TACKLING TOBACCO PRODUCT WASTE

Options for New York State

Tobacco product waste refers to any component, part, or remnant of a commercial tobacco product, including e-cigarettes.[1]

This includes waste produced from the use of a tobacco product, such as cigarette butts, cigar tips and wrappers, e-cigarette cartridges, and any packaging and incidental waste such as lighters or matches – regardless of whether it contains tobacco or nicotine. Tobacco product waste is often considered hazardous waste due to the presence of dangerous substances, such as nicotine, toxic metals, chemicals, and lithium-ion batteries in e-cigarettes. This resource describes the problem of tobacco product waste in New York State and presents several possible policy solutions to address the problem.

Overview of Problem

Tobacco product waste is severely destructive to the environment. Cigarette butts are the most littered item on the planet, with approximately

4.5 trillion cigarette butts weighing 850,000 tons[2] littered each year – roughly thirty times the weight of the Statue of Liberty. Out of 5.7 trillion cigarettes purchased each year, 65 percent are intentionally littered.[3] This toxic trash inevitably ends up in waterways, comprising 30 percent of the waste collected from all coasts over the last three decades,[4] and 19 percent of all marine debris that is collected.[5]

Approximately 15 billion cigarettes are sold daily throughout the world.[6] In New York State alone, 1.8 million adults still smoke cigarettes, meaning millions of cigarettes are smoked and discarded in the state each year.[7] Ready access to tobacco products is part of the problem. The more tobacco retailers in an area, the more cigarettes and e-cigarettes will be sold in that neighborhood, and the greater the amount of tobacco litter that will be created. Approximately 26,987 tobacco retailers are registered in the state of New York.[8] For example, the state capital of Albany alone – a city of about 97,000 people and just under 22 square miles – has 285 registered tobacco retailers.[9]

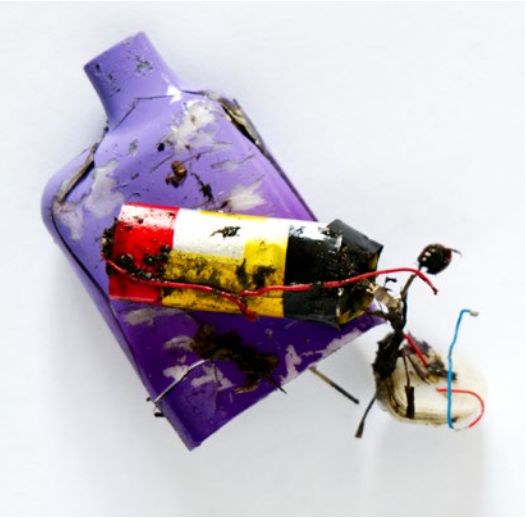
Although this brief focuses on tobacco product waste, environmental harms are also directly related to tobacco agriculture, manufacturing, and production.[10] Also, it is important to keep in mind that, in addition to the hazardous environment impact of tobacco products, the use of these products poses multiple well-documented risks to human health.[11]

Cigarette Butts

Cigarette butt pollution is a persistent problem in New York State. For example, in just western New York, approximately 1 billion cigarette butts are smoked annually.[12] In 2019, 339,716 cigarette butts, 44,822 cigar tips, and 1,868 other tobacco product waste items were collected from the Great Lakes Basin, including Lake Erie.[13] Cigarette butts are among the most commonly found objects in sewer overflows that feed into the Hudson River.[14]

Cigarette butts are made of a type of plastic called cellulose acetate and, contrary to popular belief, they are not biodegradable.[15] Over time, cellulose acetate breaks down physically into thousands of microplastic fibers,[16] which are ubiquitous and have been found in the stomachs of birds and fish[17] and even deep in the ocean.[18] One cigarette butt can contaminate 100 liters of water.[19] In fact, cigarette butts leach more than 7,000 toxic chemicals and heavy metals, such as lead, cadmium, arsenic, and formaldehyde, at least 50 of which are carcinogenic.[20] Each cigarette butt is estimated to release between 12,000 and 15,000 little fibers[21] and some studies have found that, depending on the environment, they can take from ten to fourteen years to degrade.[22]

The production of cigarettes and similar combustible products is environmentally destructive in other ways as well. For instance, one out of eight trees cut down globally is used for tobacco production – approximately 9 million trees annually. This harvesting significantly reduces the ability of forests to absorb carbon and contributes up to .2 percent of global carbon emissions worldwide.[23] In addition, cigarette butts can represent a significant fire hazard, as they are typically discarded without being extinguished.[24]



Electronic Cigarettes

E-cigarettes are another type of tobacco product waste found throughout New York State.[25] These products, designated as both hazardous waste and electronic waste ("e-waste"), typically contain three main components: a lithium-ion battery, a heating component, and a cartridge that contains concentrated nicotine liquid ("juice"), which is often flavored.[26] This liquid nicotine is considered hazardous waste[27] and is incredibly harmful if it is ingested or comes in contact with human skin.[28] In addition, lithium batteries in e-cigarettes are prone to explosions and fires, which have caused at least two deaths in the United States.[29] Also, about 53 percent of e-cigarettes sold today are disposable, meaning they cannot be refilled and reused after the initial cartridge runs out.[30] These products have a higher repurchase rate than refillable devices, so retailers and manufacturers tend to make more money off them than refillable products.[31] Because the industry markets these devices as "disposable," people regularly discard them as litter or throw them in the trash.

Hazardous waste, including concentrated nicotine and lithium batteries, should not be disposed of in regular trash. Federal regulations have special restrictions on how hazardous waste can be treated and handled.[32] While older e-cigarette devices like Juul had removable batteries that could be recycled,[33] newer devices often have built-in batteries, which makes the task of properly disposing of these devices even more difficult. Indeed, disposable e-cigarettes are often shredded or punctured in waste management facilities, which are not designed to handle such small, combustible products; as a result, fires have often occurred in the disposal process.[34] What's more, the quantity of lithium in newer devices is too small to be recovered for reuse.[35] According to waste management companies and facilities, the most common way to dispose of these devices is incineration. Incinerating lithium batteries is dangerous, time-

consuming, and destructive for the environment in terms of carbon emissions. Moreover, the e-cigarette cartridge containing concentrated nicotine must also be incinerated, as there is no reuse for this hazardous waste.

