Reducing Vaping Among Youth and Young Adults

Evidence-Based Resource Guide Series Overview

The Substance Abuse and Mental Health Services Administration (SAMHSA), and specifically, its National Mental Health and Substance Use Policy Laboratory (Policy Lab), is pleased to fulfill the charge of the 21st Century Cures Act to disseminate information on evidence-based practices and service delivery models to prevent substance misuse and help people with substance use disorders (SUD), serious mental illnesses (SMI), and serious emotional disturbances (SED) get the treatment and support they need.

Treatment and recovery for SUD, SMI, and SED can vary based on a number of geographic, socio-economic, cultural, gender, race, ethnicity, and age-related factors, which can complicate evaluating the effectiveness of services, treatments, and supports. Despite these variations, however, there is substantial evidence to inform the types of resources that can help reduce substance use, lessen symptoms of mental illness, and improve quality of life.

The Evidence-Based Resource Guide Series is a comprehensive set of modules with resources to improve health outcomes for people at risk for, with, or recovering from mental and/or substance use disorders. It is designed for practitioners, administrators, community leaders, and others considering an intervention for their organization or community.

A priority topic for SAMHSA is preventing vaping among youth. This guide reviews the related literature and science, examines emerging and best practices, identifies gaps in knowledge, and discusses challenges and strategies for implementation.

Expert panels of federal, state, and non-governmental participants provide input for each guide in this series. The panels include accomplished scientists, researchers, service providers, community administrators, federal and state policy makers, and people with lived experience. Members provide input based on their knowledge of healthcare systems, implementation strategies, evidence-based practices, provision of services, and policies that foster change.

Research shows that implementing new programs or policies requires a comprehensive, multi-pronged approach. This guide is one piece of an overall approach to implement and sustain change. Users are encouraged to review the SAMHSA website for additional tools and technical assistance opportunities.

Content of the Guide

This guide contains a foreword and five chapters. The chapters stand alone and do not need to be read in order. Each chapter is designed to be brief and accessible to school administrators, community members, policy makers, and others working to prevent and reduce youth vaping. The goal of this guide is to review the literature on prevention of e-cigarette use, also called vaping, among youth, distill the research into recommendations for practice, and provide examples of the ways these recommendations can be implemented.

FOCUS OF THE GUIDE

E-cigarette use, also called vaping, has become increasingly common among youth.[1] Vaping has increased among all adolescent demographic groups since 2010 and is more prevalent than traditional cigarettes among high school students. In 2019, more than one quarter of all high school students reported vaping during the past 30 days.[2]

Vaping among youth presents a variety of dangers. Animal studies show that nicotine exposure during adolescence can harm brain development and lead to addiction. Other chemicals and flavors in some vaping products also have toxic properties. The health risks of vaping among youth and young adults include respiratory ailments; negative impacts on attention, learning, and memory; and long-term effects remain unknown.[3-4]

This guide discusses programs and policies to reduce and prevent vaping among youth and young adults. Many of the programs and policies are modeled on evidence-based tobacco control strategies. They have been adapted to address vaping among youth and young adults. More research is needed to specifically evaluate the effectiveness of the programs and policies on vaping behavior. Policy makers, community coalitions, businesses, school administrators and educators, parents, and community members are important players in the efforts to prevent and reduce vaping among youth.

1 U.S. Department of Health and Human Services. (2016). *E-Cigarette Use Among Youth and Young Adults. A Report of the Surgeon General*. https://www.cdc.gov/tobacco/data_statistics/sgr/e-cigarettes/pdfs/2016_sgr_entire_report_508.pdf

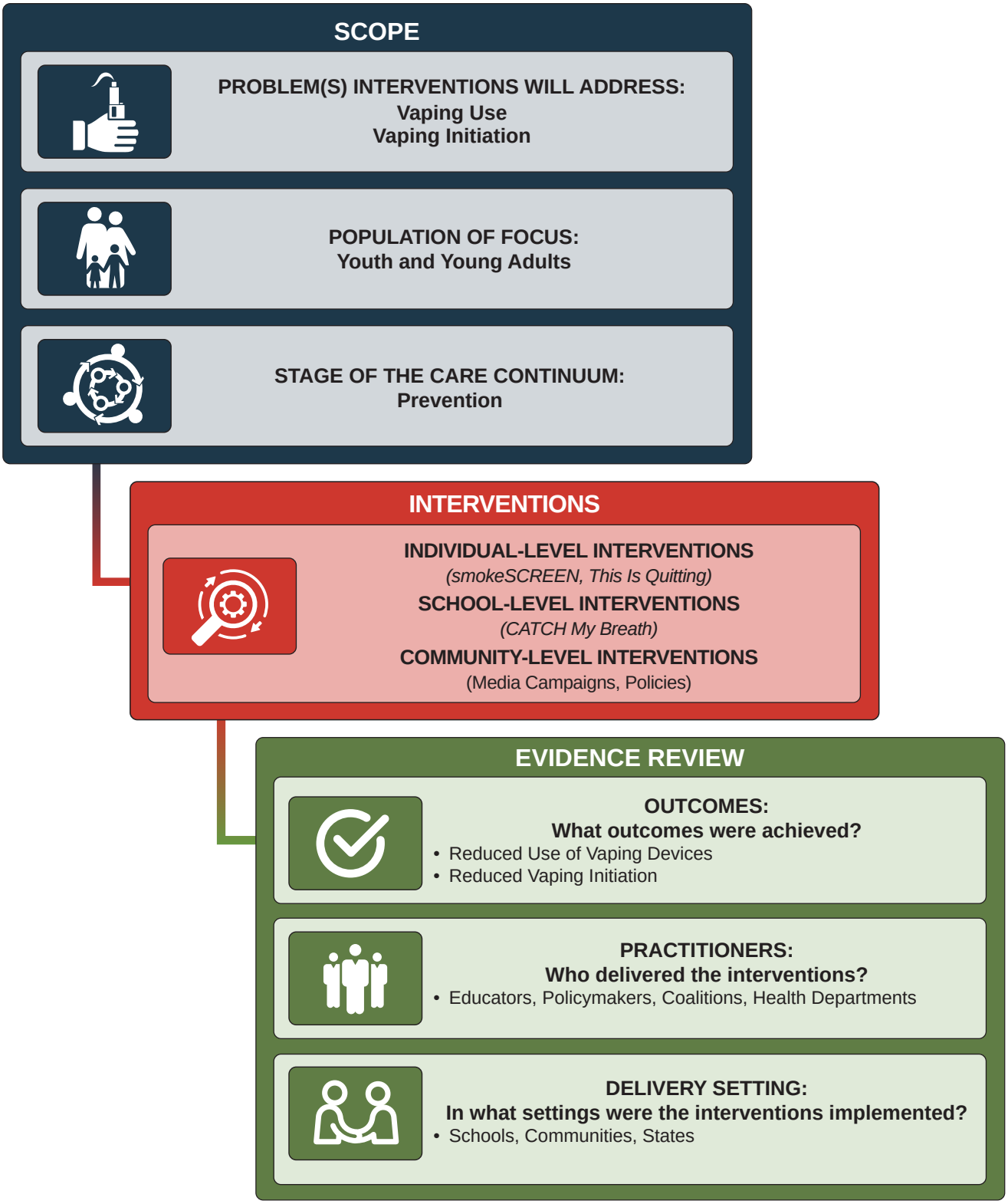
2 Food and Drug Administration. (2020, May 4). *2018 NYTS Data: A Startling Rise in Youth E-cigarette Use.* https://www.fda.gov/tobacco-products/youth-and-tobacco/2018-nyts-data-startling-rise-youth-e-cigarette-use

3 Abreu-Villaça, Y., Seidler, F. J., Tate, C. A., & Slotkin, T. A. (2003). Nicotine is a neurotoxin in the adolescent brain: critical periods, patterns of exposure, regional selectivity, and dose thresholds for macromolecular alterations. *Brain Research*, 979(1-2), 114–128. https://doi.org/10.1016/s0006-8993(03)02885-3

4 Schochet, T. L., Kelley, A. E., & Landry, C. F. (2005). Differential Expression of Arc mRNA and Other Plasticity-Related Genes Induced by Nicotine in Adolescent Rat Forebrain. *Neuroscience*, 135(1), 285–297. https://doi.org/10.1016/j.neuroscience.2005.05.057

The framework below provides an overview of this guide. The guide addresses vaping among youth and young adults. The focus of the guide is on prevention efforts that have been implemented and evaluated among youth and young adults. The review of these interventions in Chapter 2 of the guide includes specific outcomes, stakeholders, and delivery settings for the interventions.

VAPING PREVENTION GUIDE FRAMEWORK



CHAPTER

1

In 2019, the global vaping market was estimated to be worth $19.3 billion and was an approximately $7 billion business in the United States.[3] Sales of vaping devices continue to grow, projected to be a $67 billion business by 2027.[4] The legal cannabis vape market, despite steep declines in 2019, is on target to become a $10 billion a year business by 2024.[5]

Issue Brief

In 2019, more than five million, or 28 percent, of high school students reported nicotine vaping in the past 30 days,[1] a significant increase from 2018 (21 percent) and more than double the rates in 2017 (12 percent). Evidence suggests that some youth who would not otherwise use nicotine or tobacco products are vaping. Nicotine vaping may lead youth to use other tobacco products, including cigarettes, thereby increasing harmful effects.[2]

Youth are primarily vaping three different products: nicotine, cannabis (or cannabis extracts), and flavoring without active drug substances. Each has its own negative health effects, but all are harmful for youth. Additionally, new evidence suggests vaping devices themselves may expose users to a variety of chemicals with potentially harmful consequences.[6] To the extent possible based on available data, this guide will discuss nicotine and cannabis vaping separately.

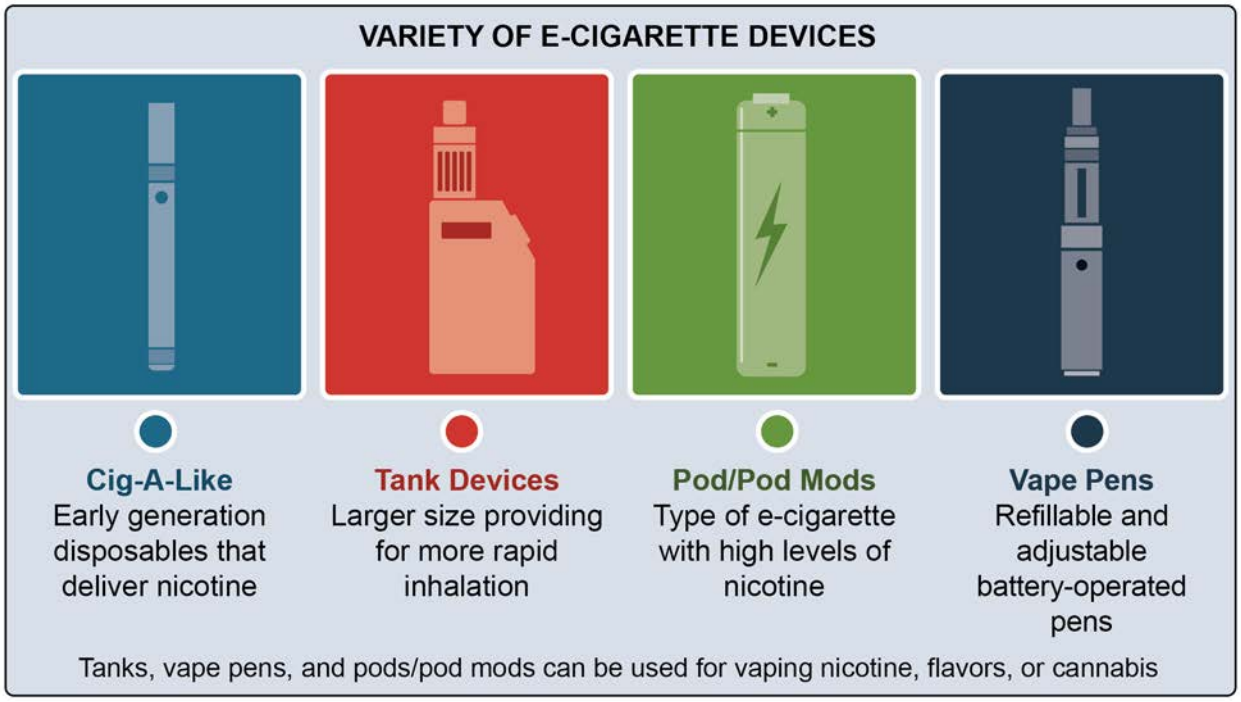
A primary concern is that many young people view vaping as socially acceptable. When youth were asked whether their peers approved of nicotine vaping, 44 percent said yes, compared to only 23 percent who said their peers approved of cigarette smoking.[7] Another study found that youth said they vaped because their friends, peers, and siblings did, and they thought it was cool, whereas they acknowledged the harms and negative components of smoking cigarettes.[8] This evolving issue, and the harms associated with it, call for a public health approach to preventing vaping among youth and young adults in the United States.

Vaping Devices and Products

VAPING TERMINOLOGY

Nicotine vaping	Use of vaping devices to inhale nicotine
Cannabis vaping	Use of vaping devices to inhale cannabis
THC vaping	Use of vaping devices to inhale THC
Flavor vaping	Use of vaping devices to inhale flavored liquids other than tobacco
Vaping	Inclusive of all types of vaping products or when the type of product was unspecified

Vaping refers to the use of any device, such as an electronic cigarette, or e-cigarette, which fundamentally heats a liquid solution into an aerosol that is inhaled into the lungs of the person using it.[29] These devices are sometimes referred to as electronic nicotine delivery systems (ENDS),[10] and include e-cigarettes, e-cigs, e-pipes, e-cigars, cigalikes, e-hookahs, mods, vapes, vape pens, tank systems, and re-buildable dripping atomizers.[11] While originally used as a way to vape flavored liquids with or without nicotine, people are increasingly using these devices to vape cannabis-derived compounds, such as tetrahydrocannabinol (THC) or cannabidiol (CBD), and other drugs,[12] though it is worth noting that some cannabis-based products are



wax-like substances that are used in devices that have a cup from which the aerosol is generated.

