December 2014

Tobacco and E-Cigarette Prevention: What Works?

The 2014 Washington State Legislature directed the Washington State Institute for Public Policy (WSIPP) to review research on tobacco and e-cigarette prevention.[1] The purpose of the review is to identify "what works," and "what does not work," in reducing tobacco use and improving public health.[2]

To carry out this assignment, WSIPP reviewed research evidence from around the United States and elsewhere on the effectiveness of various prevention and cessation programs and policies. When possible, we also conducted a benefit-cost analysis for each approach using WSIPP's standard economic methodology.

As part of the legislative direction, WSIPP consulted with the Department of Health (DOH) to identify strategies that can be brought to scale most efficiently.

This report is structured as follows:

   I.   Research Approach
  II.   Prevention and Cessation Strategies
 III.   Findings
 IV.   Scalability of Programs
  V.   Electronic Cigarettes

Summary

The 2014 Washington State Legislature directed WSIPP to identify programs and policies that can decrease tobacco and e-cigarette use and yield the greatest return on investment. WSIPP employed its standard approach to reviewing research evidence and conducting benefit-cost analysis.

The focus of the assignment was primarily on prevention programs, including population-based and individual-level strategies. We also examined several approaches to smoking cessation.

We identified 40 topics with research of sufficient rigor to allow us to draw conclusions about effectiveness. Of the 40, we found that 33 produce, on average, reductions in tobacco use. We identified a few programs that have undesirable effects on outcomes.

Our findings apply to *tobacco* prevention and cessation strategies. For *e-cigarettes*, unfortunately, we were unable to locate any rigorous evaluations that measure the impact of prevention strategies. In this report, we summarize current knowledge on e-cigarettes, including state and federal regulations as of October 2014.

The legislature directed WSIPP to consult with the Department of Health (DOH) about which policies and programs can be scaled up statewide most feasibly. According to DOH, population-level strategies such as mass media campaigns and phone- or computer-based counseling can be most feasibly scaled.

I. Research Approach

The specific direction from the 2014 Washington Legislature to review tobacco and e-cigarette research is presented in the adjoining box. When WSIPP carries out study assignments from the legislature to identify what works in public policy, we implement a three-step research approach.

Step 1: What Works? What Does Not?

In the first step, we estimate whether various programs and policies can achieve desired outcomes, such as reductions in tobacco use. We carefully analyze all high-quality studies, from the United States and elsewhere, to identify those programs and policies that have been shown to impact outcomes. We focus on research studies with strong evaluation designs and exclude studies with weak research methods.

Our empirical approach follows a meta-analytic framework to assess systematically all credible evaluations we can locate on a given topic. Given the weight of the collective evidence, we calculate an average expected effect of a program or policy on a particular outcome of interest.

Because some tobacco prevention programs and policies can affect additional outcomes, we analyzed effects on all reported measures. When we reviewed the evaluation literature and conducted the meta-analyses, we estimated program effects on tobacco use, as well as other outcomes related to alcohol, marijuana, or other drug use; mental health (e.g., depression); school-related outcomes such as test scores and grade point average; and crime.

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Legislative Study Direction

[The] Washington state institute for public policy [shall] conduct a comprehensive study of tobacco and e-cigarette prevention programs that will yield the highest public health benefit and reduce tobacco use. In conducting this study, the institute shall identify:

(a) The most effective population-based approaches and what targeted populations will yield the greatest return on investment; and

(b) other state models, including the "Friday night light" program in California, that yield the greatest likelihood of reducing state health care costs. The institute shall work with the department of health to determine which programs can be brought to scale most efficiently. The institute shall report its findings to the appropriate committees of the legislature by December 31, 2014.

Engrossed Substitute Senate Bill 6002, Sec. 609, Chapter 221, Laws of 2014 PV

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Including these additional outcomes allows us to build a comprehensive view of effectiveness and provide better estimates of the benefits and costs that can be expected from statewide implementation.

Step 2: What Makes Economic Sense?

Next, we consider the costs and benefits of implementing a program or policy by answering two questions:

- How much would it cost Washington taxpayers to produce the results found in Step 1?
- How much would it be worth to people in Washington State to achieve the results found in Step 1?

That is, in dollars and cents, what are the costs and benefits of each program or policy?

To answer these questions, we have developed, and continue to refine, an economic model that estimates benefits and costs. The model provides an internally consistent monetary valuation so program and policy options can be compared on an apples-to-apples basis. Our benefit-cost results are expressed with standard financial statistics: net present values and benefit-cost ratios.

We present monetary estimates from three perspectives:

1) program participants,
2) taxpayers, and
3) other people in society.