As a result of the youth vaping epidemic, schools have been inundated with vape devices. Afraid of being penalized for possession or use, students often smoke in secret in school bathrooms and try to dispose of these devices without detection by, for example, flushing them down the toilet. Not only can this ruin plumbing but in some instances, it can cause explosions.[36] When schools confiscate vaping devices, they end up with massive amounts of hazardous waste, and must then determine how to dispose of it.[37]

New York State is facing significant problems of accumulated e-waste. For example, Monroe County school officials confiscated and collected over 226 pounds of e-cigarettes in 2022. Since most of these products weigh between 50 and 250 grams each, this is equivalent to thousands of e-cigarettes and their cartridges.[38] Less populous communities and rural areas in New York State are also facing this issue. In Putnam County, New York, for instance, officials estimate that approximately 90 pounds of vape devices are confiscated each year.[39]

In addition, since the state's ban on flavored nicotine vapor products took effect in 2020, New York State officials have confiscated large amounts of flavored e-cigarettes – typically retail stock that can no longer be legally sold.[40] As just one example, from December 2022 to October 19, 2023, authorities in New York City seized over 449,000 packages of flavored e-cigarettes.[41] The estimated value of these confiscated devices was roughly $9 million.[42] Current disposal methods cost the city $1 per device[43] or about $1400 per container of 1200 confiscated e-cigarettes.[44] With thousands of devices being confiscated, this cost can add up both financially and environmentally.

New York City also accepts e-cigarettes during its city-sponsored waste collection events. The city ships all confiscated and collected devices to Gum Springs, Arkansas, where they are incinerated by Veolia, Inc., an international waste management company. Veolia has incinerated 1.6 million pounds of vape waste over the last few years, most of which is unsold or discontinued inventory.[45] The carbon footprint of incineration like this can be significant. Because incinerating lithium batteries is extremely difficult and can damage Veolia's incinerators, it must be done very slowly. During the process, Veolia separates all components of an e-cigarette, including the plastic, nicotine cartridge, and battery; it incinerates the nicotine at Veolia's facility in Sauget, Illinois. Veolia claims that its recycling is done in accordance with environmental regulations.[46]

Addressing the Problem

Addressing the pervasive problem of tobacco product waste requires funding, which is not always available. It also requires resources and special technology, since waste generated by these toxic products is difficult to dispose of safely. For instance, incinerating e-cigarettes that contain batteries releases tons of carbon into the air. Also, despite some company claims that they can "recycle" cigarette butts, there are no good uses for spent cigarette butts, which are full of toxic chemicals.[47] Unless and until an effective detoxification process can be developed, products made from used cigarette butts remain toxic.

In sum, tobacco product waste is a complex issue without an easy solution. The products causing the problem cause harm at all stages – environmental harm when tobacco crops are grown and tobacco products are manufactured and produced,[48] well-documented health harms when the products are smoked, vaped, or otherwise used and consumed, and environmental harm when the products become waste.[49] Greatly reducing the availability of these tobacco products would benefit both public health and the environment. In the meantime, state and local authorities in New York can take steps to begin to address this problem.

Raising Public Awareness

Along with fueling the demand for these hazardous products, industry manipulation has obfuscated and minimized the issue of tobacco product waste. For instance, the industry marketed cigarette butts as "filters" to give smokers the impression that smoking with a "filter" protected their health.[50] It does not. Popular myths that cigarette butts are biodegradable and "disposable" e-cigarettes can be discarded in the trash are a direct result of the way tobacco companies advertise and market these products. The pervasiveness of these myths has only added to the lack of understanding about how these products impact the environment.

Creating public awareness campaigns around the issue of tobacco product waste is a crucial first step in addressing the problem. Such campaigns could educate the public on the harms of tobacco product waste and its destructive impact on the environment. They could explain why cigarette butts should not be thrown on the ground and why vape devices should not go into the regular trash. Environmental concerns tend to resonate with younger people, perhaps even more than health-related messaging.[51] Moreover, teaching youth about the environmental destruction caused by the production, sale, and consumption of tobacco, as in a lesson plan in science classes, could help prevent youth initiation into tobacco use and even serve as a cessation strategy.

Public awareness can also be bolstered by additional study on the impact of this growing problem. Localities could help shed more light on the issue by collecting data on the topic. New York City, for instance, periodically conducts waste characterization surveys.[52] Municipalities can contact the Waste Data and Analysis Center at Stony Brook,[53] which is partly funded by the State Department of Environmental Conservation, to have a waste study conducted at their local waste collection facilities. Organized cleanups can also produce data by counting the amount of tobacco product waste collected.[54]

Policy Solutions

Policy approaches to address the problem of tobacco product waste include **upstream, midstream,** and **downstream** solutions. Upstream solutions refer to limiting the amount of tobacco products generated and sold in the first place; midstream solutions refer to reducing the amount of existing product that ends up as litter; and downstream solutions focus on cleaning up and mitigating the environmental impact of tobacco product waste already present in the environment.[55] Upstream solutions are the most efficient and equitable way to limit tobacco product waste, although they are more politically challenging as they restrict or ban individuals' ability to access tobacco products. Midstream and downstream solutions are more politically feasible as they do not restrict access to tobacco products, but they may be less effective and equitable in their impact.

Upstream Solutions

Upstream solutions are policies that limit the products that enter the stream of commerce by addressing the source of the problem. These policies often focus on addressing the normalization of smoking or vaping, the availability of the products, and the patterns of use of the products, rather than attempting to address the problem after the product has been discarded.[56] They can also include regulating the way tobacco product manufacturers generate and dispose of waste and hold manufacturers or distributors legally and/or financially responsible for the disposal of such products. In addition, upstream solutions can include legislation to severely limit the amount of tobacco retailers in a municipality, which can be achieved through restrictive licensing laws.[57]

Limiting the types of tobacco products sold, such as banning flavored and single-use products, is also an upstream solution. The logic behind policies such as licensing restrictions and product bans is the same: you can't litter what you can't smoke or vape, so reducing the amount of tobacco products sold reduces the amount of tobacco product waste. Upstream solutions

have the benefit of mitigating environmental damage caused by the production of tobacco products, such as deforestation, carbon emissions, and other environmental damage.[58] Even though upstream solutions are extremely effective and efficient, they can be difficult and time-consuming to achieve because they require legislation and may be politically unfeasible.

In California, for example, a bill introduced in 2019 would have banned single-use tobacco products and required manufacturers to implement take-back programs and pay for the recycling of components. The bill did not advance as the legislature was focusing on bills related to the COVID-19 pandemic.[59] Another bill introduced in California in 2022 would have banned disposable tobacco products, including imposing steep penalties for violators and explicitly prohibiting distributors from selling single use e-cigarettes.[60] That bill also did not progress.