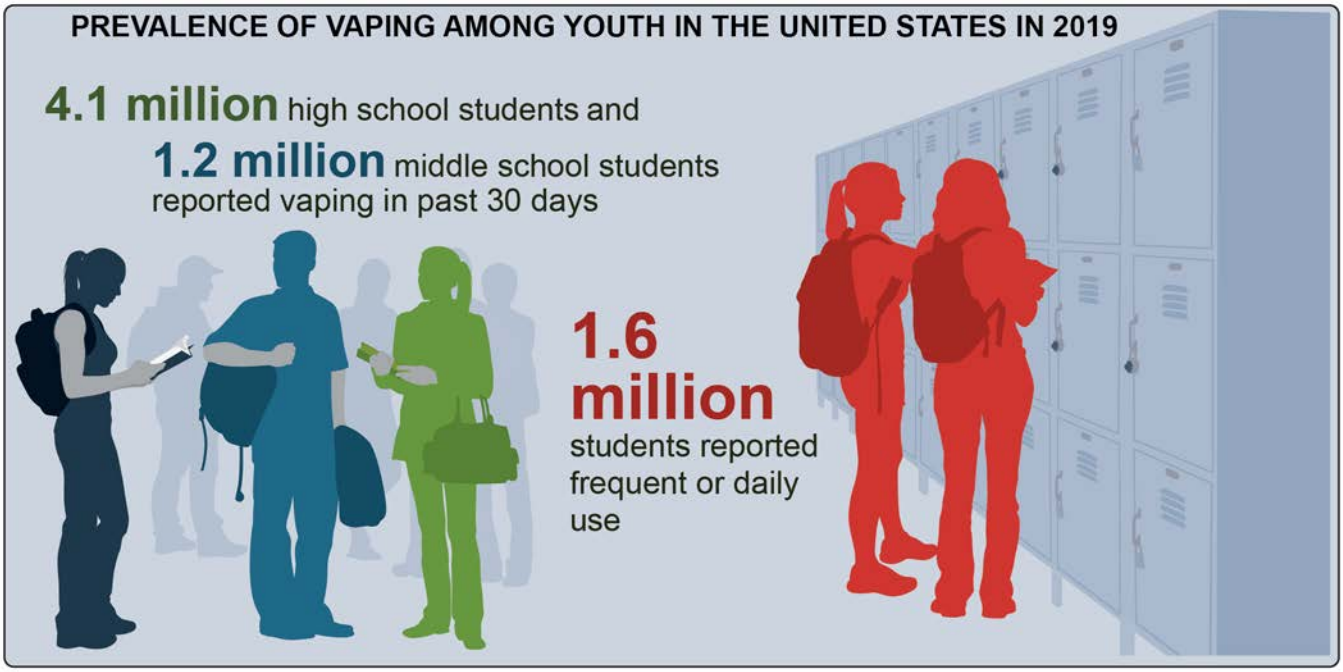
Since their introduction, the characteristics of available vaping devices have evolved and the overall market has grown. Originally manufactured to resemble a traditional cigarette,[2] vaping devices now come in a variety of shapes and sizes and can be disposable or rechargeable. Some still look like a traditional cigarette or pipe, while others look like pens, USB flash drives, and other high-tech devices or common items.[9] Consumers can purchase these devices at online retailers, vape shops, and conventional retailers, such as convenience, grocery, or drug stores.

Products are composed of a battery, an electric heating component, and a cartridge or tank that holds a liquid solution.[13] During use, a sensor is activated, which triggers the heating component, turning the liquid solution in the cartridge into an aerosol.[10] The aerosol is produced by a variety of liquid solutions, often referred to as e-liquid or e-juice. Aerosol can also be produced from "dabs," which are thick, waxy extracts of THC from cannabis plants. Most liquid solutions include sweeteners, flavoring, and solvents, which help dissolve the nicotine or other compounds.[11] It is important to note that vaping device technology changes regularly, and many devices are customizable. This image represents some of the most common forms but is not a comprehensive list of devices.

Prevalence of Vaping Among Youth

In 2019, over 5 million youth reported currently vaping nicotine, cannabis and/or flavorings without active drug substances (such as nicotine or cannabis), an increase from 3.6 million youth in 2018. Specifically, nearly 4.1 million high school students and 1.2 million middle school students in the United States reported currently using nicotine vaping devices.[1] Of these, an estimated 1.6 million students reported frequent use (using 20 or more days in the past month) and 970,000 students reported daily use. Additionally, lifetime (having ever vaped in one's life) vaping of any product among youth reached record highs in 2019, increasing from 43 percent in 2018 to 46 percent in 2019 for 12th graders, 37 percent in 2018 to 41 percent for 10th graders, and 22 percent in 2018 to 25 percent in 2019 for 8th graders.[14]

In 2019, 28 percent of high school students and 11 percent of middle school students reported vaping in the past 30 days.[15] This is 2 to 6 times greater than the percentage of adults (ages 25-44 years) who reported vaping in 2018, which was 4 percent.[16]



Source: Miech, R.A., Johnston, L.D., O'Malley, P.M., Bachman, J.G,, Schulenberg, J.E., & Patrick, M.E. (2019). *Monitoring the Future national survey results on drug use, 1975-2019: Volume I, Secondary school students*. The University of Michigan Institute for Social Research. http://dx.doi.org/10.3998/2027.42/150622

Although rates of cigarette use among youth continue to fall, vaping has become more popular since 2011.[17] Several studies report an association between nicotine vaping by youth and the use of other tobacco products, such as cigarettes, cigars, and hookahs.[18-19] However, no research has shown a causal relationship between increases in vaping and reduction in cigarette use. In fact, research has found that adolescents who reported never smoking but tried e-cigarettes were more likely to try cigarettes in the future.[20-22] One study found that young adults who vape nicotine are six times more likely to initiate cigarette use compared to those who have never vaped.[20] It is not yet clear whether vaping is associated with continued cigarette smoking in the long-term, or primarily with initial experimentation.

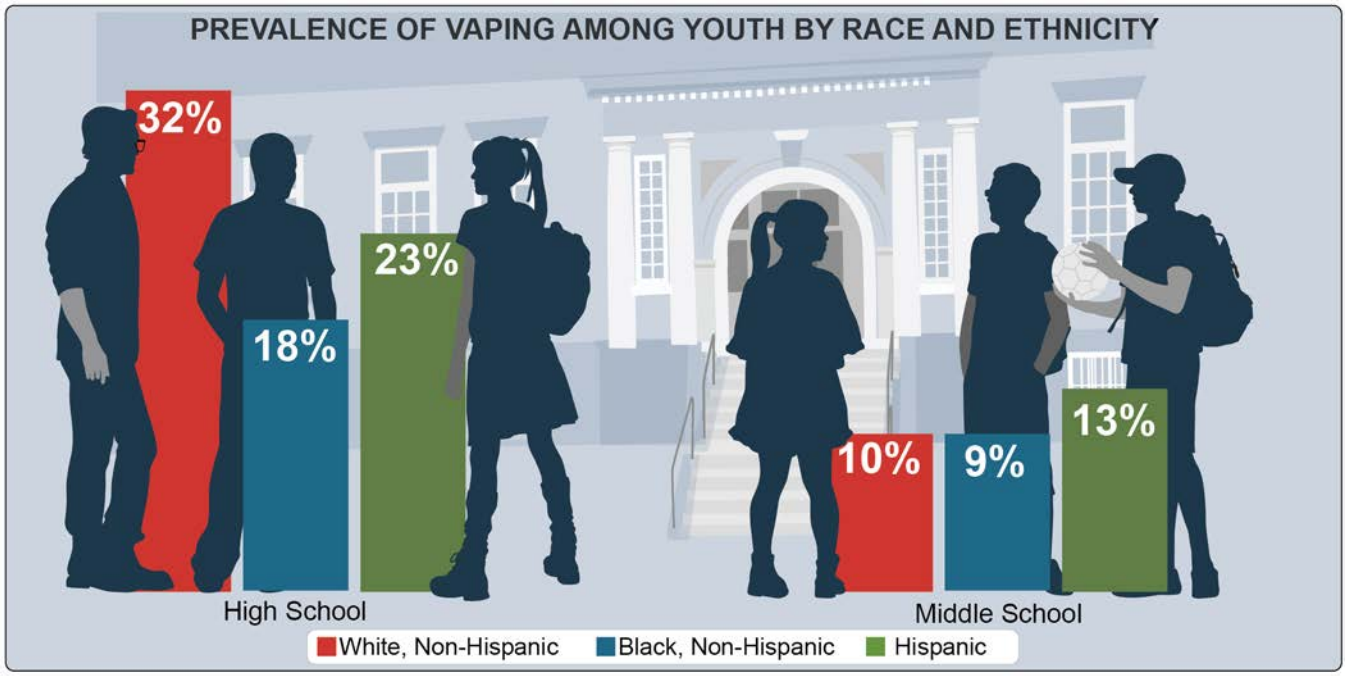
Prevalence of Vaping by **Specific Population Groups**

Certain populations report vaping more than others. More youth who identify as gay, lesbian, or bisexual report vaping (18 percent) than youth who identify as heterosexual (13 percent).[23] However, there do not appear to be differences in youth vaping by gender. In 2019, young males and females reported nicotine vaping in the past 30 days at the same rate (20 percent for females, 20 percent for males).[24]

Differences in vaping prevalence are also associated with race and ethnicity.[24-25] White non-Hispanic youth are more likely to vape than other races/ethnicities, and Black non-Hispanic youth have the lowest rates of vaping any substance.[25] Among all youth who vape, Hispanic high school students had the highest rates of vaping cannabis-derived products.[12]

Prevalence of Vaping by Type of Liquid Solution

While the vaping of liquid solutions containing nicotine remains the most prevalent among youth, vaping of cannabis-derived products (i.e., THC and CBD) and flavor-only solutions has increased substantially since 2011, reaching an all-time high in 2019. Since 2018, vaping of cannabis continued to rise among 8th, 10th, and 12th graders, while vaping of only flavored liquids declined slightly across all grades.[26] It is important to note that these data likely underreport the true



SOURCE: Wang, T. W., Gentzke, A. S., Creamer, M. R., Cullen, K. A., Holder-Hayes, E., Sawdey, M. D., Anic, G. M., Portnoy, D. B., Hu, S., Homa, D. M., Jamal, A., & Neff, L. J. (2019). *Tobacco Product Use and Associated Factors Among Middle and High School Students — United States, 2019. Surveillance Summaries*, 68(12), 1–22. http://dx.doi.org/10.15585/mmwr.ss6812a1

On December 20, 2019, the federal government raised the federal minimum age which retailers may **sell** tobacco products, including e-cigarettes containing nicotine, to 21 years. The federal law is only directed to retailers. They cannot **sell** tobacco products to anyone under age 21. There is no federal law to prohibit anyone under age 21 from **purchasing** tobacco products. However, states have the ability to pass minimum **purchasing** age restrictions, which many have.

percentage of youth vaping nicotine, as studies have found youth are often unaware that the liquids they are vaping contain nicotine.[27] Additionally, there may also be underreporting of cannabis vaping as the substance is illegal for youth and young adults to use.

Nicotine

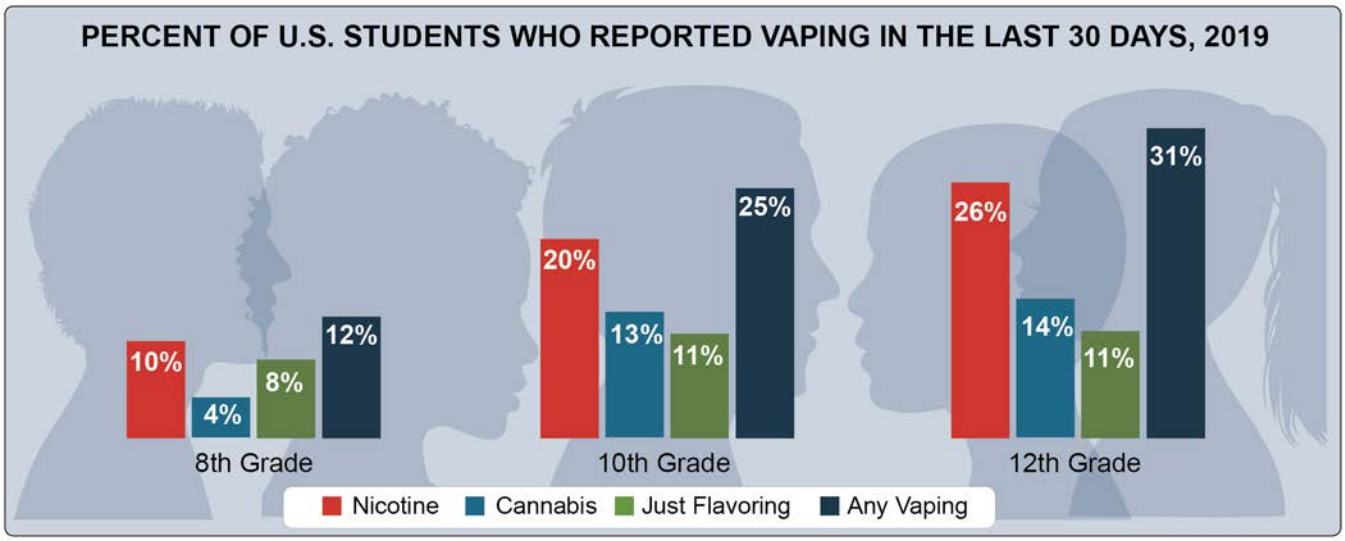
Nicotine remains the most commonly used vaping substance among youth, and data suggest vaping nicotine may introduce the substance to youth who would otherwise not have smoked cigarettes or used nicotine through another tobacco product.[20] In 2019, reports of vaping within the past 30 days were more than five times greater than that of cigarette use across all grades.[26]

This lack of awareness stems from insufficient product knowledge, with 63 percent of youth unaware that the popular vaping product "JUUL" always contains nicotine,[16] as well as some vaping products inaccurately labeling their nicotine content. Some vaping product labels underreported nicotine levels by as much as 172 percent.[28]

Cannabis

The number of 12th graders vaping cannabis in the past month increased from 8 percent in 2017 to 14 percent in 2019. Past-month cigarette use among 12th graders remained at 6 percent during this same period. Thus, the number of 12th graders vaping cannabis more than doubled those smoking cigarettes in 2019.[29]

In 2019, vaping cannabis increased significantly among high school students.[29] More youth reported ever having used a vaping device to consume cannabis than reported consumption of tobacco products delivered by mechanisms other than vaping, such as cigarettes, waterpipes, or smokeless tobacco.[30] In addition, 21 percent of 12th graders reported ever having used a vaping device to consume cannabis in the past year, an increase from 10 percent in 2017.[31] In 2019, 4 percent also reported vaping cannabis daily.[31-32] Available research suggests that



Source: Miech, R.A., Johnston, L.D., O'Malley, P.M., Bachman, J.G,, Schulenberg, J.E., & Patrick, M.E. (2019). *Monitoring the Future national survey results on drug use, 1975-2019: Volume I, Secondary school students*. The University of Michigan Institute for Social Research. http://dx.doi.org/10.3998/2027.42/150622

youth who use tobacco products are more likely to engage in vaping THC, regardless of its legality in their state.[30]

Flavors

Youth and young adults report vaping flavors, defined as any flavored liquid other than tobacco flavor such as candy, fruit, and mint, at high rates. In 2019, 19 percent of 8th graders, 28 percent of 10th graders, and 29 percent of 12th graders reported vaping flavor-only solutions.[14] However, youth may believe they are vaping flavors when, in fact, they are vaping nicotine or cannabis.[34-35] Self-report data are therefore somewhat unreliable, and the number of youth vaping just flavors may be lower while the number of youth vaping nicotine or cannabis may be even higher.

In April 2020, the Food and Drug Administration (FDA) published guidance that they are prioritizing enforcement of existing unauthorized vaping products against any flavored, cartridge-based ENDS product (other than tobacco or menthol flavored), as well as any ENDS product that does not take adequate measures to prevent minors' access or is targeted to a minor or has marketing that promotes use by a minor. This guidance prioritizes enforcement of unauthorized sales of flavored e-cigarette products that appeal to youth to reduce youth access. However, there is concern that youth are now vaping different devices, including refillable nicotine vape products and disposable vape pods, which are not covered under this guidance.[33]

Flavorings in vaping liquids have been found to not only increase youth interest in starting to vape, partially by reducing perceptions of harm, but may also impact patterns of use. Youth who use flavorings vape more and take more puffs when they vape, compared to those who use traditional flavors of tobacco, mint, and menthol.[36-37]

The appeal of vapes among both youth and adults is often attributed to the variety of liquid solution flavors and scents, as they can hide the "harsh" taste of nicotine,[38-39] as well as decrease the odors of cannabis-derived compounds.[40] One study estimated that just under 8,000 unique flavors of these liquid solutions exist;[41] flavors include: menthol, fruit, coffee, cereal, candy, ice cream, among others. The appeal of the liquid solution flavors contributes to initiation of nicotine vaping, particularly among youth.[36] As with the devices, consumers can purchase liquid solutions for vaping devices at online retailers, vape shops, and conventional retailers.[16]

Health Effects and Safety Issues

Vaping has a number of potential harmful effects, some associated directly with the device itself and some with the different e-liquid solutions being vaped. This section details some of these potential harms.