The sum of these perspectives provides a "total Washington" view on whether a program or policy produces benefits that exceed costs.

Benefits to individuals and society from smoking reduction stem from multiple sources. One source is the labor market: a decrease in smoking results in higher life expectancy, which increases lifetime earnings. Reduced smoking also results in decreased hospital, emergency department, and treatment costs. Our benefit-cost model produces estimates of these types of effects.

Step 3: What is the Risk in the Benefit-Cost Findings?

Any tabulation of benefits and costs involves a degree of risk about the estimates calculated. This is expected in any investment analysis, whether in the private or public sector. To assess the riskiness of our conclusions, we perform a "Monte Carlo simulation" in which we vary key factors in our calculations. The purpose of this analysis is to determine the probability that a particular program or policy will at least break even.

Thus, we produce two "big picture" findings for each program: an expected benefit-cost result and, given our understanding of the risks, the probability that the program or policy will at least have benefits that are greater than costs.

Readers interested in an in-depth description of the research methods for these three steps can review our Technical Documentation.[3]

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[3] Washington State Institute for Public Policy, (2014). *Benefit-cost technical documentation.* Olympia, WA: Author. Available online at http://www.wsipp.wa.gov/TechnicalDocumentation/WsippBenefitCostTechnicalDocumentation.pdf

II. Prevention and Cessation Strategies

The legislature directed WSIPP to identify strategies to reduce tobacco use and improve public health. About 17% of adults in Washington smoke tobacco. Smoking rates are higher among certain populations, including low-income individuals (27%), those with a high school degree or less (27%), American Indians/ Alaskan Natives (31%), African-Americans (26%), Pacific Islanders (24%), and individuals who identify themselves as gay, lesbian, or bisexual (22-32%).[4]

According to the Healthy Youth Survey, 5% of 8th graders in Washington use tobacco, and by the 12th grade, tobacco use increases to 16%.[5] Most (over 80%) of current adult smokers initiated tobacco use before they turned 18.[6]

For this assignment, WSIPP reviewed evaluation research on programs and policies in the following categories:

- Population-level policies such as tobacco excise taxes, underage enforcement, and media campaigns;
- Cessation programs;[7] and
- School-, family-, community-, and computer-based prevention programs.[8]

Exhibit 1 provides brief descriptions of each category.

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[4] Tobacco Prevention & Control Program. (2014) *Washington tobacco facts 2013*. Olympia, Washington. Washington State Department of Health. Retrieved from http://www.doh.wa.gov/Portals/1/ Documents/Pubs/340-149-WashingtonTobaccoFacts.pdf
[5] Healthy Youth Survey. (2012). Retrieved from https://www.askhys.net/ on October 6, 2014.
[6] US Department of Health and Human Services. (2012). *Preventing tobacco use among youth and young adults: A report of the Surgeon General*. Atlanta, GA.

[7] We did not review research for nicotine replacement therapy (NRT) programs for this report. The primary focus of this legislative assignment was to review research on prevention programs; thus we limited our review of programs designed for current smokers. We consulted with legislative and DOH staff in selecting programs and policies for review.
[8] Part of the legislative assignment was to identify the "most effective population-based approaches and what targeted populations will yield the greatest return on investment." In our review of the literature, we tried to find information about the relative effectiveness of programs for different "targeted" populations. We did not find sufficient information to perform sub-group analyses, although several of the programs reviewed have been tested on specific populations such as American Indian/Alaskan Native youth or pregnant smokers.

Exhibit 1
Tobacco Prevention and Cessation Programs and Policies Reviewed in this Study