In New York State, the Tobacco Product Waste Reduction Act,[61] which has been introduced into the state senate several times, was most recently reintroduced as Senate Bill S3063 during the 2023-2024 legislative session. The Act would prohibit the sale of cigarettes using single-use filters (cigarette butts) and ban the sale of single-use electronic cigarettes. The Act would be codified as an additional section of Article 13F Article 13-F of the Public Health Law in New York State, also known as the Adolescent Tobacco-Use Prevention Act (ATUPA). Passing the Act would be an important step in reducing tobacco product waste in New York State. It would also help combat the tobacco pandemic because it would remove the false pretense that cigarette "filters" protect users. Although this proposed law has not progressed in the senate, similar legislation could be introduced at the local level. Municipalities and counties can, and often do, act even when there is no movement at the state – or even federal – level.[62] As mentioned earlier, local retailer licensing laws can help reduce the tobacco products available for sale in a community, thus limiting the number ultimately discarded. For instance, severely restricting or banning the sale of tobacco products in certain areas, such as near schools and other youth-oriented places, would drastically reduce e-cigarette waste.

Banning single-use tobacco products altogether is an even more effective way to significantly reduce tobacco product waste. Municipalities would need to ensure that such legislation would not be preempted under New York state law. [63]The tobacco industry often brings preemption-related challenges as a way to defeat and undermine local authority to pass public health legislation, including measures to limit the industry's destructive effects on the local community and environment.[64] In general, local governments in New York may adopt laws related to the "protection, order, conduct, safety, health and well-being of persons and property," as long as those laws do not interfere with the state constitution or general laws.[65]

States and local governments can also consider suing the tobacco manufacturers to hold them accountable for the environmental harm caused by their products. When states and localities pursue litigation and remedies against tobacco manufacturers, they need to consider the cost of disposing of tobacco product waste. Forcing tobacco manufacturers and distributors to assume the cost of disposal for their hazardous products puts the onus of the problem where it belongs – on its source. Baltimore, Maryland recently took this approach by filing a lawsuit against tobacco manufacturers for creating the problem of cigarette litter. The city alleges public nuisance, trespass, and violations of state and municipal laws, seeks to recover damages including past, present, and future costs of cleaning cigarette butt litter, and punitive damages, and also asks that the manufacturers be prohibited from selling their products.[66] This litigation is ongoing.

New York City is currently suing[67] four e-cigarette distributors for continuing to illegally sell flavored vape devices, even though these devices are banned in both New York City and the state of New York.[68] The city also claims that the illegal sale of these devices constitutes a public nuisance that has created a cumbersome hazardous waste problem, forcing the city to develop disposal methods in line with hazardous waste regulations.[69] The city seeks to recoup some of the cost of hazardous waste disposal it has incurred from disposing of the hazardous waste devices. If it wins the lawsuit, the city may recover millions in monetary damages and civil penalties.[70] Enforcing preexisting tobacco laws in this way, especially bans on sales of certain products, can help curb tobacco product waste as it disincentivizes businesses from continuing illegal practices.

Midstream Solutions

Midstream solutions work to divert tobacco product waste before it becomes litter. These policies may include imposing additional costs on tobacco products or regulatory requirements on tobacco product retailers, such as licensing restrictions, or penalties for violators of smoke-free laws.[71] Some of these proposed policy solutions could ultimately have upstream effects by increasing the cost or availability of tobacco products, leading to decreased consumption or denormalization.[72] While these solutions prevent tobacco product waste from entering the environment, their feasibility and effectiveness varies depending on how the policies are implemented.

One type of midstream solution that is becoming more common is the extended producer responsibility (EPR) approach. This approach requires product manufacturers to take responsibility for the entire lifecycle of a product, from production to recycling and/or

disposal.[73] An EPR program puts the onus of paying for tobacco product waste mitigation on tobacco manufacturers and distributors, who are the cause of the problem in the first place.

Several countries are exploring the EPR approach. For instance, in 2021, France imposed an €80 million ($93.8 million) fee on tobacco companies for the cost of cleaning up cigarette butts.[74] The United Kingdom is considering making tobacco companies pay the £40 million cost of addressing cigarette butt litter.[75] In early 2023, a law in Spain took effect that requires tobacco companies to assume the cost of removing cigarette butt litter throughout the nation. A 2016 law passed in India banned the plastic packaging of tobacco products.[76] EPRs need to be crafted strategically and should not rely on the tobacco industry to regulate itself. (For instance, in Spain, the industry is expected to pass the cost of cleaning up cigarette butt litter on to the consumer.) EPR laws must be written carefully and consider how the industry may try to manipulate policymakers and avoid assuming full responsibility for tobacco product waste.[77]

EPR programs already exist for several products in New York State, including some types of electronic equipment and rechargeable batteries.[78] A bill introduced in the state senate in 2022 sought to create an EPR program for plastic packaging, which is often found on e-cigarettes. [79] This bill has not advanced.[80]

Another midstream option is to require tobacco manufacturers to collaborate with the government regarding disposal of their products. For instance, a bill introduced in the New York State Senate in 2022 would require tobacco manufacturers to develop a plan for the collection, transportation, and recycling of electronic cigarettes, estimate the cost, and submit that plan to the Commission of Environmental Conservation.[81] Ideally, manufacturers would also be held financially liable for costs. This kind of collaborative waste management can keep the onus of proper disposal on the source of the waste -- the tobacco producers -- while making sure government oversight keeps those companies in check.

Downstream Solutions

Downstream solutions focus on cleaning up and mitigating the harm of tobacco products that have already been discarded. Some options include installing cigarette butt waste receptacles near smoking areas, setting up e-cigarette collection boxes in schools and public areas, and organizing litter cleanups. Downstream solutions help keep the environment clean by removing litter and/or redirecting waste from becoming litter and causing pollution. Downstream solutions are also cheaper and easier to implement than midstream or upstream solutions and can more easily be done on the local level.