Toxicity of Products Found in Vaping Solutions

A variety of substances that are known to be toxic, carcinogenic, or cause disease have been identified in vaping liquid solutions and aerosols, including delivery solvents, flavorings, carbonyl compounds, minor tobacco alkaloids, tobacco-specific nitrosamines, reactive oxygen species, metals, and other toxicants.[42] However, the toxicity of the liquid solutions and aerosols varies by formulation and device used.[10]

In addition, because vaping devices use high temperatures to produce the aerosol, the substances that comprise the liquid solution may undergo a chemical reaction when exposed to heat, creating potentially toxic products such as formaldehyde that were not present in the original formulation.[9, 43] As a result, ingredients used in the liquid solutions which the FDA generally considers safe for oral consumption may take on different properties when heated in vaping devices and may potentially be harmful health. These products are not considered safe to inhale.[44] This includes flavoring agents themselves, like cinnamon and vanilla, which may become toxic when heated or aerosolized.[44]

Depending on the type of vaping devices used, some harmful materials used to manufacture or built into the device itself, such as metals or plastics, can be aerosolized with the liquid solution and inhaled.[10, 45] For example, liquid solutions exposed to the heating element of some vaping devices contained a higher concentration of heavy metals than liquid solutions in refillable dispensers, indicating contamination from the device itself. These heavy metals included chromium, nickel, and lead, which can result in neurotoxicity, cardiovascular disease, respiratory disease, and lung cancer.[45] In approximately half of the sample devices tested, the average concentration of heavy metals was greater than the daily limits recommended by the Agency for Toxic Substances and Disease Registry.[45]

Health Effects of Vaping Solutions Containing Nicotine

Nicotine is a highly addictive substance that can adversely affect several body systems. Most frequently impacted is the cardiovascular system, as nicotine raises the heart rate and increases blood pressure, which can lead to hypertension and other heart disease.[46] However, nicotine has also been shown to negatively affect respiratory, reproductive, and other systems.[47-48] Additionally, there is limited evidence that nicotine may accelerate cancer development and other diseases.[49]

Nicotine disrupts normal neurotransmitter functioning in the brain and negatively affects emotional and cognitive processing among youth.[48] Over time, this changes how the brain works, resulting in nicotine's addictive nature.[48] The effects of nicotine are particularly harmful to youth, as nicotine exposure may adversely impact their developing brains, causing long-term effects on cognitive ability, mental health, and personality traits (though it is important to note that human studies on the long-term impacts are limited).[50-52] Further, adolescents are vulnerable to addiction to nicotine due to being particularly susceptible to peer influences and social pressures.

Health Effects of Vaping Solutions Containing Cannabis-Derived Products

The cannabis plant produces over 540 chemical compounds,[53] and THC and CBD are two of the most commonly used and studied components of cannabis.[54] As noted earlier, THC is the compound that has psychotropic effects (affecting a person's mental state), including intoxication and euphoria. CBD is an active ingredient of cannabis but does not have psychotropic effects.[54-55] Cannabis products containing THC are regulated at the federal level. As of December 2018, cannabis products that do not contain THC, such as CBD, are legal at the federal level, as are hemp products that contain no more than 0.3 percent THC.[56-57] Cannabis products containing THC are increasingly becoming legalized in several states for medicinal or recreational use, but remain illegal federally if the THC content is more than 0.3 percent at the federal level. As of August 2019, 33 states, the District of Columbia (DC), Guam, Puerto Rico, and the U.S. Virgin Islands have legalized medical marijuana, and 11 states and DC have legalized the non-medical adult use of marijuana.[58]

At high doses, short-term effects of THC use include altered senses (such as seeing brighter colors), changes in mood, impaired functioning, cognitive difficulties, hallucinations, delusions, and psychosis; this is also particularly true for individuals with a family history of pscyhosis.[59] Levels of THC in cannabis have increased over the past two decades, rising from four percent in 1995 to twelve percent in 2014.[60] Long-term effects of THC use may include altered brain functioning that can lead to addiction, altered brain development, cognitive impairment, symptoms of chronic bronchitis (resulting from inhalation

of cannabis), and increased risk of psychiatric disorders.[61] Many of the long-term effects of THC, especially those related to brain function and cognition, are exacerbated when use begins during adolescence.[59, 61]

What Are the Challenges to Preventing Youth Vaping?

Youth who had not previously smoked or used cigarettes or cannabis are vaping. In 2014, for the first time, data showed that more youth were vaping than using traditional cigarettes.[2] Additionally, vaping is associated with the use of other tobacco products, including cigarettes, and potential nicotine addiction.[2] There are a number of factors that make preventing the initiation of vaping particularly challenging among youth in the United States.

Access and Availability of Vaping Products

As of December 20, 2019, a federal law was passed to raise the federal legal age to purchase tobacco, including e-cigarettes, to 21. Still, many consumers under the legal age of purchase are using e-cigarettes. Youth are able to obtain vaping products by purchasing from a variety of in-person and online retail environments and obtaining products through their social networks.[62]

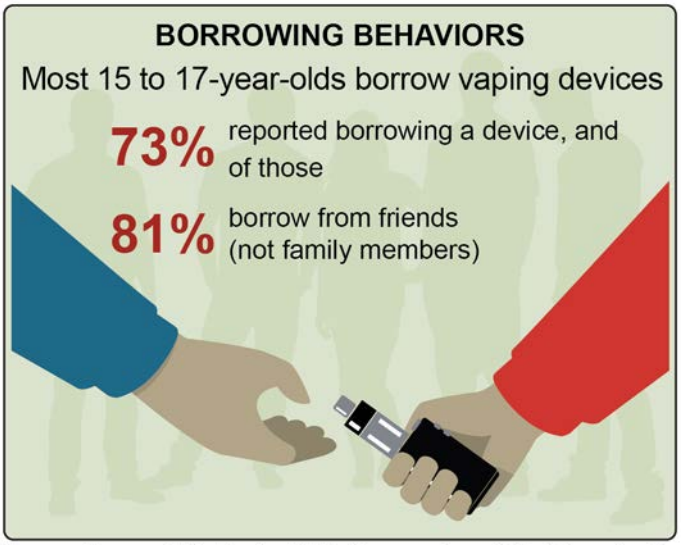
In a study of youth aged 15 to 17 years, 31 percent said they obtained their main vaping device from a store, vape shop, or online retailer; while 16 percent bought from another person, 15 percent gave money to another person to buy for them, and 14 percent received it as a gift from a friend or family member.[62]

Youth purchasing vaping products online are either claiming to be over 21 or are not faced with age verification requirements. Most vape vendors (63 to 68 percent) did not require age verification, or relied entirely on strategies that cannot effectively verify age (such as checking boxes to certify the buyer is of legal age, or a statement that says an order certifies the buyer is of legal age).[63]

Marketing

Similar to alcohol and cigarettes, a substantial amount of vaping advertisements have been directed toward youth.[64-65] These advertisements normalize vaping behavior among youth and make the product seem especially alluring.[66] Advertising that appeals to youth

Source: Pepper, J. K., Coats, E. M., Nonnemaker, J. M., & Loomis, B. R. (2019). How Do Adolescents Get Their E-Cigarettes and Other Electronic Vaping Devices? *American Journal of Health Promotion*, 33(3), 420–429. https://doi.org/10.1177/0890117118790366



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includes sponsorship of and marketing at youth-oriented events where products are used by popular celebrity ambassadors.[67] Companies who sell vaping devices frequently provide promotions and deals to consumers to reduce the expense. Other brands and products have used colorful advertisements with youth-focused flavors and products.[68] Marketing is of particular concern given that cigarettes and little cigars have been prohibited from broadcast media since the 1970s and smokeless tobacco products since the 1980s,[69] but vaping devices are able to advertise on television, in movies, magazines, newspapers, social media, and other mediums. As a result, youth are seeing advertising for nicotine products for the first time in nearly 50 years.

Use of Vaping Products in Public Places

As of April 2020, there are a total of 994 smoke-free laws at the state and local level that prohibit the use of e-cigarettes in smoke-free environments. However, many people who vape do not think smoke-free laws are applicable to vaping, and thus feel entitled to vape in a large variety of otherwise smoke-free settings.[75] Some states have included vaping in their smoke/tobacco-free laws, but others have not, potentially further complicating the issue. One study found that nearly 60 percent of those who vape do so in smoke-free locations, including bars, restaurants, worksites, malls, and movie theaters. Of this group, three quarters were between the ages of 18 and

E-CIGARETTE, OR VAPING, PRODUCT USE-ASSOCIATED LUNG INJURY

Beginning in early 2019, the United States experienced a marked increase in e-cigarette or vaping product use-associated lung injury (EVALI) and deaths. Symptoms of EVALI include trouble breathing, shortness of breath, cough, chest pain, nausea, vomiting, abdominal pain, fever, chills, and weight loss. Increasingly, EVALI is being associated with vaping illicit or black-market products, primarily THC.

According to the Centers for Disease Control and Prevention (CDC), there were 2,807 cases of EVALI from March 31, 2019 to February 17, 2020 across all states and the District of Columbia, as well as Puerto Rico and the U.S. Virgin Islands. These illnesses led to 68 confirmed deaths in 29 states.[70] The majority of those who fell sick were young males, with a median age of 23 years; the median age of death was 49.5 years.[70]

In December 2019, CDC announced that vitamin E acetate, an additive in some THC-containing vaping products, is closely associated with EVALI. Of those individuals determined to have EVALI based on CDC's case definition, approximately 86 percent reported the use of vaping products that included THC, and nearly 34 percent reported using only THC-containing products. Approximately 64 percent reported vaping products that contained nicotine, with 11 percent reporting exclusive use of nicotine-containing products. However, many experts consider the THC vaping prevalence numbers to be conservative estimates because of the hesitation to report the use of cannabis or THC, particularly in states where it is illegal.[70-72]

Additionally, many of those diagnosed with EVALI used multiple products, and the evidence is not clear which product, or combination of products, may have contributed to the condition. Given the lack of clarity around the contents of THC vaping products, both the CDC and FDA have warned against vaping THC products and against vaping products acquired from informal sources such as friends, family, or in-person or on-line dealers.[73-74]

29 years.[75] Additionally, many people perceive vaping cannabis as a discrete, undetectable, and more socially acceptable alternative to smoking cannabis in public.[76]

Cultural/Social Considerations

As the popularity of vaping has increased, a vaping culture has developed among youth who are inundated by peer pressure and norms in their schools and communities.[77] Additionally, a culture has developed around vaping, and people who vape, including youth, are performing tricks and organizing competitions around activities such as trying to blow large and different vape rings and sizes.[78] The sharing and borrowing behavior may also contribute to the development of an individual's social vaping identity.[62]

The social component of vaping is thought to be a compelling driver in its uptick of use. Vaping devices and flavors are easy to share and borrow, which allow youth to treat it as a casual commodity. Hundreds of YouTube channels, websites, and social media accounts are dedicated to vaping, some with over a million subscribers.

Perceptions of Vaping as Low-Risk

For many youth, vaping is seen as less harmful, better, and cheaper than smoking cigarettes.[2] Since no combustion occurs during the vaping process, those who vape consider nicotine vaping products to be less harmful than traditional cigarettes because many do not produce tar or carbon monoxide.[13] Former smokers believe their breathing is less affected by nicotine vaping than smoking traditional cigarettes, and others see it as a harmless alternative to smoking.[79-81] However, these perceptions are incorrect, and vaping still presents a number of harms.

Regulatory Environment

The vaping regulatory environment is complicated and evolving. The 2009 Tobacco Control Act gave the FDA the authority to regulate tobacco products, including cigarettes, roll-your-own tobacco, smokeless tobacco, and "any other tobacco products that the Agency by regulation deems to be subject to the law."[82]

E-cigarettes and vapes are new products and few existed in 2009. Like other tobacco products, e-cigarettes and vaping products must be reviewed by FDA prior to being marketed legally. For products already on the market in August 2016, recent rulings have required manufacturers to submit applications for FDA review by September 9, 2020, in order to continue marketing nicotine vaping devices and related products.[82] Products introduced or changed after August 2016 may not be marketed without premarket review and authorization by FDA. It should be noted that, while the FDA has federal regulatory authority over e-cigarettes and vaping devices, states and local jurisdictions may also have the authority to pass policies to reduce access to, and availability of, these products.[82-83]

FDA regulation of THC vaping products is even more complicated than tobacco regulation. At the federal level, cannabis products containing less than 0.3 percent of THC are considered legal, and concentrations greater than 0.3 percent are illegal. Thirty-three states, plus the District of Columbia, Guam, U.S. Virgin Islands and Puerto Rico, allow THC for medicinal use, and 11 states plus the District of Columbia have legalized it for both medicinal and personal usage purposes.

The FDA has approved a small number of cannabis-derived drugs that are available by prescription only for specific medical conditions, but, to date, the FDA has only approved oral formulations, and it is still unclear which entity is ultimately responsible for regulating non-prescription cannabis. At present, the FDA is still determining their regulatory framework and subsequent application for cannabis-derived products.[84]

Consequences of Unregulated Vaping Products

Mislabeling is a frequent issue for illicit black market THC vaping products, with many being labeled as pure when they contain contaminants, including pesticides.[85] For example, a product may claim to contain CBD, but it may or may not have more than the legally allowed amount of THC.[86] One study tested a sample of nine CBD solutions for vaping that claimed to be 100 percent pure CBD extracts and found one contained dextromethorphan (a cough medication), two contained THC, and four contained a synthetic cannabinoid that has been linked to over 2,000 incidents involving medical intervention or death.[87]

This complicated and continually evolving environment makes oversight over vaping devices and products increasingly challenging, particularly at the state and local levels, and supports the need for preventive policy and evidence-based approaches to reduce rates of vaping by youth and young adults in the United States.

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CHAPTER

2

What Research Tells Us

Vaping and its related health risks for youth are relatively new problems. As rates spike among youth, communities are looking for ways to intervene. To meet this immediate need, many evidence-based interventions that were originally developed to address cigarette use have been modified for vaping. This chapter describes several of these, including:

- *smokeSCREEN*
- *This is Quitting*
- *CATCH My Breath*
- Media campaigns, including the *Real Cost campaign and the truth® campaign*
- Policies, including price policies and zoning/ density policies

The evidence for effective strategies to prevent the initiation and use of vaping devices is limited, but continuing to emerge. When available, this guide presents available findings specific to nicotine vaping for each intervention. When those data are not available, it relies on the research for preventing cigarette smoking and other unhealthy or risky behaviors. Many of these interventions also include findings specific to cannabis use, or can be adapted for preventing cannabis vaping among youth.

This guide identifies a set of interventions that are implemented at the individual, school, or community level. The interventions should not be considered in isolation. Decades of research show that the most effective prevention strategies are comprehensive and include interventions at multiple levels. Comprehensive prevention strategies are more likely to succeed and have broad and lasting impact.

Specific interventions may be more relevant to particular audiences. For example, schools are the primary audience for *CATCH My Breath*, while pricing policies need engagement and support from coalitions and other community members. This guide identifies who the key stakeholders are for each intervention, identified through the following icons:

Program and Policy Selection

The programs and policies included in this chapter were selected in collaboration with subject matter experts after conducting a comprehensive environmental scan. Eligible programs and policies were required to meet the following criteria:

- Be clearly defined and replicable;
- Address the target outcome of reduction in or prevention of vaping among youth;
- Be currently in use; and
- Have accessible technical assistance and support for implementation.

