short-term lung changes and irritations, and the long-term health effects are unknown<sup>10</sup>; and

**WHEREAS**, for every nine smokers who die, one nonsmoker dies from exposure to secondhand smoke<sup>6</sup>; and

**WHEREAS**, approximately half of Alaska's population is not protected by a smoke-free workplace law<sup>7</sup>; and

**WHEREAS**, among those who work primarily indoors, young adults aged 18 to 29 are significantly less likely to be protected by a smoke-free indoor workplace policy than other Alaskan adults<sup>8</sup>; and

**WHEREAS**, research in communities where smoke-free laws have been adopted has consistently shown neutral or positive economic effects to the hospitality industry following a smoke-free workplace requirement<sup>9</sup>; and

**WHEREAS**, smoke-free workplace laws protect people from secondhand smoke<sup>4</sup>, reduce tobacco use overall and reduce health care costs<sup>6</sup>; and

**WHEREAS**, all Alaskans have the right to breathe smoke-free air.

**NOW, THEREFORE, BE IT RESOLVED** that to protect the health and safety of all workers and visitors from the dangers of secondhand smoke, the Fairbanks City Council supports a law in Alaska to make all workplaces 100% smoke-free; and

**BE IT FURTHER RESOLVED** that this resolution shall take effect upon adoption by the Fairbanks City Council and that the City Clerk is hereby directed to send a copy of this resolution to Governor Walker and members of the Interior Delegation.

**PASSED and APPROVED this 3rd Day of April 2017.**

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**Jim Matherly, City Mayor**

AYES:  
NAYS:  
ABSENT:  
APPROVED:

ATTEST:

APPROVED AS TO FORM:

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**D. Danyielle Snider, CMC, City Clerk**

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**Paul J. Ewers, City Attorney**

**Sources:**

1. U.S. Surgeon General, *How Tobacco Smoke Causes Disease*, 2010.
2. American Cancer Society Cancer Action Network, *The Facts About Secondhand Smoke*, 2012.
3. Centers for Disease Control and Prevention, *Health Effects of Secondhand Smoke*: [www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/secondhand\\_smoke/health\\_effects/#lung](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/health_effects/#lung).
4. U.S. Surgeon General, *The Health Consequences of Involuntary Exposure to Secondhand Smoke*, 2006.
5. U.S. Surgeon General, *How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease Fact Sheet*, 2010: [www.surgeongeneral.gov/library/reports/tobaccosmoke/factsheet.html](http://www.surgeongeneral.gov/library/reports/tobaccosmoke/factsheet.html).
6. Centers for Disease Control and Prevention. *Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses—United States, 2000–2004*. Morbidity and Mortality Weekly Report 2008; 57(45):1226–8.
7. Tobacco Program Records, 2012 and Alaska Department of Labor and Workforce Development 2011 Population estimates: [www.almis.labor.state.ak.us/pop/popest.htm](http://www.almis.labor.state.ak.us/pop/popest.htm).
8. Alaska Department of Health and Human Services, 2012 Alaska Tobacco Facts, 2012.
9. Eriksen, Michael & Frank Chaloupka. *The Economic Impact of Clean Indoor Air Laws*. CA: A Cancer Journal for Clinicians. 2007: <http://caonline.amcancersoc.org/cgi/content/full/57/6/367>.
10. American Cancer Society Cancer Action Network, *Commonly Asked Questions about Electronic Cigarettes*, 2014.