Downstream solutions have limitations, however. They do nothing to decrease the amount of tobacco waste that is produced in the first place. Given the sheer volume of tobacco product waste generated every day, cleanups only address a miniscule fraction of the products. Moreover, methods like increasing waste receptacles may not be effective, since studies show that most smokers discard their butts on the ground even when waste receptacles are widely available.[82] At the same time, downstream solutions normalize tobacco product waste. Tobacco industry-funded cleanups, for instance, may give people the mistaken belief that meaningful steps are being taken to solve the problem, which help the tobacco industry launder (or "greenwash") its public image without acknowledging that these events exist to clean up their own dangerous products.[83] In addition, downstream solutions may be tedious to implement, for example, conducting cleanups require a significant investment of time and people. Finding ways to dispose of hazardous tobacco waste can also be dangerous. Cleanup volunteers may risk exposure to toxic substances, such as those within discarded cigarette butts. E-cigarette collection puts waste management personnel and facilities at risk due to the potential of lithium battery explosions and concentrated nicotine exposure. Fires at waste management facilities and landfills have become more common due to lithium batteries in e-cigarettes.

As mentioned, the best option currently available for the disposal of e-cigarette devices is incineration, although it is a process that releases carbon, greenhouse gases, and toxins into the atmosphere. Importantly, downstream solutions pass the cost of disposal to individual consumers and/or taxpayers. While consumers bear some responsibility for proper disposal, the origin of the problem rests with tobacco manufacturers whose highly addictive products trap people into a cycle of addiction, harming them and their surrounding environment. Downstream solutions cannot be the sole solution to the issue of tobacco product waste but they are an unfortunate necessity. Although the goal should be to eliminate the creation of tobacco product waste, the existing waste problem still needs to be addressed, and downstream solutions can effectively raise awareness about the scope of the problem.

New York State has adopted some downstream solutions to address this issue. For instance, the Manhattan Solid Waste Advisory Board[84] and Tobacco-Free Western New York's Kick Butts

Collaborative[85] organize cleanups to collect cigarette butts. Roswell Park Comprehensive Cancer Research Center has also organized "plogging" events, where individuals pick up litter while jogging.[86] E-cigarette collection and disposal and/or recycling programs are another downstream solution. Municipalities will find some approaches more feasible to adopt than others.

For instance, Monroe County in Western New York has implemented a waste management program to dispose of electronic cigarettes. The ecopark facility in Monroe County accepts e-cigarette device disposal drop-offs.[87] It costs about sixty dollars per gallon container for schools, which are collecting large amounts of these devices. Monroe County schools, universities, businesses, retailers, and other organizations that have e-cigarettes and vaping devices for disposal can use Monroe County / Waste Management ecopark's Conditionally Exempt Small Quantity Generator Program (CDSOG). The facility contracts with a hazardous waste company to incinerate the e-cigarette devices at an industrial waste incinerator facility in Arkansas.[88] In the first year of its vape disposal program, the ecopark facility collected 340 pounds of vape devices, two-thirds of which came from schools.[89] Meanwhile, Putnam County has installed vape collection boxes in town halls, the department of motor vehicles, and police departments, and is working on installing them in schools as well, modeled after a similar program in a New Jersey school district. The boxes are in temperature-controlled environments and emptied at least every six months, which mitigates the risk of battery explosions and fires. The boxes have a QR code on the outside that connects smokers with cessation resources.[90]

Several jurisdictions have also begun accepting vape devices as part of medication takebacks – programs designed to help consumers safely dispose of unwanted or unusable pharmaceuticals. On a national level, the Drug Enforcement Administration's medication takeback program is accepting e-cigarette devices that do not contain lithium batteries.[91] Unfortunately, many e-cigarette devices contain nonremovable lithium batteries, so they are not covered in this program.

In New York State, the Prevention Council of Putnam County accepts e-cigarette devices in collection boxes and as part of its medication takeback days.[92] The Prevention Council works with the Drug Enforcement Administration as well as private companies to dispose of the devices. Another proposed bill in the New York State Senate, the Drug Take Back Act (S5209), would amend the state's public health law to include single-use and reusable electronic cigarettes in the state's drug takeback program. This would allow consumers to dispose of these devices in medication drop off boxes, instead of throwing them in the trash. Although this is a downstream solution that would not reduce the amount of tobacco product waste being generated, it would keep some of these devices from polluting the environment.

Other Policy Considerations

New York communities exploring effective ways to address tobacco product waste must ensure that environmental justice and equity principles are factored into any discussion of policy solutions.

Environmental Justice

Unfortunately, years of discriminatory redlining and systemic racism in industrial development has shaped urban planning and development and disproportionately inflicted the burden of environmental harms on these communities.[93] Historically, waste facilities have often been concentrated in disadvantaged neighborhoods, including Black, immigrant, and communities of color and/or communities with lower socioeconomic status.[94] Rural and remote communities may also be unduly impacted, especially on or near Tribal lands.[95] Landfill leaching can also contaminate waterways and recreational areas. Illegal dumping is also more common near these areas.

Not only are most landfills and burn facilities located near marginalized communities, but so are 79 percent of municipal waste incinerators.[96] Residents of communities with high rates of litter and waste already suffer from greater physical and mental health issues than the general population.[97] Individuals residing in communities near incinerators often are exposed to higher emissions of harmful particulate matter and other toxic substances, such as mercury and lead. These emissions can lead to higher rates of respiratory illness and disease, as well as cardiovascular disease.

In 2021, the New York State Senate introduced a bill[98] to require the Department of Environmental Conservation[99] to consider the cumulative pollution burden on a neighborhood before granting licenses to waste facilities. The law would have prohibited the state from approving any permit or carrying out any action that could put a disproportionate pollution burden on a community predominately comprised of racial minorities or residents of lower socioeconomic status, or that is economically distressed or already unduly burdened by pollution.[100] The governor did not sign the bill, so it did not become law. The City of New York also assesses environmental equity issues and incorporates environmental justice concerns in its decision-making.[101]

Municipalities should keep environmental justice principles in mind when passing legislation and taking initiatives related to tobacco product waste. For instance, government authorities should consider which communities are disproportionately impacted by preexisting waste management facilities and services and which will be affected if new facilities are permitted.