Individual-Level Interventions

Individual-level interventions are those that are specifically targeted towards individuals or small units, such as one or two schools, a classroom, or a specific individual who has shown signs of risk for vaping. These interventions typically focus on the characteristics of an individual that influence behavior change, such as:

- Knowledge
- Attitudes
- Behavior
- Self-efficacy
- Developmental history
- Age
- Values
- Goals
- Expectations
- Stigma

smokeSCREEN and *This is Quitting* are two individual-level interventions that show promise for reducing nicotine vaping among youth.

smokeSCREEN

Goal/Outcome(s)

smokeSCREEN, developed by the play2PREVENT Lab at Yale University and evaluated with funding from the National Institutes of Health (NIH), Food and Drug Administration, and CVS Health Foundation, is a videogame intervention aimed at changing risk perceptions, beliefs, and knowledge about e-cigarettes to reduce early adolescent smoking and nicotine vaping. In the videogame, players help their character navigate situations in which tobacco use, including e-cigarettes or nicotine vaping, may be present.

Examples of scenarios that help adolescents learn to avoid tobacco use include:

- Decision-making about whether or not to throw a party
- What to do when another character says that vaping is safe
- How to react when encouraged to try vaping because it tastes good

The program's content areas cover:

1. Electronic Cigarettes
2. Flavored Tobacco
3. Health Effects of Smoking
4. Tobacco and the Media
5. Tobacco Marketing
6. Addiction

smokeSCREEN aims to help adolescents build skills to avoid smoking- and nicotine vaping-related behaviors. A full-scale evaluation study found that the videogame effectively changed beliefs and knowledge about smoking and nicotine vaping in a positive direction.[1]

Older adolescents reported healthier beliefs and greater knowledge about nicotine vaping after playing the videogame as compared to younger adolescents also playing the game. This suggests that the videogame may be more relevant and relatable to older adolescents. Findings also suggested that gender may be associated with beliefs and gameplay experience, though there was no association between gender and knowledge.

Outcomes Associated with *smokeSCREEN*

Studies included in this evidence review demonstrated that playing the *smokeSCREEN* video game resulted in:

- Improved beliefs about nicotine vaping and cigarette smoking
- Improved knowledge about nicotine vaping and cigarette smoking

The time between intervention completion and follow-up varied from 2 to 12 weeks.

Though the current version of *smokeSCREEN* does not include a focus on cannabis use, earlier versions that did indicate its use may be an effective intervention for youth who vape cannabis products.[2]

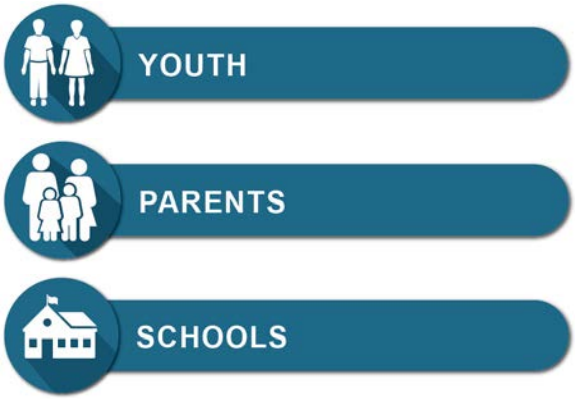
Typical Setting(s) / Demographic Groups for Intervention

The videogame was developed for youth aged 10 to 16. To access the game, program administrators must request a unique username and password for each student. No additional materials are needed to play *smokeSCREEN*, although headphones are recommended. The game can be played on tablets, phones, and computers and is also available free to download from app stores.

Studies included participants between the ages of 10 and 16, and included both boys and girls and a diverse representation of ethnicities.

Stakeholder Type

This intervention is typically implemented in schools or youth programs but is fully accessible to youth interested in playing the videogame outside of school. The program includes a manual for educators with guidance on implementing the game in their classrooms.



The studies in this review only included the videogame; no additional educator or school involvement was included or assessed. However, an NIH-funded study conducted interviews with educators using the videogame and those results are forthcoming.

Number of Sessions

The game is estimated to take approximately two to three hours in total and can be played in numerous sessions, ideally in 30 to 60 minute increments.

There are seven different storylines for students to complete with mini-games built into each storyline. These include:

1. *The New Kid*
2. *Free After School*
3. *The B-Team*
4. *Musical to My Ears*
5. *Pushing Limits*
6. *Not My Flavor*
7. *Final Project*

Adaptation

smokeSCREEN was developed by Yale University's play2PREVENT lab, which develops and evaluates videogames on several different health promotion topics. *smokeSCREEN* is a nicotine vaping and smoking adaptation based on the theories and principles employed in previous play2PREVENT videogame interventions.

This is Quitting

Goal/Outcome(s)

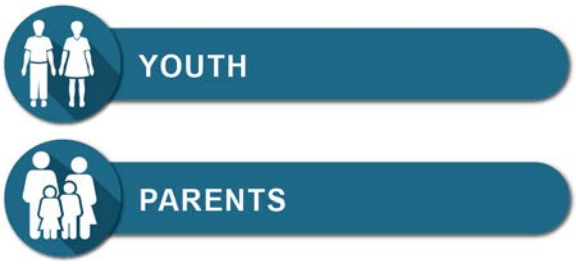
This is Quitting is a text message program developed by Truth Initiative to help teens and young adults (ages 13 to 24) quit nicotine vaping. The program consists of daily text messages from peers who have attempted to, or successfully, quit using e-cigarettes or vaping devices. The program is designed to build skills and confidence, reinforce social norms and support for quitting, and illustrate both the positive and challenging aspects of quitting.

Each day, program participants receive automated, tailored messages based on their enrollment or quit date. They can choose to set or reset that date via text message. Participants who are not ready to quit receive at least four weeks of messages. Participants with a set quit date receive messages for up to 45 days prior to their quit date and up to two months after.

Typical Setting(s) / Demographic Groups for Intervention

The intervention is available to participants aged 13 to 24, with messages tailored based on age.

Stakeholder Type



This is Quitting is conducted entirely remotely via text message.

Number of Sessions

Evaluations of this program are limited. At the time of publication, data are not available on the number of text messages or length of time in the program that are associated with quitting or reducing use of vaping devices.

Early Results

A three-month, pre-post test of *This is Quitting* found that in the first five weeks of the program, 13,421 teens and 13,750 young adults enrolled. Two weeks after enrollment, 61 percent of the respondents said they had reduced their use of vaping devices or quit altogether. At three months, 25 percent said they had not vaped in the past seven days and 16 percent said they had not vaped in the past 30 days.[3] At the time of publication, the effectiveness of *This is Quitting* is being studied using a randomized controlled trial.[4]

School-Level Interventions

School-level interventions focus on the implementation of interventions in school-based settings, including elementary, middle, and high schools. These interventions may be implemented in individual classrooms, specific schools, or entire school districts. This guide highlights one such program, but there are numerous school-based programs and policies for vaping prevention and reduction.

Though not explicitly included in this guide, there are also a number of school-based policies that should be considered to help prevent and reduce youth vaping. These policies include tobacco-, smoke-, and vaping-free campus policies, meaning that not only can the products not be used on campuses, they cannot be carried onto campus.[5-6] Schools can also prohibit the acceptance of any donations or curriculum from any tobacco-related industry, and prohibit the promotion of tobacco products, including vaping devices.

CATCH My Breath

Goal/Outcome(s)

CATCH My Breath, developed by the University of Texas School of Public Health in partnership with the Michael & Susan Dell Center for Healthy Living, is a school-based program developed to prevent nicotine vaping and tobacco use among students in 5th through 12th grade. The program includes classroom lessons, physical education strategies, and parent education.

The classroom lessons are based on cooperative learning, group discussions, goal setting, classmate and adult interviews, and activities such as analyzing tobacco and nicotine vaping advertising and developing counter-advertising messages. Program content is made available via a digital portal where schools receive a range of materials to support implementation of the program, including:

- Grade level teachers' guides
- Annotated teacher presentations
- Peer-facilitated group work and discussions
- Posters to appeal to each age group

The program is available for free through support from CVS Health. The goals of *CATCH My Breath* are to:

1. Reinforce a tobacco-free lifestyle
2. Prevent experimentation and regular use of nicotine vaping products
3. Increase knowledge of the physical, social, and legal consequences associated with nicotine vaping
4. Expose tobacco/vaping industry marketing strategies designed to attract youth and young adults to vaping, and develop counter-advertising messages
5. Demonstrate nicotine vaping refusal skills

Outcomes Associated with *CATCH My Breath*

Research shows that the CATCH My Breath curriculum resulted in:

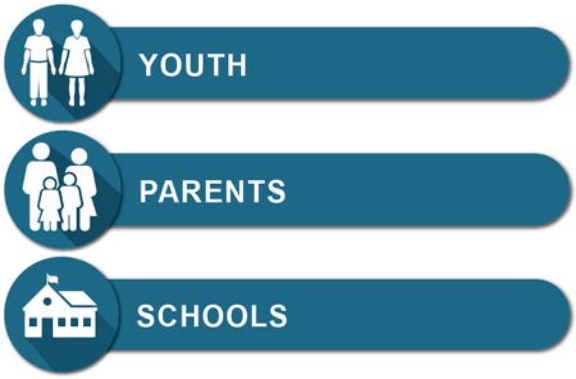
- Reductions in nicotine vaping use (both lifetime and within the past 30 days)
- Increases in nicotine vaping knowledge
- Increases in positive perceptions of a vape-free lifestyle
- Reductions in overall tobacco use

All outcomes were measured by self-report. The time between intervention completion and follow-up varied from immediately post-intervention to 16 months after.

Typical Setting(s) / Demographic Groups for Intervention

CATCH My Breath is a school-based intervention for students aged 10 to 18, with course options for 5th through 12th grade. *CATCH My Breath* is implemented in classrooms or in youth-based organizations and is free to schools that complete the enrollment information.

Stakeholder Type



The program is designed to be taught by educators, tobacco prevention educators, counselors, nurses, and public health advocates. Additionally, the curriculum includes peer-led discussions.

This program has been tested with classroom teachers and peer facilitators.

Number of Sessions

For each grade level, the *CATCH My Breath* course has four lessons that are approximately 30 to 40 minutes long. The curriculum is designed to use once per week for four weeks with optional physical education lessons and a parent toolkit. In Texas, the *CATCH My Breath* program was found to significantly reduce the likelihood of nicotine vaping in the year after program participation.[7]

Adaptation

CATCH My Breath is built on the Coordinated Approach to Child Health (CATCH) curriculum and an evidence-based program called the "Class of 1989 Study." The original CATCH intervention focuses on dietary intake and physical activity among students in 3rd through 12th grade. Class of 1989 was a school-based program that aimed to improve dietary and physical activity behaviors and prevent tobacco use among students in 6th through 12th grade. The original CATCH intervention and Class of 1989 both have substantial evidence of success supported by multiple randomized controlled trials.

CATCH My Breath was formally evaluated with 6th and 7th grade students and the resulting peer-reviewed study is the only published evaluation of the intervention at the time of this guide's publication. However, the 5th grade and high school versions of *CATCH My Breath* were built based on contemporary behavioral science theory, empirical evidence, previous tobacco studies by the program investigative team, and input from a national team of grade appropriate educators.

Community-Level Interventions

Community-level interventions focus on the entire population within a country, state, county, or city. These interventions attempt to influence youth behavior by changing social norms and attitudes, economic conditions, and environmental factors that may impact vaping behaviors.

Media Campaigns

Media campaigns are examples of community-level interventions that reach wide audiences. There are a number of campaigns currently in place that focus on reducing vaping; they have different approaches and different target audiences, but are grounded in over 20 years of empirical evidence that media campaigns can change knowledge, attitudes, and beliefs, and, ultimately, behavior.[8] CDC Best Practices estimates that campaigns need to reach approximately 75 percent of their target audience. With this sufficient level of exposure, shifts in attitude are expected in 12 to 18 months, and behavioral change is expected within 18 to 24 months following the campaign's launch.[9]

Two national campaigns are highlighted here, and each campaign approaches nicotine vaping reduction a little differently. Communities should also look to their states for additional evidence-based media campaigns they can adopt or implement; a number of states have created strong campaigns based on research to help prevent vaping among youth and young adults.

The Real Cost Campaign

Goal/Outcome(s)

The Real Cost campaign, developed and implemented nationally by the FDA, focuses on reducing tobacco use among youth. In 2014, the FDA launched *The Real Cost* cigarette prevention campaign, which includes advertising and other prevention materials disseminated to youth aged 12 to 17, such as television ads, streaming video ads, digital ads, social media, and a youth-targeted website.

The goal of the campaign is to educate at-risk youth about the harmful effects of tobacco use. The campaign strives to prevent youth who are open to smoking from trying it in the first place, and to reduce the number of youth who move from experimenting with cigarettes to using them regularly. It does so by messaging the non-monetary costs that every cigarette has on youth. Messages include:

- Emphasizing loss of control due to addiction
- Depicting the dangerous chemicals found in cigarettes
- Reinforcing the negative health consequences of smoking in a way that speaks to youth

The campaign has aired continuously since its launch, with smokeless tobacco and e-cigarette additions incorporated in 2016 and 2018, respectively.

In fall 2018, *The Real Cost* campaign expanded its advertising to include e-cigarettes. The e-cigarette component of the campaign targets the over 10 million U.S. teens aged 12 to 17 who have used e-cigarettes or are open to trying them. Similar to the original campaign focused on cigarette use, the ENDS campaign urges these teens to "know the real cost of vaping" with advertising designed to snap teens out of their "cost-free" mentality by educating them on the risks of using e-cigarettes. Since its launch, *The Real Cost* released a suite of e-cigarette prevention advertisements on broadcast television, streaming video, online radio, social media, and other digital platforms popular to teens. Additionally, the campaign distributed posters containing e-cigarette prevention messages to all high schools nationally for display in bathrooms.[10]

In fall 2019, the FDA expanded the educational program by providing high school and middle school educators with resources such as fact sheets, lesson plans, and activity sheets to help educators start educational conversations about the harms of youth e-cigarette use.[11]

The 2013-2016 evaluations of *The Real Cost* campaign measured the effect of the campaign following the CDC's Best Practices for Comprehensive Tobacco Control Programs:

1. An initial outcome of awareness
2. An intermediate outcome of change in knowledge, attitudes, and beliefs
3. A final outcome of initiation of smoking.[12]

The evaluation followed a group of youth aged 11 to 16 from November 2013 to November 2016. The first published evaluation data showed very high awareness of the campaign among youth generally, the target audience of at-risk youth, and other demographic and smoking status variables.[13]

The second published evaluation results showed changes over time in harm perceptions and campaign-related beliefs.[14] These changes were examined in the overall sample, at-risk youth, and other demographics, such as race/ethnicity, gender, and household smoking status. Lastly, there were two manuscripts published on initiation of smoking among youth at two time points in the longitudinal sample.[15-16]

Studies have found that a "high exposure" to campaign advertisements, compared to low or no exposure, was associated with a 30 percent decrease in risk of beginning smoking among youth.[14] Exposure to the campaign nationally is estimated to have prevented between 380,000 and 587,000 youth from beginning to smoke between 2013 and 2016.[16]

Outcomes Associated with *The Real Cost* Campaign: Cigarette-Focused Intervention

Studies included in this evidence review demonstrated that exposure to *The Real Cost* campaign resulted in:

- Delayed smoking initiation
- Increased perceptions of smoking harm

According to a *The Real Cost* e-cigarette prevention campaign study that began in the summer of 2018, *The Real Cost* e-cigarette prevention campaign generated 2 billion teen views in its first 9.5 months, along with 578,000 likes, 89,000 shares, and 31,000 comments.[11]

Typical Setting(s) / Demographic Groups for Intervention

The campaign encompasses national and local media sources, including television, web, print, and social media. The focus is on middle and high school students.