Name	Program/policy description
Population-level policies	
Anti-tobacco media campaigns	Mass media campaigns aim to educate the public about tobacco use, prevent initiation, and encourage cessation. Typically, media campaigns are of an extended duration with varying frequencies of brief, reoccurring informational and motivational messages.
Tobacco excise taxes	Excise taxes on cigarettes can be levied to discourage cigarette smoking by raising the effective price for smokers.
Age-of-sale and youth possession law enforcement	Youth possession laws and age-of-sale laws aim to reduce supply of tobacco to youth through penalties to minors and retailers, respectively. Enforcement of these laws includes compliance checks and fines for youth possession or sales to minors.
Tobacco retailer density	Zoning and licensing laws can limit tobacco retailer density and/or proximity to schools. These policies aim to reduce access to and supply of tobacco.
Cessation programs	
Computer-based	These programs use the internet or computer software to help smokers (youth or adults) quit. Generally, the programs involve selecting a quit date and provide tailored information and feedback to participants to help them quit and maintain smoking abstinence.
Mobile phone-based (text messages)	Text message-based smoking cessation interventions use "short message services" (SMS) to support smokers in quit attempts. The programs send messages to help participants set a quit date, prepare for quitting, and provide support after the quit date. Many interventions feature interactive components such as a "craving helpline" for instant support or check-ins.
Quitlines	Quitlines offer telephone counseling, frequently with nicotine replacement, to help clients quit smoking. The number of calls offered varies from one to five, depending on insurance plans.
Counseling for pregnant smokers	These programs offer counseling to assist pregnant smokers to quit using tobacco. Often, counseling is initiated in a primary care setting. Counseling can be delivered remotely (via telephone) or face-to-face.
Prevention programs	
School-based	These programs, usually delivered by a trained teacher or "interventionist," use a variety of techniques including instruction, role playing, videos, games, small group discussions, and individual seat work. Curricula often address consequences of substance use, the social pressures to use substances, and strategies to resist these pressures.
Family-based	Family-based prevention programs often focus on many of the same underlying factors as school-based programs. These programs involve parents and/or other family members and may be implemented in the home, school, or community setting by telephone or through mailed materials. Family-related influences are also addressed, including factors such as parent-child communication and rule-setting.
Community-based	These programs include family, school, community and/or media components and aim to comprehensively alter attitudes and norms surrounding substance use.
Computer-based	These programs deliver interactive materials to youth via the internet or computer software. The materials describe dangers of drug and tobacco use, encourage resistance skills, and aim to influence attitudes towards use. The software includes quizzes, surveys, and feedback. Programs can be implemented in schools, home, community centers, or primary health care facilities.

The legislative assignment also directed WSIPP to "identify ... other state models ... that yield the greatest likelihood of reducing state health care costs."[9] In 1998, 46 state attorneys general and the tobacco industry signed a Master Settlement Agreement. Following this settlement and the resulting payments from the tobacco industry, many states, including Washington, implemented tobacco prevention and control programs.[10] These state programs typically include multiple components addressing prevention and cessation.

Unfortunately, existing research does not evaluate the effectiveness of statewide comprehensive models. Rather, the available research examines the effectiveness of programs and policies separately, not as a coordinated strategy.

Our findings for specific programs and policies are summarized in Section III of this report. Section IV presents the state Department of Health's assessment of which options "can be brought to scale most efficiently," as directed in the legislative assignment.[11]

We also searched for rigorous outcome evaluations of e-cigarette prevention and cessation programs. E-cigarettes are relatively new and research is just beginning to emerge on this topic. We were unable to locate sufficient research to analyze how various programs and policies impact e-cigarette use. Section V summarizes current knowledge on this topic.

[9] Engrossed Substitute Senate Bill 6002, Chapter 221, Laws of 2014 PV.
[10] http://www.cdc.gov/pcd/issues/2007/jul/06_0109.htm

[11] Engrossed Substitute Senate Bill 6002, Chapter 221, Laws of 2014 PV.

III. Findings

In all, we were able to find sufficiently rigorous research on 40 separate topics. We found that 33 produced, on average, desirable reductions in tobacco use. A detailed list of all studies included in WSIPP's analyses is provided in a separate technical document available online.[12]

We were able to conduct benefit-cost analysis on 37 of the 40 topics.[13] Exhibit 2 displays WSIPP's benefit-cost results for all of the programs and policies for which we were able to estimate benefits and costs. The results are organized into the following categories:

- Population-level policies;
- Cessation programs; and
- Prevention programs.

The exhibit reports our estimates of the total monetary benefits of each specific topic, along with the cost and a measure of the riskiness of each investment. Of the 37 programs and policies, we found that 32 had benefits that outweigh costs, and five did not.

The following highlights some of the findings from the major areas of our review.

Population-Level Policies

"Population-level" policies have a broad focus on reducing smoking rates in an entire community or the state as a whole. For this report, we analyzed research on five types of population-level policies:

- anti-tobacco media campaigns;
- enforcement of age-of-sale laws;
- enforcement of youth possession laws;
- excise taxes; and
- tobacco retailer density.

We found that age-of-sale enforcement and media campaigns produce favorable results, with benefits exceeding costs 89% to 100% of the time (Exhibit 2). For example, the typical anti-smoking media campaign reduced adult smoking by 1.4 percentage points (from 17.0% to 15.6%),[14] youth smoking in middle school by 1.9 percentage points (from 5.0% to 3.1%), and youth smoking in high school by 1 percentage point from (16% to 15%).[15]

Two of the population-level policies we researched could not be analyzed in WSIPP's benefit-cost model at this time. For one, excise taxes, we analyzed research estimating the relationship between tobacco prices—affected by excise taxes—and smoking rates. Our analysis found that youth are more sensitive to price changes than adults. A 10% increase in cigarette prices results in a 3.5% decrease in smoking rates among youth, in comparison with a 1.3% decrease among adults.