Equity Considerations

Upstream and downstream approaches can impact social equity in different ways. One advantage of upstream approaches is that they tend to equitably advantage all communities, as everyone benefits from having fewer products enter the market. On the other hand, downstream solutions require more government involvement in communities that are actively harmed by the tobacco epidemic. Communities and public institutions have varying abilities to properly confiscate vape devices, ship them to disposal facilities, and pay for safe disposal. While wealthier schools may have the ability to staff and fund these efforts, schools in disadvantaged communities may not have the same resources. Also, vape device takeback boxes featured in medication takeback programs are often located in law enforcement facilities, such as police stations, or may be manned by local, state, or federal law enforcement, including police or the Drug Enforcement Administration. For communities that have been victimized by institutional violence, a mistrust of law enforcement may result in a reluctance or unwillingness to implement, and participate in, such programs. Intrusive solutions should always be scrutinized. For instance, some schools around the country are installing vape detectors in school bathrooms. Such measures may be considered inappropriate surveillance of students and may not even be effective.[102]

Enforcement approaches such as these may result in putting students of color and lower income students at greater risk of consequences, such as suspensions and law enforcement involvement. Punitive approaches punish students for getting hooked on a highly addictive product designed to appeal to youth and discourage students from seeking help in quitting or properly disposing of tobacco products.[103] Nonpunitive approaches, such as education and counseling, would be more effective in encouraging cessation among youth.[104] For instance, a school that chooses to install vape disposal boxes could have an amnesty policy and not penalize students who are observed disposing of e-cigarettes.

Finally, communities that experience significant economic, health, and environmental burdens tend to have higher concentrations of tobacco retailers. Living in these neighborhoods makes youth more likely to start and can result in higher tobacco addiction, as well as greater tobacco product waste.[105] This is another reason why upstream or midstream solutions, such as restricting retailer density, can help target the problem of tobacco product waste at the source.

Conclusion

Tobacco product waste in New York State is a growing problem that requires investigation, research, and solutions. While mitigation efforts such as public awareness campaigns, cleanups, and disposal programs are important, addressing the root cause of tobacco product waste is vital. The best way to reduce tobacco product waste and its impact on the environment and public health is to reduce and, ideally, eliminate tobacco products from entering the consumer stream in the first place.

Contact us for assistance! If you're working on New York State commercial tobacco control issues and need assistance, contact the Public Health Law Center at (651) 290-7506 or publichealthlawcenter@ mitchellhamline.edu.

This brief was prepared by the Public Health Law Center, a nonprofit organization that provides information and legal technical assistance on issues related to public health, and was made possible through a contract with the New York State Department of Health. The Center does not provide legal representation or advice. The information in this document should not be considered legal advice.

Endnotes

1 The Public Health Law Center recognizes that traditional and commercial tobacco are different in the ways they are planted, grown, harvested, and used. Traditional tobacco is and has been used in sacred ways by Indigenous communities and tribes for centuries. In contrast, commercial tobacco is manufactured with chemical additives for recreational use and profit, resulting in disease and death. For more information, visit http://www.keepitsacred.itcmi.org. When the word "tobacco" is used throughout this document, a commercial context is implied and intended.

2 Rich Schrader, *Kicking Butts: NY Bill Proposes Banning Filtered Cigarettes*, NRDC (Mar. 2, 2021), https://www.nrdc.org/bio/marisa-guerrero/kicking-butts-ny-bill-proposes-banning-filtered-cigarettes.

3 Rosemary Misdary, *Meet The New Yorkers Who Want To Eliminate The Cigarette Butt*, GOTHAMIST (Jan. 15, 2022), https://gothamist.com/news/meet-the-new-yorkers-who-want-to-eliminate-the-cigarette-butt.

4 Thomas E. Novotny & Elli Slaughter, *Tobacco Product Waste: An Environmental Approach to Reduce Tobacco Consumption*, 1 CURRENT ENV'T HEALTH REPS. 208-16 (2014), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4129234.

5 *Id.*

6 *How Many Cigarettes are Produced Each Year?*, Smart Capital Mind, https://www.smartcapitalmind.com/how-many-cigarettes-are-produced-each-year.htm.

7 Ctrs. for Disease Control & Prevention, *NYS Behavioral Risk Factor Surveillance System Brief* (2023), https://www.health.ny.gov/statistics/brfss/reports/docs/2023-05_brfss_cigarette_smoking.pdf.

8 *Registered Retail Dealers of Cigarettes and Tobacco Products and Vapor Products*, Data.NY.Gov (2023), https://data.ny.gov/Government-Finance/Registered-Retail-Dealers-of-Cigarettes-and-Tobacc/55xf-9jat.

9 *Id*.

10 *See* Thomas Novotny, *The Environmental and Health Impacts of Tobacco Agriculture, Cigarette Manufacture and Consumption*, 93 Bulletin World Health Org. 877-80 (2015), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4669730; *see also* Yogi Hale Hendlin & Stella Bialous, *The Environmental Externalities of Tobacco Manufacturing: A Review of Tobacco Industry Reporting*, 49 Ambio 17-34 (2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6889105/#CR118.

11 *See, e.g.*, Surgeon General's Reports on Smoking and Tobacco Use, https://www.cdc.gov/tobacco/sgr/index.htm, including The Health Consequences of Smoking: 50 Years of Progress (2014) and E-Cigarette Use Among Youth and Young Adults (2016).

12 Breanna Fuss, *WNY Group is Kicking Butt, One Cigarette Butt at a Time*, Spectrum Local News (Nov. 18, 2021), https://spectrumlocalnews.com/nys/buffalo/news/2021/11/18/hamburg-butt-kickers-cleaning-up-cigarette-waste-and-share-enviornmental-impact.

13 *339,716 Cigarette Butts - Tobacco Free WNY*, Tobacco-Free Western New York (Apr. 30, 2021), https://tobaccofreewny.com/339716-cigarette-butts.

14 *This is What a Hudson River Sewage Overflow Looks Like*, Riverkeeper (July 19, 2017), https://www.riverkeeper.org/blogs/water-quality-blogs/hudson-river-sewage-overflow-looks-like.

15 Thomas Webler & Karin Jakubowski, *Attitudes, Beliefs, and Behaviors about Cigarette-Butt Littering among College-Aged Adults in the United States*, 19 Int'l J .Env't Res Public Health 8085 (2022), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9265565.

16 *Cigarette Butts are Rubbish,* Keep Britain Tidy, https://www.keepbritaintidy.org/smoking-related-litter; *Cigarette Butts*, Manhattan Solid Waste Advisory Board, https://www.manhattanswab.org/cigarette-butts.

17 Schraeder, *supra* note 2.

18 Keep Britain Tidy, *supra* note 16; *Cigarette Butts*, Manhattan Solid Waste Advisory Board, https://www.manhattanswab.org/cigarette-butts.

19 Keep Britain Tidy, *supra* note 16.

20 Rosemary Misdary, *supra* note 3.

21 John Atkinson, *Cigarette Filters as a Source of Microplastics*, Public Health Law Center (Sept. 27, 2023), https://www.publichealthlawcenter.org/sites/default/files/inline-files/TPW-in-NY.pdf.