The Real Cost campaign is also cost-effective. One study found that in the first two years of the campaign, for every $1 spent on *The Real Cost*, the campaign saved $128 in costs associated with smoking-related harms.[17]

Stakeholder Type

FDA implements *The Real Cost* campaign, providing resources to middle and high school educators across the country.

truth® campaign

Goal/Outcome(s)

The *truth® campaign*, developed by the Truth Initiative, was launched in 2000 as a national mass media campaign focused on the prevention of youth and young adult tobacco use. The campaign has aired continuously since its launch and has gained significant prominence as the longest and largest anti-tobacco campaign in the United States. Recently, the *truth® campaign* has expanded its efforts to include mitigating and preventing e-cigarette use. Its messages primarily air across television and digital platforms targeted to youth and young adults, ages 15 to 24. The campaign is currently based on a set of key message themes found to be associated with a lower likelihood of nicotine vaping. Themes include:

- Exposing the undue influence of the tobacco and nicotine vaping industries
- Driving collective action against tobacco and vape use
- Disseminating facts around the health effects of tobacco use and nicotine vaping
- Creating opportunities to form community around living smoke- and vape-free
- Providing resources to quit smoking and nicotine vaping

Typical Setting(s) / Demographic Groups for Intervention

The campaign employs national media platforms including television, web, and social media targeted to youth and young adults 15 to 24-years old.

Numerous long-term evaluation studies, controlling for a variety of individual- and community-level variables, found that awareness of the *truth® campaign* was significantly associated with stronger anti-smoking attitudes and beliefs, intentions not to smoke, and reduced tobacco use behavior.[18-21] Studies also found the *truth® campaign* to be a cost-effective intervention given its broad reach.[22]

Stakeholder Type

The Truth Initiative, an independent nonprofit organization, implements this intervention which includes engaging youth and young adults across the nation to help spread messages about the harms associated with smoking and nicotine vaping.

Policies

Laws, policies, and ordinances are also examples of community-level interventions. There are a number of evidence-based prevention policies that should be considered for vaping. These policies include:

- Pricing policies that can determine minimum prices and tax rates for products
- Zoning/licensing laws that limit the number and locations of retailers able to sell products
- Minimum legal purchasing age that can be set, and enforced, by state governments to restrict access to products by young adults
- Clean air laws that can be enacted to restrict vaping in public places, parks, college campuses, workplaces, and more
- Bans on advertising for vaping that can include on television, newspapers, online, on billboards, in sports stadiums, and more
- Laws on packaging for vaping-related products, including supporting graphic warning labels or banning youth-oriented imaging
- Point of sale laws, including limiting where vaping products can be sold within a store and what advertisements can be displayed within a store
- Banning flavors used when vaping, including menthol, dessert, and fruit flavors
- Increased compliance checks to ensure establishments are not selling vaping devices to individuals under the age of 21

Clean Air Laws

Although there are limited data on the effects of clean air laws on vaping behavior, there is evidence of the effectiveness of these laws on cigarette smoking, and experts believe they will have an impact on vaping behavior, too.

The National Academies of Sciences, Engineering, and Medicine found that e-cigarettes increase particulate matter and nicotine levels in indoor settings,[23] and the Surgeon General recommended including e-cigarettes in smoke-free laws.[24] As of October 2019, 20 states and Washington, DC have included nicotine vaping in their smoke-free laws, as do hundreds of cities and counties.[25] Banning vaping in workplaces and public areas may improve air quality and help reduce confusion around enforcement of smoke-free law.

Policies should be considered specifically for vaping cannabis, as well as tobacco. For example, clean air laws should specifically include cannabis; advertising bans can prohibit cannabis advertising that appeals to youth; and flavor bans can include flavors in cannabis liquids that appeal to youth. Zoning and licensing policies, as well as price policies, can be enacted to include all aspects of vaping, including flavors, nicotine, and cannabis.

Two policies are highlighted here as examples of prevention interventions with strong evidence. Across all of these policies, it is important to be thoughtful and nuanced about implementing them so as to not increase rates of cigarette smoking; this is particularly relevant when considering the price and tax policies.[26]

Like the programs included previously in this chapter, the policies have been well studied for cigarettes and tobacco products, but have more limited evidence for their application to vaping. The policy reviews are based on the strong evidence base related to cigarettes, and the newer application to vaping is presented separately.

Price Policies

Goal/Outcome(s)

Raising the price of vaping devices, cigarettes, and tobacco products is known to be one of the most effective tobacco control interventions.[30] The goal of raising vaping device and related product taxes is to reduce rates of vaping. A secondary outcome is often raising revenue for the jurisdiction.

Overall, 19 states and the District of Columbia (DC) have imposed a tax on e-cigarettes, but there is no federal excise tax.[31] In the absence of federal regulations in the United States, states have enacted laws regulating the price and taxation of e-cigarettes.

Typical Setting(s) / Demographic Groups for Intervention

Price increases can occur at the local, state, and/or federal levels, and affect all populations. Youth and young adults are particularly responsive to tax increases given they typically have less disposable income to spend on vaping devices and products.

Numerous states are implementing taxes on different aspects of vaping. For example, in 2020, New Hampshire

implemented an 8 percent wholesale tax on e-liquids that contain nicotine, and a 30 cents per milliliter tax on nicotine in closed nicotine vaping devices.[32] New York State implemented a 28 percent sales tax on vaping products, which represents a 20 percent increase from the past.[33] Some states consider e-cigarettes subject to broader tobacco product tax rates, which were originally implemented to reduce cigarette use; Minnesota, Nevada, Vermont, West Virginia, and Wyoming consider e-cigarettes as "tobacco products" and tax them at the same rate as cigarettes. Other states do not include e-cigarettes in their definition of "tobacco products," and, therefore, they are not subject to tobacco product taxes.[34]

Support for Increasing the Price of Cigarettes

The 2014 Surgeon General's Report stated that "the evidence is sufficient to conclude that increases in the prices of tobacco products, including those resulting from excise tax increases, prevent initiation of tobacco use, promote cessation, and reduce the prevalence and intensity of tobacco use among youth and adults;"[27] this position was reaffirmed in the 2020 Surgeon General's Report on Smoking Cessation.[28]

- **The World Health Organization**: "Significant increases in the taxes and prices of tobacco products are the most cost effective measures to reduce tobacco use."
- **Centers for Disease Control and Prevention**: "Research has shown that increasing the unit price of tobacco products…are effective strategies for curbing youth and adult smoking."[9]
- **National Academies of Sciences, Engineering, and Medicine**: "States with excise tax rates below the level imposed by the top quintile of states should substantially increase their own rates to reduce consumption and to reduce smuggling and tax evasion. State excise tax rates should be indexed to inflation."[29]

Though these data are not yet available for vaping, research on price policies for cigarettes have shown varying effects among adults of different races. Smoking prevalence among African Americans, Asians, and Hispanics decreased with higher cigarette prices, but prevalence was not affected for Whites. Smoke intensity did, however, decrease for whites as well as African Americans when prices were raised. Despite these differences, evidence shows that increasing the price of cigarettes decreased the demand for cigarettes across all races.[35]

Price Policies: Cannabis

As states legalize cannabis, many are implementing additional price policies and sales taxes. In Massachusetts, the ballot initiative that legalized cannabis taxed it at 3.75 percent; in 2017, excise taxes were raised to 10.75 percent.[36] Colorado increased sales tax from 10 percent in 2017 to 15 percent in 2019.[37] Similar to cigarettes, increasing the price of cannabis may help reduce cannabis misuse, including underage use and the use of cannabis in vaping devices.[38]

Stakeholder Type

Price policies can be passed by city, town, or county councils, or state or federal legislators. The support of the public health community is particularly relevant in the passage of such legislation.

Policy Characteristics

To date, studies are mixed on the effects of price increases on vaping rates; There is not a set increase in cost that demonstrates greater, or fewer, returns; however, research has shown that higher tax increases are associated with greater decreases in tobacco use. In summary, studies show:

- **Vaping**
  - One study found a 10 percent increase in the price of disposable e-cigarettes was associated with an 18 percent reduction in the number of days middle and high

school students vaped,[39] and a 2014 study found that sales of e-cigarettes were very responsive to price changes.[40]

- **Cigarette use**
  - Increasing the price of cigarettes by 10 percent reduces adult smoking by 2 percent, young adult smoking by 4 percent, and youth smoking by approximately 7 percent.[41]
  - For every $1 cigarette tax increase, there was a 2 percent reduction in smoking among 14-year-olds and a 2 percent reduction among 15-year-olds.[42]
  - Price increases also reduce per-capita consumption, smoking rates, and the number of cigarettes smoked each day.[43]

Increasing the price of vaping devices and related products is uniquely complicated. Though research shows it will reduce use among youth, there is concern that if prices are too high, it will drive people to use black-market products, or may encourage adults to switch to combustible products.[44] Any policy-maker looking to institute a price increase on vaping devices or related products should review emerging research to determine the most appropriate percent increase to minimize harms across youth and young adults alike.

Licensing and Zoning Policies

Goal/Outcome(s)

Limiting the number and location of tobacco retailers is an effective policy to reduce tobacco use among youth. When there are a large number of tobacco retailers in an area, people are more likely to consume more cigarettes per day and have a harder time quitting, and youth are more likely to start smoking.[45] Additionally, tobacco retailers often cluster in predominantly low-income neighborhoods or in areas with a high percentage of residents of color, causing disproportionate harms associated with tobacco use.[46] While the research on cigarette density and use is strong, there are no studies that look at changes in vaping behavior after the introduction of density laws or ordinances.

There are two primary ways a jurisdiction or state can limit the number and location of vaping retailers: licensing and zoning.[47] Note that whether this is done through licensing or zoning depends on the regulatory structure of the state or locality.

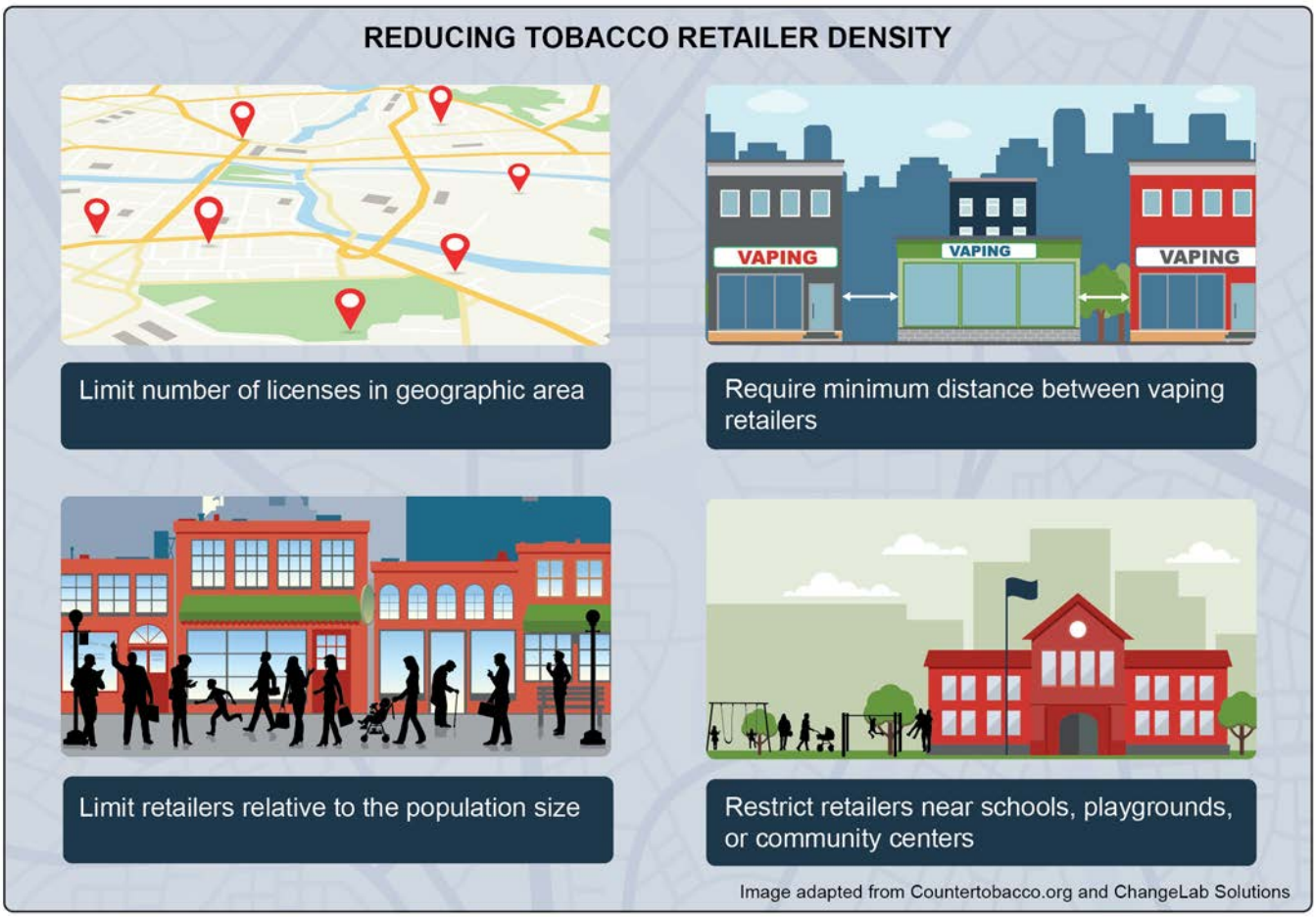
Licensing: The first is by restricting the types of businesses that can sell these products by requiring specific e-cigarette licenses. As of September 15, 2019, 25 states and DC require a license for the sale of e-cigarettes or e-liquid (including over the counter, online, or in vending machines). Delaware requires a license to sell e-cigarette liquid, but not the vaping devices themselves.[48]

Zoning: Jurisdictions also ban sales in specific locations. Communities can determine how close tobacco or e-cigarette retailers can be to places with vulnerable populations, such as schools or parks. These proximity sales bans help reduce youth access to the products while simultaneously decreasing tobacco outlet density, a strong policy for prevention. For example, Montgomery County, MD, does not allow the sale of vaping or tobacco products within half a mile of any school.[49]

Licensing or Zoning: Another form of access regulation is capping the number of tobacco and e-cigarette retailers in a defined area, based either on square mileage or population. This can be done through licensing or

zoning. Saint Paul, MN, limits the number of tobacco retailers, including those who sell vaping devices, to 242 across the city,[50] and Philadelphia, PA, allows one tobacco retailer per 1,000 residents.[51]

Communities can reduce vaping retailer density in the following ways:[47]



Licensing and zoning laws not only reduce the number of vaping retailers in a community,[52] they can also provide an additional level of regulation that allows for the fining, suspension, or revocation of licenses from retailers that sell vaping products to minors.

Typical Setting(s) / Demographic Groups for Intervention

Licensing or zoning laws can occur at the local, state, and/or federal level, and affect all populations.

Zoning and licensing studies have focused on a variety of populations, including adolescents living in an urban environment, middle and high school students in California,[53-54] high school students in New Jersey,[55] African American adolescents,[56] Latinos,[57] and nationwide surveys. The diversity of study populations suggests that these policies can be implemented in a variety of localities and settings.

Outcomes Associated with Retail Density Policies

Studies included in this evidence review demonstrated that reducing the number and location of tobacco outlets resulted in:

- Reduced youth e-cigarette use (both lifetime and current)
- Reduced state-level smoking rates
- Increased household quitting rates

The time between intervention completion and follow-up varied from immediately post-intervention to eight months after.