22 *See* Fuss, *supra* note 12; Keep Britain Tidy, *supra* note 16; *see also* Giuliano Bonanomi et al., The Fate of Cigarette Butts in Different Environments: Decay Rate, *Chemical Changes and Ecotoxicity Revealed by a 5-years Decomposition Experiment* 261 Envt'l Pollution 114108 (2020), https://www.sciencedirect.com/science/article/abs/pii/S0269749119364693.

23 *See* World Health Org., *Cigarette Smoking: An Assessment of Tobacco's Global Environmental Footp.rint Across Its Entire Supply Chain and Policy Strategies to Reduce It* 32 (2018); *see also Policy Solutions*, Sierra Club Tobacco Product Waste and Environmental Justice Project, https://www.stoptoxictobaccowaste.org/policy-options.

24 Vimal Patel et al., *Cigarette Butt Littering in City Streets: A New Methodology for Studying and Results*, 22 Tob Control 59-62 (2013), https://pubmed.ncbi.nlm.nih.gov/22821749.

25 Jamie Ducharme, *The Vape Industry Is Creating a Mountain of Trash. Can It Change?*, TIME (July 11, 2023), https://time.com/6293772/disposable-vapes-plastic-waste.

26 *Hazardous Waste Management of E-Cigarettes*, HAZARDOUS WASTE EXPERTS (July 17, 2017), https://www.hazardouswasteexperts.com/hazardous-waste-management-e-cigarettes.

27 *Where Are the Management Standards for Hazardous Waste Pharmaceuticals?*, Env't Protection Agency, https://www.epa.gov/hwgenerators/where-are-management-standards-hazardous-waste-pharmaceuticals-and-amendment-p075.

28 Leonard P. Lockhart, *Nicotine Poisoning*, 3762 BRIT MED J. 246–47 (1933), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2368002.

29 *Exploding E-Cigarettes*, Beasley Allen, https://www.beasleyallen.com/e-cigarette-explosions/#:~:text=As%20far%20as%20electronic%20devices%20go%2C%20e-cigarettes%20are,tucked%20away%20loosely%20in%20a%20pocket%20or%20purse.

30 Associated Press, *New Vaping Problem: How to Safely Get Rid of Them*, KREM2 (Oct. 22, 2023), https://www.krem.com/article/news/national/communities-cant-recycle-trash-disposable-e-cigarettes/527-dc1cf459-0cc5-4b2b-b89e-575bfd39ba21.

31 *Why Did the Vape Industry in the U.S. Turn To Disposable Devices?*, VAPE RANGER (Dec. 22, 2022), https://vaperanger.com/blogs/vape-business/why-did-the-vape-industry-in-the-us-turn-to-disposable-devices.

32 Public Health Law Center, *Disposing of E-Cigarette Waste: FAQ for Schools and Others*, (2023), https://www.publichealthlawcenter.org/sites/default/files/resources/FAQ-e-cig-disposal-schools.pdf.

33 Matthew Perrone, *E-cigarettes Pose a New Environmental Dilemma—The 'Insidious Devices' Can Be Neither Recycled Nor Thrown in the Trash*, FORTUNE (Oct. 19, 2023), https://fortune.com/2023/10/19/e-cigarettes-pose-a-new-environmental-dilemma-the-insidious-devices-can-be-neither-recycled-nor-thrown-in-the-trash.

34 James Tapper, *Single-use Vapes Sparking Surge in Fires at UK Waste Plants*, THE OBSERVER (May 12, 2023), https://www.theguardian.com/society/2023/may/13/single-use-vapes-sparking-surge-in-fires-at-uk-waste-plants.

35 Associated Press, *supra* note 30.

36 Sara Harrison, *How Wily Teens Outwit Bathroom Vape Detectors*, WIRED (Nov. 14, 2019), https://www.wired.com/story/how-wily-teens-outwit-bathroom-vape-detectors.

37 Public Health Law Center, *Disposing of E-Cigarette Waste: Options For New York State* (2023), https://www.publichealthlawcenter.org/sites/default/files/resources/E-Cigarette-Waste-FAQ.pdf.

38 *Vape Size Chart by Brand and Type of Electronic Cigarette*, SIZE CHARTS (May 30, 2022), https://size-charts.com/topics/vape-size-charts-by-type/#:~:text=Vape%20Brands%20Comparison%20Size%20Chart%20%20%20Vape,g%200.05%20kg%20%204%20more%20rows%20.

39 *Prevention Council Launches Safe Vape Disposal Boxes*, PUTNAM PRESS TIMES (Aug. 1, 2023), https://www.putnampresstimes.com/post/prevention-council-launches-safe-vape-disposal-boxes.

40 *New York State Department of Health Announces Statewide Ban of Flavored Nicotine Vapor Products Takes Effect Today*, NYS Dep't Health (May 18, 2020), https://www.health.ny.gov/press/releases/2020/2020-05-18_fl_nicotine_vapor_products_ban.htm.

41 Perrone, *supra* note 33.

42 *See, e.g.,* Mayor Adams, *Corporation Counsel Hinds-Radix Announce Lawsuit Against Four Companies Illegally Selling Disposable Flavored E-Cigarettes*, City of New York (July 10, 2023), https://www.nyc.gov/office-of-the-mayor/news/493-23/mayor-adams-corporation-counsel-hinds-radix-lawsuit-against-four-companies-illegally#/0.

43 Associated Press, *supra* note 30.

44 Perrone, *supra* note 33.

45 *Id*.

46 *E-Cigarettes - A Responsible Recycling Solution*, VEOLIA, https://www.veolianorthamerica.com/ecigarettes-responsible-recycling-solution.

47 *The Warehouses of Plastic Behind TerraCycle's Recycling Dream*, *Bloomberg* (Oct. 31, 2022), https://www.bloomberg.com/features/2022-terracycle-tom-szaky.

48 *See* Thomas Novotny, *The Environmental and Health Impacts of Tobacco Agriculture, Cigarette Manufacture and Consumption*, 93 BULLETIN WORLD HEALTH ORG. 877-80 (2015), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4669730; *see also* Yogi Hale Hendlin & Stella Bialous, *The Environmental Externalities of Tobacco Manufacturing: A Review of Tobacco Industry Reporting*, 49 Ambio 17-34 (2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6889105/#CR118.

49 *See, e.g.*, Surgeon General's Reports on Smoking and Tobacco Use, https://www.cdc.gov/tobacco/sgr/index.htm, including THE HEALTH CONSEQUENCES OF SMOKING: 50 YEARS OF PROGRESS (2014) and E-CIGARETTE USE AMONG YOUTH AND YOUNG ADULTS (2016).

50 *Butts, Filters, Microplastics: Making Big Tobacco Take Responsibility for Environmental Harm*, THE VIBES (Jun. 2, 2022), https://www.thevibes.com/articles/world/62226/butts-filters-microplastics-making-big-tobacco-take-responsibility-for-environmental-harm.

51 *Millennials and Generation Z are More Sustainability-orientated – Even When It Comes to Money, Researchers Find*, SCIENCE DAILY (Mar. 31, 2021), https://www.sciencedaily.com/releases/2021/03/210331103635.htm.

52 *Waste Characterization*, City of New York, https://www.nyc.gov/assets/dsny/site/resources/reports/waste-characterization.

53 *New York State Solid Waste Characterization Project*, WASTE DATA & ANALYSIS CENTER, https://wastedata.info/ny-waste-characterization#cfd721f4-a9f5-42f8-ab94-b9968f72939b.

54 Cleanups are sometimes described as "greenwashing," which means conveying a false impression or misleading information about the environmental soundness of a company›s products or practices. Cleanups are not a solution to TPW: even the most robust efforts will never do more than chip away at the problem. Instead, they're important for raising public awareness and collecting data.

55 Kyra Hill et al., *A Review of Policy Options to Address Tobacco Product Waste*, Appendix B3, San Diego State University 5 (2022), https://merg.sdsu.edu/wp-content/uploads/2022/05/Appendix-B3-A-Review-Of-Policy-Options-To-Address-Tobacco-Product-Waste.pdf.

56 *Id.*

57 Public Health Law Center, *Comprehensive Tobacco Retailer Licensing Model Ordinance* (2023), https://www.publichealthlawcenter.org/sites/default/files/resources/TRL-Model-Ordinance-NYS.pdf.

58 Sierra Club, *supra* note 23.

59 California Legislature, Senate Bill 424 (2019-2020), https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB424.

60 *California Bill Would Ban Single-use Cigarette Filters*, LOS ANGELES TIMES (Jan. 25, 2022), https://www.latimes.com/california/story/2022-01-25/california-bill-would-ban-single-use-cigarette-filters.

61 S. 3063, *An Act to Amend the Education Law, in Relation to Enacting the "New York Climate Mobilization Act of 2023,"* N.Y.S. (2023), https://www.nysenate.gov/legislation/bills/2023/S3063.

62 New York State municipalities are not preempted by state law from passing local bans.

63 *Id.* Note that in New York State localities are not preempted from enacting laws more stringent than state Articles 13-E and 13-F. *See* Ctrs. for Disease Control & Prevention, *State Tobacco Activities Tracking & Evaluation (STATE) System*, https://www.cdc.gov/statesystem/factsheets/preemption/Preemption.html.

64 AMERICAN NONSMOKERS' RIGHTS FOUNDATION, *Preemption*, https://no-smoke.org/smokefree-threats/preemption/#:~:text=Preemption%20is%20a%20tobacco%20industry%20tactic%20that%20removes,influence%20in%20state%20legislatures%20than%20in%20local%20communities.

65 N.Y. Const. art. IX, § 2(c), N.Y. Mun. Home Rule Law § 10(1)(i), (ii) (The New York Court of Appeals explained in *DJL Restaurant Corp. v. City of New York* that state law preempts local law when 1) the local law conflicts with a state statute; and 2) when a locality tries to legislate in a field that the state occupies, either expressly or by implication. The state occupies a field when "the Legislature has enacted a comprehensive and detailed regulatory scheme in a particular area." A New York locality considering implementing legislation to reduce tobacco product waste would have to use this analysis to gauge the risk of facing a preemption challenge. *Id.)*

66 Public Health Law Center, *Litigation Tracker: Baltimore v. Philip Morris* (2022), https://www.publichealthlawcenter.org/litigation-tracker/baltimore-v-philip-morris-2022.

67 *See* Office of the Mayor, *Mayor Adams, Corporation Counsel Hinds, and Radix Lawsuit Against Four Companies Illegally Selling Cigarettes Without Health Warnings*, City of New York, https://www.nyc.gov/office-of-the-mayor/news/493-23/mayor-adams-corporation-counsel-hinds-radix-lawsuit-against-four-companies-illegally#/0; *see* City of New York v. Magellan Technology et al., Complaint, Case 1:23-cv-05880 (July 10, 2023), https://www.nyc.gov/assets/home/downloads/pdf/press-releases/2023/Vape-Complaint.pdf.

68 *Vape Complaint Guidance*, City of New York Dep't Health and Mental Hygiene, https://www.nyc.gov/assets/home/downloads/pdf/press-releases/2023/Vape-Complaint.pdf.

69 City of New York, *supra* note 67.

70 *Id.*

71 *See* Kyra Hill, *supra* note 55.

72 *Id.*

73 Plastics Industry Association, *What Are Extended Producer Responsibility Programs?*, https://thisisplastics.com/economics/what-are-extended-producer-responsibility-programs/#:~:text=Extended%20producer%20responsibility%20%28EPR%29%20is%20a%20tool%20that,producers%20create%2C%20especially%20in%20terms%20of%20hard-to-recycle%20goods.

74 *Cigarette Manufacturers Must Finance Cig Butt Clean-up*, TOBACCO J. INT'L(Aug. 12, 2021), https://www.tobaccojournal.com/news/cigarette-manufacturers-must-finance-cig-butt-clean-up/#:~:text=In%20France%2C%20the%20tobacco%20industry%20will%20have%20to,Paris%20alone%2C%20350%20tonnes%20are%20collected%20every%20year.

75 Rebecca Pow & Jo Churchill, *Press Release: Government Explores Next Steps to Clean Up Tobacco Litter in England,* GOV.UK (Mar. 30, 2021), https://www.gov.uk/government/news/government-explores-next-steps-to-clean-up-tobacco-litter-in-england.

76 Swati Singh Sambyal, *Environment Ministry Order Bans Use of Plastic Packaging for Tobacco, Gutkha*, DOWN TO EARTH (Oct. 7, 2016), https://www.downtoearth.org.in/news/waste/environment-ministry-order-bans-use-of-plastic-packaging-for-tobacco-gutkha-55944.

77 Kai Hill and Hudson Kingston, *End the Tobacco Industry's Pollution: Put an End to the Tobacco Industry*, Public Health Law Center (June 30, 2020), https://www.publichealthlawcenter.org/commentary/200630/end-tobacco-industrys-pollution-put-end-tobacco-industry.