Stakeholder Type

State regulatory structure determines how much authority localities have in passing licensing or zoning ordinances. Typically, city or county councils are able to pass zoning policies, but many states maintain the authority to control licenses. The support of the public health community is particularly relevant in the passage of any legislation.

The majority of studies reviewed for this guide evaluated the effects of local licensing and zoning laws near schools, and one was focused on reduction in smoking in states with a national major retailer after they stopped selling cigarettes.[58]

Policy Characteristics

As community needs are different, there is no concrete number that can be used to determine optimal or minimum zoning/density distances or licensing numbers. However, the Center for Tobacco Policy and Organizing has determined that strong retailer licensing must have four key components at a minimum, including:

1. A requirement that all retailers obtain a license and renew it annually
2. An annual licensing fee high enough to fund critical enforcement
3. Meaningful penalties for violators
4. Coordination of laws so that a violation of any existing local, state, or federal tobacco or vaping regulation violates the license[62]

Support for Tobacco Density Policies

The National Academies of Sciences, Engineering, and Medicine:

"All states should license retail sales outlets that sell tobacco products. Repeat violations of laws restricting youth access should be subject to license suspension or revocation. States should not preempt local governments from licensing retail outlets that sell tobacco products."[29]

Public Health Law Center:

"Restrict the types of businesses that can sell tobacco, e-cigarettes, and related products; Regulate where tobacco and e-cigarette retail outlets can be located; Cap the number of tobacco and e-cigarette retailers in a defined area."[45]

Licensing and Zoning: Cannabis

Licensing and zoning laws are also applied to cannabis retailers in states where cannabis has been legalized. For example, in Los Angeles, CA licensed retail stores must be more than 700 feet from schools, public parks, libraries, drug and alcohol treatment facilities, day care centers, permanent supportive housing, or any other licensed cannabis retailer.[59] Stockton, CA has 600 feet requirements from the businesses listed above, as well as family day care homes and religious facilities, and 300 feet from any residential zones.[60] In Washington State, licensed cannabis businesses must be more than 1,000 feet away from restricted entities, such as those listed above.[61]

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CHAPTER

3

Guidance for Selecting and Implementing Evidence-based Programs and Policies

Before a community, school, or organization implements an intervention to prevent and reduce vaping among youth, it is important to assess its appropriateness for the setting and context in which it will be implemented. This chapter provides a framework to use when implementing prevention interventions, and includes recommendations for addressing implementation challenges for the programs and policies described in Chapters 2 and 4.

Using the Strategic Prevention Framework

A number of frameworks and guidelines provide insight into how to best implement programs and policies. SAMHSA's Strategic Prevention Framework (SPF) provides a comprehensive, five-step approach for understanding and addressing vaping within states and communities:

1. **Assessment -** Identify prevention needs using qualitative and quantitative data, such as incidence and prevalence of vaping among youth and factors that influence vaping
2. **Capacity -** Determine what resources the community or implementing organization has and what is needed to prevent and reduce vaping among youth (e.g., the human, organizational, community, and financial resources available)
3. **Planning -** Develop a comprehensive implementation plan that includes goals, objectives, strategies, programs, and policies to address the vaping prevention priorities identified in steps 1 and 2
4. **Implementation -** Implement programs and policies, using available guides and manuals for the interventions selected in step 3
5. **Evaluation -** Evaluate the implementation process and assess whether the program or policy is having the intended effect (see more in Chapter 5)

Communities need to assess their needs continually. This is especially true with a rapidly evolving issue like vaping. The population engaged in vaping may change over time, as may the substances youth and young adults are vaping or the products they are using. As more federal and state laws are enacted, vaping behavior will change in response to these policies. Vaping behavior is also likely to change as a result of the vaping industry's marketing strategies. By conducting regular needs assessments, communities can ensure they are implementing the most appropriate interventions and can make revisions, adaptations, or changes, as needed.

Key Considerations for Implementing Programs to Address Vaping

Once a community or organization has selected a program or policy to address vaping, several strategies can be used to support implementation efforts and address potential challenges and barriers.

Stakeholder Engagement

Challenge

- Gaining support from school administrators, school district officials, health administrators, health care professionals, child advocacy groups, parent associations, and city or county officials to implement a vaping prevention program is critical to success. Every intervention needs one or more champions.

Strategy

- Identify the most relevant champions for each community. Champions may include principals, parents, educators, community members, and youth and young adults themselves. These stakeholders should be engaged in the process early and often for the best effect. Appeals to stakeholders and potential champions should include a mix of current data on vaping in schools or in the community along with personal stories from youth and young adults as well as parents who have been affected by vaping and its associated harms.

Financing

Challenge

- Though CATCH My Breath, smokeSCREEN, and This is Quitting are all available at no cost at the time of this guide's publication, obtaining and sustaining program funding for program materials, training resources, and program staff efforts is a common challenge. Often, limited funding is available for prevention efforts, and resources are stretched thin.

Strategy

- From the very beginning of any intervention planning, it is important to estimate costs and develop a budget, being sure to include time and costs related to relationship development, capacity building, staff training, evaluation, and other necessary implementation components.[1] A comprehensive plan should address and allocate resources to implement, maintain, and evaluate the program over time.

Tailoring Interventions

Challenge

- Given the scarcity of data on vaping interventions, the effectiveness of these interventions in various populations or among individuals with different demographic characteristics is unknown. Since that vaping rates vary by certain demographic characteristics, such as age, race/ethnicity, and sexual orientation, programs may require some adaptation to have the intended impact.

Strategy

- The U.S. Department of Health and Human Services has developed National Standards for Culturally and Linguistically Appropriate Services (CLAS).[2] The principal standard of CLAS is to "provide effective, equitable, understandable, and respectful quality care and services that are responsive to diverse cultural health beliefs and practices, preferred languages, health literacy, and other communication needs." CLAS includes 15 standards that should each be evaluated when selecting and implementing an intervention.[2] When tailoring these prevention programs, consider the CLAS principles, and be sure to rigorously evaluate how the amended components produced program effects.

Adaptation vs. Fidelity

Challenge

- As communities consider implementing programs or policies, they may have questions about how to adapt the model to their specific circumstances, while still maintaining fidelity to the core elements of the intervention. Fidelity is the degree to which a program delivers an intervention as intended and must be maintained for desired outcomes.

Strategies

- There is a large body of implementation science research that examines the tension between adaptation and fidelity, and the importance of balancing both. One study recommended developing intervention-specific descriptors for the components essential for fidelity, and what adaptations may be allowed.[3] Another

study proposed developing hybrid prevention programs that include adaptation from the beginning, while also working to maximize fidelity of the intervention.[4]

- SAMHSA recommends that all programs conduct the following steps when considering adaptation:
  1. Identify and understand the theory of the program
  2. Obtain or conduct a core components analysis of the program
  3. Assess fidelity adaptation concerns for the particular implementation site
  4. Consult with the program developer, as needed
  5. Consult with the organization/community where the intervention will be implemented
  6. Develop an overall implementation plan based on steps 1 through 5[5]

- To ensure adapted programs or policies are implemented with their core elements upheld, those doing the adaptation need to collect rigorous data to assess the intervention for fidelity to the program. When programs are not able to maintain fidelity to the established practice, a rigorous evaluation of the adapted intervention provides evidence for the field on the impact of the intervention for reducing vaping among youth and young adults.

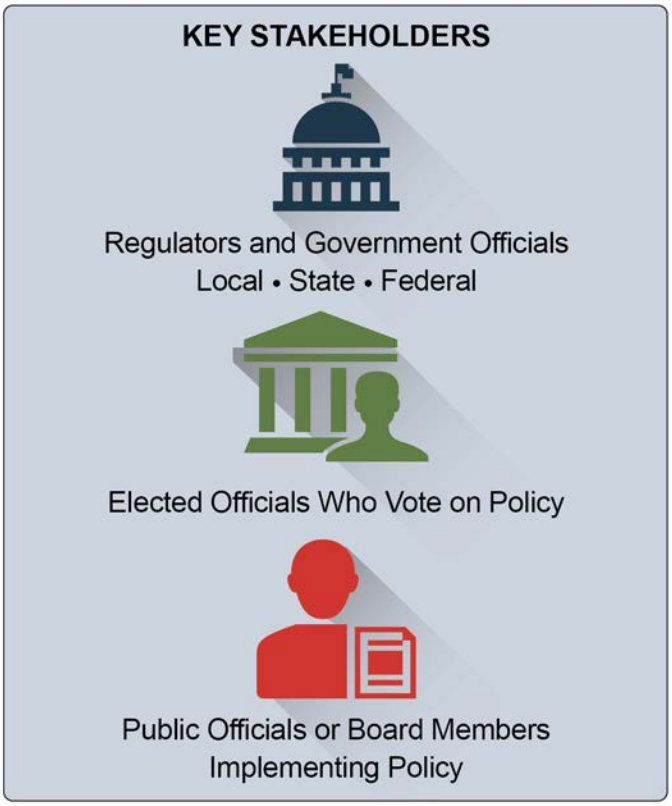
Staff Training

Challenge

- It is vital that properly trained staff be available for successful program implementation and to build program capacity. However, this may be difficult to achieve due to staff turnover and limited time for existing staff to become familiar with the program.

Strategy

- When preparing to implement an intervention, organizations and communities must ensure that staff have access to ongoing support and training on the program itself, as well as their setting's broader vaping context. Program assessment should be ongoing to determine if staff need additional training to support successful implementation.



Key Considerations for Implementing Policies to Address Vaping

Policy implementation entails different considerations than program implementation. Getting a policy enacted and passed takes political will, persistence, and knowledge of the policy process. Key stakeholders include the local, state, or federal agencies who will be responsible for regulating and reporting requirements, the elected officials who will vote on the policy, and any public officials or state/local board members who will implement the new policy.

Additionally, when developing a policy, it is essential to empower the community to provide leadership and help drive policy change. It is critical to engage a host of partners such as public health and policy/legislative experts, parents, youth and young adults, These individuals can help craft not only the policy language, but also determine the best communications and media strategy to promote political will and raise public awareness.

When working with a government to implement a policy, whether it is city, county, state, or federal, there are three important activities to keep in mind:

1. **Public Awareness**: Any rule change will require educating the public and/or the specific organizations that will be affected. For example, if a city changes the legal age of purchase, city officials must inform the broader public about this change, as well as any current vaping-related retailers. In 2016, Chicago changed the legal age of purchase from 18 to 21 for all tobacco products. The city created new signage for all retailers, as well as put together a package of information for tobacco retailers on the new laws.[6]
2. **Regulations**: If a new policy impacts existing structures or systems, new procedures will need to be established. In the example of changing zoning laws, stakeholders will need to make decisions on how licenses will be tracked and how often new licenses will be provided to those who apply for them. Minnesota has put together a guide on the different approaches to regulating the location and types of tobacco outlets. This guide notes the different systems that may be involved in regulating the number of tobacco and vaping outlets, including retailers, health departments, local government, licensing boards, and more.[7]
3. **Enforcement**: Nearly all policies require some level of monitoring or enforcement. Cities that change their zoning laws will need to ensure that retailers are not selling vaping devices or related products without the correct license and will need to maintain consistent enforcement. San Marcos, CA, passed an ordinance to use the fines from retailers selling nicotine vaping products to minors to pay for the enforcement of nicotine vaping prevention activities. This may be a strategy others can use to ensure that policies are enforced.[9]

In addition to these common factors, there are a number of challenges that must be considered when implementing policies to prevent vaping among youth and young adults. Some of these challenges, and strategies to address them, are discussed below.

State or Federal Preemption

Challenge

- Many cities and counties are preempted from passing tobacco control policies that are stronger than either the state or federal policy equivalent. As of December 31, 2019, 23 states have laws that preempt local jurisdictions from passing certain policies, regulations, or ordinances related to tobacco control.[10]

Strategies

- There are a number of legal experts on tobacco policy who can help any jurisdiction better understand potential preemption issues and existing nuances or gray areas in the law, as well as encourage lawmakers to enact policy to protect from preemption. The ability for jurisdictions to pass more restrictive policies that are responsive to their local needs is critical, and numerous respected bodies, including CDC, Healthy People 2020, the National Association of County and City Health Officials (NACCHO), and the U.S. Surgeon General, have called for the elimination of state laws that preempt stronger local tobacco control laws.
- Resources from the Public Health Law Center and CDC-funded ChangeLab Solutions may be helpful in better understanding preemption and providing access to experts in this area.

Organizations receiving federal funds are not able to lobby federal, state, or local officials. This includes:

- Spending federal funds to influence any employee of an agency or Congressional office
- Influencing an election or contributing to a partisan organization
- Influencing development, enactment, or enforcement of federal/state/local legislation[8]

Evolving Community Needs

Challenge

- The vaping landscape is continually evolving, and the most appropriate program or policy for the community may change over time.

Strategy

- Regularly collecting and analyzing data on youth and young adult vaping behavior in the community will help determine what products are being used, where youth and young adults are obtaining their devices and liquids, and if certain subgroups are vaping at higher rates than others. Community stakeholders engaged in the community's prevention efforts, including parents and youth, may also provide first-hand information about vaping patterns and behaviors

within the community. Regularly assessing these data will ensure that the community is implementing the best possible intervention for the specific needs of the community.

Vaping Product Diversity

Challenge

- There is a wide variety of different liquid solutions in vaping, and different active drug substances, including cannabis. Policies that are focused on nicotine only, as many e-cigarette or tobacco policies are, may exclude flavored extracts, cannabis, or other substances, and, therefore, may neglect to prevent vaping for a significant portion of a community's youth and young adults.

Strategies

- Communities can work with public health and legal experts to determine if the policies being considered should explicitly include cannabis in addition to nicotine or tobacco, or be worded more broadly in anticipation of the continued diversity in formulations.
- Policy interventions specific to cannabis may be particularly relevant in states where cannabis is legal, as recreational cannabis use is illegal for all youth and young adults aged 21 or below.

Policy Impact on Current Smoking Rates

Challenge

- Although there is limited research on the impact of vaping policies on other tobacco product use, including cigarettes, there are a few studies suggesting that vaping restrictions may result in people who vape switching to smoke combustible cigarettes or other tobacco products.[11] This is relevant when considering policies to prevent or reduce vaping, avoid unintended consequences of vaping, and implement a broader, comprehensive vaping control effort across individual, school, and community levels.

Strategy

- Prevention of vaping should not occur in isolation. Policies to prevent vaping must be enacted in the context of broader tobacco control and health promotion frameworks. Policy-makers, health department officials, and those working in the substance use prevention field should be sure that comprehensive efforts are being implemented to minimize substance substitution or switching from one risky behavior to another.

Understanding Vaping Research

Challenge

- Those implementing interventions to prevent vaping among youth and young adults may encounter opposition from stakeholders who support vaping as a preferred alternative to smoking traditional cigarettes. These misguided ideas about vaping are often based on false information on the harms of vaping use by youth, largely driven by the pro-vaping or pro-tobacco industry.

Strategy

- The harms of vaping by youth and young adults are indisputable. Implementers, educators, parents, and other community leaders working on this issue should review and disseminate the latest science on government websites, such as the Substance Abuse and Mental Health Services, National Institutes of Health, Centers for Disease Control and Prevention, and the Food and Drug Administration. These agencies conduct and disseminate the latest research on vaping, which shows that nicotine,[12] cannabis,[13-14] and flavors[15] used in vaping devices are harmful for attention, learning, and memory in adolescents, and that youth who vape are more likely to initiate use of cigarettes and other combustible products and may be more disposed to long-term addiction.[16-17] These facts should be shared with policy-makers and other stakeholders to educate them about the research and evidence on this issue.