78 NYS Dep't of Env't Conservation, *Product Stewardship & Extended Producer Responsibility*, https://www.dec.ny.gov/chemical/66746.html.

79 Marissa Heffernan, *EPR and Packaging-reduction Bill Introduced in New York*, Plastics Recycling Update (May 11, 2022), https://resource-recycling.com/plastics/2022/05/11/epr-and-packaging-reduction-bill-introduced-in-new-york.

80 A. 10185, *An Act to Amend the Public Health Law, in Relation to Establishing a Statewide Recycling Program for Rechargeable Batteries,* N.Y.S. (2021), https://www.nysenate.gov/legislation/bills/2021/A10185.

81 A. 8884, *An Act to Amend the Education Law, in Relation to Requiring the Establishment of a Notification System for School-Sponsored Extracurricular Activities,* N.Y.S. (2021), https://www.nysenate.gov/legislation/bills/2021/A8884.

82 Vimal Patel et al., *Cigarette Butt Littering in City Streets: A New Methodology for Studying and Results*, 22 TOB CONTROL 59-62 (2013), https://pubmed.ncbi.nlm.nih.gov/22821749.

83 *See, e.g.*, World Health Org., *Talking Trash: Behind the Tobacco Industry's "Green" Public Relations* (May 12, 2022), https://www.who.int/news-room/events/detail/2022/05/12/default-calendar/talking-trash--behind-the-tobacco-industry-s--green--public-relations.

84 *Cigarette Butts*, Manhattan Solid Waste Advisory Board, https://www.manhattanswab.org/cigarette-butts; Keep Britain Tidy, *supra* note 16.

85 *Tackling Tobacco Waste: The Kick Butts Collaborative*, Tobacco-Free Western New York https://tobaccofreewny.com/tackling-tobacco-waste-the-kick-butts-collaborative.

86 Public Health Law Center, *No Filter: The Truth About Tobacco Product Waste in New York State* (Sep. 27, 2023), https://www.publichealthlawcenter.org/sites/default/files/inline-files/TPW-in-NY.pdf.

87 *Electronics/Cell Phone Recycling*, Monroe County, NY, https://www.monroecounty.gov/ecopark-electronics#ecig.

88 Associated Press, *supra* note 30.

89 *County Executive Bello Announces 340 Pounds of Vapes & E-Cigarette Devices Collected in First Year of Residential Vape Disposal Program*, Monroe County, NY (Aug. 25, 2023), 0

90 PUTNAM PRESS TIMES, *supra* note 39.

91 *DEA to Accept Electronic Vaping Devices and Cartridges as Part of National Prescription Drug Take Back Day*, DRUG ENFORCEMENT AGENCY (Oct. 18, 2019), https://www.dea.gov/press-releases/2019/10/18/dea-accept-electronic-vaping-devices-and-cartridges-part-national.

92 Prevention Council of Putnam, *Medication Take Back Day*, https://preventioncouncilputnam.org/medication-take-back-day.

93 Calif. Env't Justice Alliance, *Defining Environmental Justice Communities: Using CalEnviroScreen in State Policy*, MEDIUM (Sep. 6, 2016), https://cejapower.medium.com/defining-environmental-justice-communities-using-calenviroscreen-in-state-policy-4d1f350b3207.

94 Marco Martuzzi et al., *Inequalities, Inequities, Environmental Justice in Waste Management and Health*, 20 EUR J. PUB HEALTH 21–6 (2010), https://academic.oup.com/eurpub/article/20/1/21/611240.

95 Delia MacLaughlin, *Beyond Cities: Uncovering the What and Why of Rural Environmental Justice*, Novel Hand (Apr. 13, 2021), https://novelhand.com/rural-environmental-justice.

96 Celine Yang, *Q&A: Addressing the Environmental Justice Implications of Waste*, Env't & Energy Study Inst. (May 14, 2021), https://www.eesi.org/articles/view/qa-addressing-the-environmental-justice-implications-of-waste.

97 Carl A. Latkin & Aaron D. Curry, *Stressful Neighborhoods and Depression: A Prospective Study of the Impact of Neighborhood Disorder*, 44 J. Health Soc Behav. 34-44 (2003), https://pubmed.ncbi.nlm.nih.gov/12751309.

98 S. 1031, *An Act to Amend the Education Law, in Relation to the Regulation of Pharmacy Benefit Managers*, N.Y.S. (2021), https://www.nysenate.gov/legislation/bills/2021/S1031.

99 NYS Dep't Env't Conservation, *Environmental Justice,* https://www.dec.ny.gov/public/333.html.

100 Julia Kane, *Environmental Justice Law in New York Could Prevent New Pollution in Hard-hit Neighborhoods*, Grist (May 9, 2022), https://grist.org/accountability/new-york-ambitious-environmental-justice-law.

101 Mayor's Office of Climate and Environmental Justice, *Environmental Justice*, City of New York, https://climate.cityofnewyork.us/topic/environmental-justice.

102 Sarah Harrison, *How Wily Teens Outwit Bathroom Vape Detectors*, Wired (Nov. 14, 2019), https://www.wired.com/story/how-wily-teens-outwit-bathroom-vape-detectors; see also Public Health Law Center, *How to Spend Juul Settlement Funds, Champion Our Children, Target Commercial Tobacco* (2023), https://www.publichealthlawcenter.org/commentary/230727/7/27/23-how-spend-juul-settlement-funds-champion-our-children-target-commercial

103 Jankowski et al., *E-Cigarettes are More Addictive than Traditional Cigarettes—A Study in Highly Educated Young People*, 16 Int'l J. Env't Res Public Health 2279 (2019), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6651627.

104 *See, e.g.,* Public Health Law Center, *Student Commercial Tobacco Use in Schools: Alternative Measures (*2019), https://www.publichealthlawcenter.org/sites/default/files/resources/Student-Commercial-Tobacco-Use-in-Schools-Alternative-Measures-2019.pdf.

105 *See, e.g.,* Stephen Higgins, *A Review of Tobacco Regulatory Science Research on Vulnerable Populations*, 128 Preventive Medicine 105709 (2019), https://www.sciencedirect.com/science/article/pii/S009174351930163X; *see also* Public Health Law Center, *To End the Tobacco Industry's Pollution, Put an End to the Tobacco Industry* (2020), https://www.publichealthlawcenter.org/commentary/200630/end-tobacco-industrys-pollution-put-end-tobacco-industry.