Industry Influence

Challenge

- Interventions intended to reduce or prevent vaping may be met with resistance from the vaping industry and local vape shops.[18] The tobacco and vaping industries spend billions of dollars each year to sell and lobby for their products. By 2022, it is expected that the global vaping market will be worth over $29 billion.[19] These industries work with vaping advocacy movements that promote the use of vaping devices as an alternative to combustible products (e.g., cigarettes, little cigars, cigars) in the media and at policy levels.

Strategy

- A majority of Americans who agree that vaping devices specifically attract teens support policies designed to reduce youth vaping such as restrictions on flavored e-cigarettes.[20] An important aspect for community leaders, parents, and other stakeholders promoting these policies is to prepare strategies and evidence-based messages that both anticipate and respond to the vaping industry. In addition, different messages can be used to reach unique segments of the population and should be directed to stakeholders' interests and concerns.

Implementation Guides and Manuals

In addition to the implementation strategies provided above, there are a number of manuals developed specifically to help stakeholders implement the programs and policies described in Chapter 2. Overarching guidance is also included below, as many of the recommendations and suggestions are similar across all programs and policies.

Individual-Level Interventions

- *smokeSCREEN*
  - Educator's manual and tutorial video for teachers.
- *This is Quitting*
  - Resources and research for targeted communities (such as low income, racial and ethnic minorities, LGBTQ individuals, women, and youth) who face a disproportionate burden from tobacco.

Though this is not specific to *This is Quitting*, it applies to numerous tobacco prevention and cessation programs.

- *This is Quitting* allows teens and young adults (ages 13-24) to enroll in a text message program that provides tailored advice to combat cravings, make a quit plan, build confidence, and get support. Users may enroll through an online form or by texting DITCH JUUL to 88709.

Community-Level Interventions

- *CATCH My Breath*
  - Resources available in Spanish.
  - Implementation guides for early childhood centers, after school programs, elementary school, middle school, summer and day camp programs, city/county/state health departments, hospitals, and community organizations.
  - *CATCH My Breath* Ambassadors increase awareness about e-cigarettes through personal and community advocacy.
  - Webinars for community members, parents, and practitioners.
  - Service learning projects that empower students to have a significant impact on curbing the vaping epidemic and offer college scholarships to participants.
- *Media Campaigns*
  - Resources for Spanish speakers for The Real Cost campaign.
  - The Truth Initiative's Tobacco / Vape-Free College Program which supports action on the ground by youth and young adults.
  - The Center for Tobacco Product Exchange Lab offers digital and print content to help state and local officials, nonprofits, and schools support media campaigns.
  - The Center for Tobacco Products Exchange Lab's Strategic Outreach Team will answer questions about available resources at the email address, CTPPOutreach@fda.hhs.gov.
- *Tools to Support Program Implementation*
  - Community Anti-Drug Coalitions of America (CADCA) Implementation primer provides comprehensive strategies to achieve population-level reduction of substance use.

Population-level Interventions

- *Price Policies*
  - Tobacco Control Guide on Pricing Policy developed by the Tobacco Control Legal Consortium to assist states and local tobacco control staff in building comprehensive tobacco control programs and policies.
  - Guidelines for implementation of Article 6 of the World Health Organization's Framework Convention on Tobacco Control (WHO FCTC) provides price and tax measures to reduce the demand for tobacco.
- *Zoning/Licensing Policies*
  - Tobacco Retailer Density, a guide from ChangeLab Solutions on implementing place-based strategies.
  - A comprehensive guide on tobacco retail licensing from the Public Health and Tobacco Policy Center, which includes a detailed discussion of implementation, funding, and enforcement.
- *Tools to Support Policy Interventions*
  - Information on policy communication and the legislative process developed by CADCA.
  - Resources developed by the National Conference of State Legislatures that outline state legislative processes and the e-cigarette policies in effect in different states.
  - CADCA's Coalitions in Action - Healthy Lamoille Valley Youth Talks about Vaping in His Community and How He Used Capitol Hill Day to Advocate for Change.
  - Campaign for Tobacco Free Kids has developed guides for Media and Policy campaigns. These toolkits can be utilized by state or local governments.
  - The Policy Strategies, a Tobacco Control Guide, developed by the Center for Public Health Systems Science, provides assistance to state and local tobacco control staff to build effective and sustainable comprehensive tobacco control programs.

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CHAPTER

4

Examples of Effective* Vaping Prevention and Reduction Interventions

This chapter highlights efforts made in three distinct settings to reduce vaping among youth and young adults. These case examples demonstrate how programs and policies can be implemented in a range of settings at the individual, school, and community levels. Each case example features one or more of the following programs and policies described in Chapter 2:

- *CATCH My Breath*
- *smokeSCREEN*
- *This is Quitting*
- Media campaigns
- Price policies
- Licensing and zoning policies

The programs and policies highlighted in each case example should not be considered in isolation. This chapter documents the ways states and communities have implemented these programs and policies as part of a comprehensive prevention strategy.

Specific information about the programs and policies featured in this chapter was identified in consultation with experts and through an environmental scan, including a review of published journal articles, state policies and regulations, state and federal government

* Since vaping is relatively new, included examples may not have been evaluated for effectiveness.

resources and publications, and nonprofit/programmatic resources and publications. While there are other case studies that could have been featured in this chapter, those highlighted have been included to provide diverse examples of youth and young adult vaping prevention. To be included in this chapter, the examples had to meet the following criteria:

- Include the implementation of one or more of the programs or policies identified in Chapter 2
- Have well-defined outcomes associated with the program or policy, or be considered an emerging approach
- Be implemented as part of a comprehensive prevention strategy

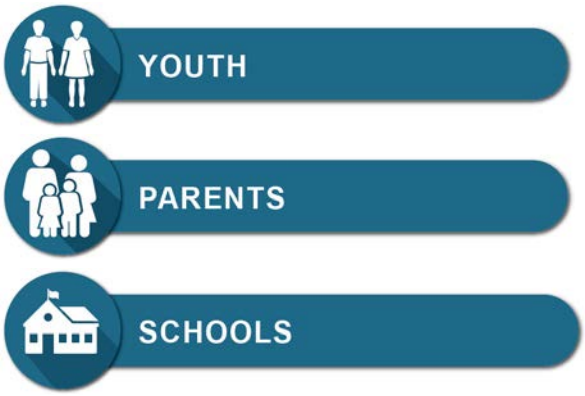
The setting in which the featured interventions were implemented, challenges and limitations of the interventions and implementations, outcomes, and lessons learned are provided for each case example.

Overview of States and Interventions Featured

The vaping prevention programs and policies featured in these case examples build on, or are expansions of, long-standing tobacco control efforts. These case examples are each part of a multi-pronged, comprehensive vaping control strategy that includes programs and policies across the levels and interventions described in Chapter 2.

smokeSCREEN

Experiences of Connecticut Youth



Given the wide access to interactive devices and integration of these technologies into everyday activities, programs utilizing such formats are particularly engaging for delivering health interventions to youth and young adults. One such health intervention aimed at curbing youth and young adult nicotine vaping, *smokeSCREEN*, has been used in Connecticut, where vaping rates among youth and young adults have risen at alarming rates in recent years.[1]

In Connecticut, over 27 percent of high school students have tried nicotine vaping compared to only 15 percent who have tried traditional cigarettes, and almost 15 percent of high school students vape regularly.[2] This makes vaping the most common form of tobacco used among Connecticut's youth and young adults.[3] These observed increases prompted several schools and youth programs in the state to implement individual-level vaping interventions like *smokeSCREEN* in conjunction with ongoing state-wide initiatives and policies.[4]

Program Implementation

smokeSCREEN is an individual-level intervention administered on technological devices that can be played wherever there is internet access and with minimal oversight. Given the minimal materials needed and ease of access to digital technologies, approximately 28 afterschool programs in Connecticut have implemented *smokeSCREEN*. Connecticut schools have also implemented *smokeSCREEN* in health and physical education classes, as part of lessons to increase the program's reach, and in distance learning health programs for faculty and staff.[5]

Program Implemented *smokeSCREEN*

Approach

Individual-level health promotion

Setting

Youth programs (e.g., schools, youth groups, afterschool programs)

Program Characteristics

Repeated skill building opportunities and topic engagement through a videogame format.

Interactive learning that integrates entertainment with education and behavior change.

Intrapersonal factors and potential consequences related to nicotine vaping through targeted storylines.

Program Duration

The game contains 7 levels that can be completed in 3 hours and played in increments if time is limited.

Related Resources

smokeSCREEN Game:
https://www.*smokeSCREEN*game.org/

Yale Center for Health & Learning Games play2Prevent Lab:
https://www.play2prevent.org/

Findings and Outcomes

smokeSCREEN is a relatively new intervention, and at the time of publication, research is continuing to emerge. Outcomes specific to individual programs that have implemented *smokeSCREEN* in Connecticut are not currently available. However, existing studies that have been conducted with students in several states, including Connecticut, have found that even brief exposure to *smokeSCREEN*, as few as four hours over four weeks, has an effect on critical aspects of preventing tobacco use, particularly the use of vaping devices, among youth.[6-7]

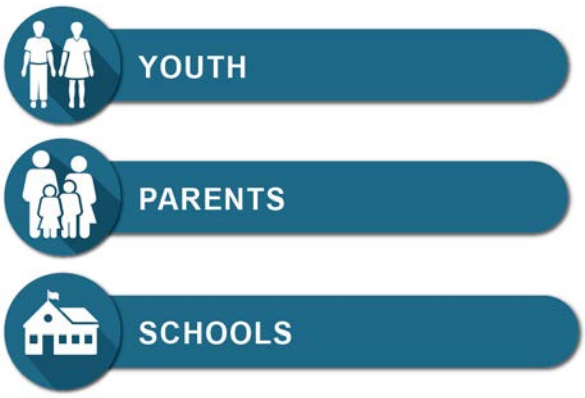
Lessons Learned

Costs & Funding Sources: Although *smokeSCREEN* is currently offered for free, program leadership should determine any future potential costs of implementing the program and identify available funding through partnerships with departments of public health, community-based health centers, physician offices, and other health and human service agencies should the funding status change.

Planning and Research: When planning to implement *smokeSCREEN*, program leaders should review existing products and resources for *smokeSCREEN* to determine how the program can be delivered in a flexible manner. Studies of *smokeSCREEN* only evaluated the videogame; no additional educator or school involvement was assessed. However, an NIH-funded study interviewed educators using the videogame, and those results are forthcoming.

CATCH My Breath

Experiences in Wareham Middle School, Wareham, Massachusetts



Schools have long been a primary setting for implementing health-based prevention programs. In Massachusetts, school-based prevention programs have been part of a community-wide prevention approach, including education about the risks of certain behaviors, how to make good decisions, and resources for parents.

Massachusetts has traditionally had progressive tobacco control laws, with many local communities enacting regulations restricting the availability of tobacco products, particularly for minors. As a result, tobacco use rates in Massachusetts are typically lower than the national average;[8] however, as in other states, the growing popularity of vaping among youth and young adults has concerned state and local leaders. In 2018, just over 20 percent of high school students reported current vaping, and 41 percent of high school students reported ever having used vaping products. In Massachusetts, the rate of vaping is almost six times higher among youth and young adults than adults.[9]

Program Implementation

Massachusetts schools (elementary, middle, and high schools) have implemented a variety of different programming efforts to help address vaping among youth and young adults, including *CATCH My Breath*, *smokeSCREEN*, and The Real Cost of Vaping.[9]

Among the Massachusetts schools implementing youth and young adult vaping prevention programs, Wareham Middle School has gained national attention as a result of their successful application of *CATCH My Breath*, which is administered in four lessons throughout the year in all 7th grade health classes in the school starting during the 2017-2018 school year.[10] All of the *CATCH My Breath* lesson plans are available online and are updated regularly in response to current vaping trends.[11]

To support school programming efforts, like the *CATCH My Breath* initiative in Wareham, Massachusetts has developed a website and toolkit containing information and resources about nicotine vaping for both parents and school staff, including administrators, health educators, teachers, and school health service workers.[9] Massachusetts has developed public information campaigns to educate parents, youth, and young adults about the dangers of vaping to supplement school programming.[9]

Findings and Outcomes

While the overall impact and effectiveness of educational programs and campaigns aimed at vaping in Massachusetts are not yet known, results are available

Program Implemented
CATCH My Breath

Approach

Targeted school-level programming efforts

Setting

Middle and high schools

Program Characteristics

- Increases students' knowledge about nicotine vaping and its associated harms among youth, as well as parents, educators, and other school participants.
- Empowers youth to make informed decisions about nicotine vaping and their health.
- Engages students in peer leadership programming and encourages healthy behaviors.
- Targets certain beliefs and knowledge of students in particular schools or school districts.

Three versions are available: 5th and 6th grade, 7th and 8th grade, and 9th to 12th grade

Program Duration

Four 30-40 minute lessons

Related Resources

CATCH My Breath: https://catchinfo.org/modules/e-cigarettes/

for Wareham Middle School's *CATCH My Breath* program. Many students in Wareham have shared their individual experiences in stopping or rejecting nicotine vaping as a result of the program.[10]

Similarly, since being implemented in Wareham, 87 percent of all Wareham students who received the *CATCH My Breath* curriculum said that the program increased their overall knowledge of nicotine vaping. In addition, 80 percent said they felt confident refusing to vape if offered based on the skills acquired through the program, and the percentage of students who recognized that the vapor produced is not harmless increased from 69 percent to 85 percent.[10]

Lessons Learned

Leadership: Previous research on the *CATCH My Breath* program has highlighted the importance of supportive school administrators. In Massachusetts, health class is not a requirement in middle school and it is up to the district to decide if it will be offered. In Wareham, school administrators decided to continue offering health class to middle school students despite recent budget cuts, allowing the district to continue to offer them *CATCH My Breath*.[11] Program advocates must generate supportive involvement of school leadership to facilitate implementation and continued availability of health programming that supports vaping prevention and education.

Collaboration: When planning and implementing *CATCH My Breath*, it is important to collaborate with key stakeholders to help ensure program acceptance. In particular, *CATCH My Breath* program leaders at Wareham Middle School have emphasized the importance of family and community engagement and collaborating with students in implementing and delivering the program curriculum.[12]

Staffing: Research on the *CATCH My Breath* program has found that its success relies on effectively trained staff to implement the program. It is also crucial to identify and train program staff with the ability to liaise with school decision makers, answer questions, represent the program at public events, and conduct trainings. *CATCH My Breath* program leaders at Wareham Middle School found the most effective way to deliver the curriculum was to have a single individual responsible for managing the class content and teaching all students.[12]

Price and Density Policy Implementation

Experiences in California Communities

As part of their tobacco control prevention efforts, California has enacted many policies restricting access to tobacco products, including age restrictions and bans on flavored products. Tobacco use within California has been greatly reduced since the California Tobacco Control Program was initiated in 1989.[13] Since its inception, the program has worked throughout the state and local communities to reduce the availability of tobacco through progressive, state-wide tobacco control policies.[13-15] As a result of these efforts, the prevalence of smoking among adolescents in California has declined to historic lows, even with the introduction of vaping.

In 2018, 11 percent of California high school students reported vaping at least once in the past month, and almost a third had tried vaping at least once.[16] To reduce the incidence of vaping, many local communities have followed the state's lead and developed their own, more restrictive policies to further limit access to vaping and tobacco products. For example, in 2014, the City of San Francisco passed a policy that limited the number of tobacco retailers to 45 per district, or 495 total.[17]

Policy Implementation

Vaping devices and products are taxed differently under California law – when the device or product contains nicotine or is sold in combination with nicotine, these products are taxed as "tobacco products," and an additional tax, as well as the standard state sales tax, is imposed upon distributors. However, when nicotine or tobacco is not part of the product or sold in combination with the product, these items are only subject to the standard sales tax, which are imposed at the retail level.[18] In 2016, the state passed a law that the vaping products considered "tobacco products" were to be taxed at the same level as cigarettes.

Policies Implemented
Price and Density Policies

Approach

- State- and community-level policy development
- Various community-level programming efforts

Setting

Local communities and jurisdictions (e.g., San Francisco, Richmond)

Policy Characteristics

- Reduces the acceptability of tobacco use via media campaigns, school-based programming, and programs implemented by local health departments.
- Evaluates policy interventions implemented locally before wide-scale adoption.

Program Duration

Indefinite

Related Resources

City and County of San Francisco:
https://sf.gov/

City of Richmond:
https://www.ci.richmond.ca.us/

City of Los Angeles:
https://www.lacity.org/

The FY20-21 budget includes a proposal to impose an additional tax at a rate of $2 per each 40 milligrams of nicotine in the vaping product; at the time of publication, the budget had not yet been passed.[19]

To date, no statewide regulations which completely ban or severely restrict the purchase of vaping products have been passed in California. However, local communities, cities, and counties have enacted sweeping ordinances restricting access to vaping products and devices in their communities. The cities of San Francisco, Richmond, and Livermore have banned the sale of all vaping products and devices, while Los Angeles County has banned the sale of all flavored tobacco products, including those used for flavor vaping and chewing

tobacco.[20] As of late 2019, nearly 60 communities in California had passed ordinances restricting or prohibiting the sale of flavored vaping products, or were considering doing so.[21-22]

Findings and Outcomes

Because these community-level interventions have been implemented only recently, there are no data available yet on the impact of these policies on vaping among youth and young adults within individual communities in California.

Lessons Learned

Collaboration: San Francisco's experiences building relationships with stakeholders has demonstrated the importance of collaborations with key stakeholders as a strategy in developing effective tobacco control policy. Stakeholders included local officials, grocers, youth, and public health organizations.

Political Support: San Francisco has used frameworks, such as the Community Action Model, to build political support for tobacco control policies.[17] This model allows policy and decision makers to hear about community priorities and concerns and build trust and relationships across stakeholders.

Informational Opportunities: Support for new policies requires that information is shared with vaping retailers, as well as the general public, about impending and recently enacted policy changes, legislation, enforcement, and penalties. When San Francisco enacted new tobacco retail density policies in 2016, many retailers were not aware of these changes. To address this, the city conducted educational outreach and education campaigns to both retailers and the public.

Enhanced Enforcement Activities: To ensure that the policy has been adopted and is working as intended, San Francisco coalitions worked with law enforcement and community leaders to enhance enforcement activities related to point of sale interventions.

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CHAPTER

5

Resources for Evaluation and Quality Improvement

The primary purposes of evaluation in public health education and promotion are to:[1]

- Determine the effectiveness of a given intervention
- Assess and improve the quality of the intervention.

Program and policy evaluation answers critical questions about whether an intervention is producing the intended outcomes, and why or why not. Evaluation also can show how a program or policy benefits individuals and be helpful in securing additional funding by providing evidence of program effectiveness. In addition, information gathered through evaluation can be used to encourage dissemination of the intervention to other communities.

This chapter provides an overview of approaches to evaluate implementation and results of interventions to prevent vaping among youth and young adults. The chapter also includes information on implementing a continuous quality improvement (CQI) process, which allows for rapid evaluation to improve interventions quickly based on the results. Finally, it includes specific evaluation resources, including potential outcomes that might be tracked.

Types of Evaluations and Study Designs

Evaluation is best planned and initiated before a program or policy is implemented to determine its feasibility (formative evaluation), during implementation (process evaluation), and after the intervention has been delivered (short-term outcome and long-term impact evaluations). All four types of evaluations are useful to make judgments about an intervention's effectiveness in preventing vaping among youth and young adults.

Although it is often omitted when planning and implementing an intervention, evaluation is an integral part of the implementation process and should be considered from the start.

Formative evaluations assess the readiness of an organization or community to implement the intervention, articulate a theory of change, and determine the extent to which an intervention can be evaluated in a reliable and credible fashion.

Process (implementation) evaluations collect data about an intervention's implementation. They enable program managers and policy makers to assess whether an intervention was implemented as planned, such as reaching the intended audience.

Outcome evaluations collect baseline data and data at the end of the intervention to compare changes on the target behaviors over time. These data should be collected from program participants or community members on outcomes of interest. Outcome data provide program managers and policy makers with information to assess changes or improvements in attitudes and behaviors that can be associated with the intervention.

Impact evaluations assess an intervention's effectiveness in achieving its ultimate goals. Impact evaluations determine the extent to which changes in outcomes can be attributed to the newly implemented intervention.

CONTINUOUS QUALITY IMPROVEMENT (CQI)

What is CQI?

CQI involves a systematic process of assessing program or practice implementation and short-term outcomes and then involving program staff in identifying and implementing improvements in service delivery and organizational systems to achieve better treatment outcomes. CQI helps assess fidelity, the degree to which a program delivers a practice as intended.

CQI differs from process evaluation in that it involves quick assessments of program performance, timely identification of problems and potential solutions, and implementation of small improvements to enhance treatment quality. CQI is usually conducted by internal staff. Process evaluation involves longer-term assessments and is best conducted by an external evaluator.

The **Network for Improvement of Addiction Treatment (NIATx)**, a project originally funded by SAMHSA's Center for Substance Abuse Treatment (CSAT), offers tools to conduct CQI and improve services in substance use disorder treatment settings. NIATx is based on the foundational principle of aiming to accomplish program improvement through not one big change, but through a series of smaller changes, tested and implemented one at a time, that in the end have a cumulative effect.

Why use CQI?

CQI takes a broader look at the systems in which programs or practices operate. Because of the pivotal role it plays in performance management, organizations implementing new clinical practices or programs for preventing vaping among youth and young adults are encouraged to implement CQI procedures.

What are the steps involved in CQI?

Although steps in the CQI process may vary based on objectives, typical CQI steps are:

- Identify a program or practice issue needing improvement and a target improvement goal
- Analyze the issue and its root causes
- Develop an action plan to correct the root causes of the problem, including specific actions to be taken
- Implement the actions in the action plan
- Review the results to confirm that the issue and its root causes have been addressed and short-term and long-term treatment outcomes have improved
- Repeat these steps to identify and address other issues as they arise

https://www.nj.gov/dcf/about/divisions/opma/CQI%20framework.pdf

https://www.hhs.gov/ash/oah/sites/default/files/cqi-intro.pdf

https://www.niatx.net/what-is-niatx/

Outcomes

An important but often challenging step in the process of implementing programs and policies is determining whether they have yielded desired outcomes. An **outcome** is the change an intervention is intended to accomplish through the implementation of a program or policy. Below is a list of potential outcomes, illustrative outcome indicators, and data sources that may be used to evaluate interventions to prevent vaping among youth and young adults.

Regardless of which evaluation design is best for an intervention, it may take time to realize some of the intended outcomes. **Short-term effects** of a program or policy may be seen quickly, such as changes in knowledge, beliefs, or perceptions, while long-term outcomes may take much longer.

Long-term outcomes include change in behavior, including reductions in initiation and prevalence of vaping. Additionally, the nature of the vaping problem may change over time as programs and policies are implemented, or as new vaping products are added to the market. Collecting data on the patterns of vaping, including what is being vaped and by whom, will help communities conduct their regular needs assessments, as described in Chapter 3.

In addition to the National Institutes of Health's (NIH) core measures toolkit, CDC has compiled a list of outcomes and illustrative indicators that may be used when evaluating programs designed to prevent tobacco initiation. These outcomes and indicators may also be used or adapted to evaluate interventions to prevent vaping.

NIH has established a set of core measures to be used by tobacco researchers. These include variables such as 30-day quantity and frequency of tobacco use, age of initiation, and sociodemographic characteristics. The toolkit includes the source for each of the relevant measures and the description and instructions on how to use the measures. These measures, and their data sources, should be reviewed by any community looking for potential sources of data or measures to use in their evaluation. Find more at: https://www.phenxtoolkit.org/

Given the recent emergence of vaping, there are several key data elements communities need to collect to understand vaping reduction efforts. Stakeholders working to prevent vaping should also:[2]

- Collect data on existing policies at the national, state, local, tribal, and territorial levels
- Examine how vaping products are marketed in their community to understand the potential impact of future regulation
- Track patterns of vaping in populations at high risk, such as racial/ethnic, gender identity, and sexual orientation minorities

Outcome	Illustrative Indicators	Illustrative Data Sources
Short-term outcomes		
Knowledge of the dangers of vaping use, strengthened social norms	Level of perceived harm of vaping products among youth and young adults	National Youth Tobacco Survey
Perceived social norms on vaping behaviors	Proportion of youth and young adults who overestimate the smoking rate among their peers	National Youth Tobacco Survey
Policy and enforcement efforts to reduce vaping industry influence	Proportion of jurisdictions with public policies that establish a fee on each tobacco product sold	State or local policy tracking systems
	Proportion of jurisdictions with comprehensive policies that require retail licenses to sell	
Susceptibility to experimentation with vaping products	Proportion of youth and young adults who have never vaped but are susceptible to its use	National Youth Tobacco Survey
Price of vaping products	Amount of vaping product taxes and fees	CDC State Tobacco Activities Tracking and Evaluation System Data
Exposure to vaping marketing and availability of tobacco products	Density of stores selling vaping products	Government bodies/organizations licensing tobacco retailers
Long-term individual- and population-level outcomes and impacts		
Initiation of vaping use	Proportion of youth and young adults who report never having tried a vaping product	CDC Youth Risk Behavior Surveillance System
Vaping use prevalence	Prevalence of vaping among youth and young adults	National Youth Tobacco Survey
Sales of vaping devices and related products	Fewer sales reported in a community	Tax data, retail establishments

Several publicly available datasets that include measures on vaping are detailed below. Communities looking for more localized data should look to see what surveillance measures their county and state public health departments are already collecting at the county or census tract levels. Communities should additionally consider whether there is an appropriate community they can compare their data against. Depending on the data available, this may be a similar city or county, or may be comparing community data to state averages.

Sources of National Data on Tobacco Use Among Youth and Young Adults						
	National Survey on Drug Use and Health (NSDUH)[3]	**Monitoring the Future (MTF)[4]**	**Youth Risk Behavior Surveillance Survey (YRBSS)[5]**	**National Youth Tobacco Survey (NYTS)[6]**	**Population Assessment of Tobacco and Health (PATH)[7]**	**Tobacco Use Supplement to the Current Population Survey (TUS-CPS)[8]**
Sponsoring Agency or Organization	Substance Abuse and Mental Health Services Administration	National Institute on Drug Abuse; administered by the University of Michigan's Institute for Social Research	Centers for Disease Control and Prevention	Centers for Disease Control and Prevention	Food and Drug Administration; National Institutes of Health	National Cancer Institute
Type of Survey	Cross-sectional	Cross-sectional and Longitudinal	Cross-sectional	Cross-sectional	Longitudinal	Longitudinal
Mode of Survey Administration	Audio, computer-assisted self-interview	School-based, self-administered questionnaire	School-based, self-administered questionnaire	School-based, self-administered questionnaire	Home-based interview	Home-based and telephone interviews
Ages/Grades	≥12 years	8th and 10th grades (since 1991) and 12th grade (since 1975); college students; young adults	9th–12th grades	6th–12th grades	≥12 years	≥15 years
Vaping Substances Examined	Vaping data available in 2019 survey	Tobacco, Flavoring, Cannabis	Does not specify vaping substance	Tobacco, Flavoring, Cannabis	Nicotine, Flavoring, Cannabis	Tobacco, Flavoring
Level of Data Available	National, state, sub-state regions	National, regional	National, state, district	National	National, state, census region	National, state, large metropolitan statistical areas

Outcome measures for programs and policies designed to prevent youth from vaping cannabis can follow a similar structure as those included in the table above. Short-term outcomes can be measured by attitudes and beliefs around cannabis vaping, intermediate outcomes by susceptibility and exposure to cannabis vaping, and long-term outcomes by the proportion of youth and young adults who have never vaped cannabis and the overall prevalence of youth vaping cannabis.

Data sources that measure the prevalence of cannabis vaping include the National Youth Tobacco Survey, Population Assessment of Tobacco and Health (PATH) Study, and the Monitoring the Future Survey.

Qualitative Data: Throughout an evaluation, it is important to engage those implementing the program or policy and those affected by it. Hearing the voices of the key stakeholders through qualitative data collection, such as interviews or focus groups, provides necessary context and allows evaluators to gain a deeper understanding of the story behind the quantitative data collected as part of the evaluation.

Qualitative data may be collected from youth who vape to better understand attitudes and perceptions of vaping, such as why they vape, and after an intervention has been implemented to learn their perspectives on what did and did not work. Interviews can be conducted with those who implemented the intervention to understand what went well and what may need to be changed for future versions. If survey data show that an increase in tax policy is affecting one demographic group differently than others, focus groups may help stakeholders understand why these differences may be occurring.

Qualitative data collection efforts should be considered at the beginning of any evaluation and reconsidered again at the end to help provide context for some of the study findings.[9]

Once an evaluation has been completed, corrections should be made, as needed, to improve the intervention and initiatives to prevent harmful vaping behavior. Results should also be shared with stakeholders and the broader community. Disseminating the findings will contribute to the growing body of evidence on effective strategies to prevent vaping among youth and young adults, allowing other organizations and communities to benefit from knowledge gained during the evaluation.

Evaluation Resources

Programs (*CATCH My Breath, smokeSCREEN, This is Quitting, Real Cost Campaign*)

- Evaluation tools for *CATCH My Breath* are available to those who sign up for the program.

Overarching Program Evaluation Guidance

- A Framework for Program Evaluation, developed by the Performance and Evaluation Office (PPEO) at CDC, summarizes essential elements of program evaluation and the website includes key points, a video, and a summary of the framework.
- Examples of evaluation measures developed by the Rural Health Information Hub, which include process measures and outcome measures meant to keep the project team working towards the same goal.
- Introduction to Program Evaluation for Public Health Programs is a self-study guide from CDC that includes worksheets and checklists for implementing the steps in CDC's Framework for Program Evaluation in Public Health.

Overarching Policy Evaluation Guidance

- Methods for Evaluating Tobacco Control Policies developed by the International Agency for Research on Cancer of the World Health Organization in 2008 are designed to be used at a population level, particularly at a national level, but can be applied to sub-national and local levels.
- A guide on the Introduction to Process Evaluation developed by CDC that focuses on Tobacco Use Prevention and Control, defines process evaluation, and describes the rationale, benefits, key data collection components, and program evaluation management procedures.
- CADCA's Evaluation Primer: Setting the Context for a Community Anti-Drug Coalition Evaluation which specifically addresses coalition evaluation.
- An Evaluation Toolkit for Smoke Free Policies provided by CDC that is designed to help community tobacco control programs and coalitions assess the impact of local smoke-free laws.
- National Institute of Health's webpage on evaluation provides information on using qualitative research methods.

Quality Improvement and Continuous Performance Monitoring

- Roadmap to a Culture of Quality Improvement is a guide to the quality improvement process for local health departments developed by the National Association of County & City Health Officials (NACCHO).
- The National Network of Public Health Institutes developed a webinar on CQI: Building a Performance Management System to Strengthen Quality Improvement, with speakers from the Macomb County Health Department.

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