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[12] http://www.wsipp.wa.gov/ReportFile/1579/Wsipp_Tobacco-and-E-Cigarette-Prevention-What-Works_Benefit-Cost-Results.pdf

[13] We were unable to estimate the total costs involved with fining youth for possession, cigarette taxes, and counseling for pregnant women and, thus, we cannot analyze benefits and costs for these topics. For the meta-analytic results, see: http://www.wsipp.wa.gov/ReportFile/1579/Wsipp_Tobacco-and-E-Cigarette-Prevention-What-Works_Benefit-Cost-Results.pdf

[14] Tobacco Prevention & Control Program, (2014).

[15] Healthy Youth Survey, (2012).

In addition to examining age-of-sale enforcement and tobacco prices, we also reviewed evaluations of the effect of fining youth for possessing tobacco. We found that these fines lead to reduced smoking among teenagers.

Our review of research on tobacco retailer density found that density is correlated with smoking rates among youth and adults. However, due to a lack of high-quality studies examining the effect of changes in density, we cannot provide a confident estimate of the cause-and-effect impact on smoking of decreasing tobacco retailer density.

Cessation Programs

The legislative study assignment focuses on preventing tobacco use. In addition to reviewing the prevention research literature, we reviewed research on certain smoking cessation strategies, including:

- Quitlines,
- Computer- and text-based programs,
- Project EX (for teenage smokers), and
- Counseling for pregnant smokers.

Our review found favorable results for three of the strategies, with the chance of benefits exceeding costs ranging from 86% and 100%.

Counseling for pregnant smokers could not be analyzed in the benefit-cost model; however, we found that these programs reduced smoking rates in this population. For example, the typical counseling program reduced tobacco use among pregnant smokers by about five percentage points.

Prevention Programs

We located and analyzed rigorous evaluation research that measures tobacco use as an outcome for the following types of prevention programs:

- School-based (20 topics),
- Family-based (4 topics),
- Community-based (4 topics), and
- Computer-based (1 topic).

For school-based prevention curricula, we found that 16 of the 20 programs have benefits that outweigh program costs on average. Three (out of four) family-based and four (out of four) community-based programs demonstrate favorable results, as did the computer-based strategy. Even when benefits exceed costs on average, the risk can vary; the chance that benefits exceed costs for these programs ranges from 53% to 99%.

Exhibit 2
Benefits and Costs of Tobacco Prevention and Cessation Programs and Policies (Per Participant, Lifetime)

Program name	Total benefits	Taxpayer benefits	Non-taxpayer benefits	Costs	Benefits minus costs (net present value)	Benefit to cost ratio	Chance benefits will exceed costs
Population-level prevention							
Anti-smoking media campaign, youth effect	$3,398	$813	$2,585	($27)	**$3,371**	$125.82	**99%**
Enforcement of age-of-sale laws	$2,293	$697	$1,596	($6)	**$2,288**	$399.16	**100%**
Anti-smoking media campaign, adult effect	$1,899	$530	$1,369	($35)	**$1,865**	$55.38	**89%**
Cessation programs							
Access to tobacco quitlines	$33,436	$2,017	$31,419	($211)	**$33,225**	$158.44	**98%**
Computer-based programs for smoking cessation	$30,799	$5,650	$25,149	($39)	**$30,760**	$782.07	**100%**
Text messaging programs for smoking cessation	$18,069	$3,208	$14,861	($51)	**$18,018**	$351.58	**100%**
More intensive tobacco quitlines (compared to less intensive quitlines)	$9,702	$1,390	$8,312	($128)	**$9,574**	$75.68	**100%**
Project EX	$3,511	$819	$2,692	($58)	**$3,452**	$60.13	**86%**
School-based prevention							
Elementary school-based social development programs	$13,946	$3,952	$9,994	($236)	**$13,710**	$59.31	**77%**
Good Behavior Game	$9,081	$2,788	$6,294	($158)	**$8,924**	$57.53	**93%**
Caring School Community (formerly Child Development Project)	$8,611	$2,171	$6,440	($1,218)	**$7,393**	$7.06	**62%**
School-based tobacco prevention programs	$4,012	$986	$3,026	($62)	**$3,950**	$64.64	**99%**
Minnesota Smoking Prevention Project	$2,712	$652	$2,061	($32)	**$2,681**	$86.00	**94%**
All Stars	$2,389	$735	$1,654	($101)	**$2,288**	$23.59	**99%**
Drug Abuse Resistance Education (D.A.R.E.)	$1,941	$334	$1,607	($53)	**$1,888**	$36.44	**84%**
SPORT	$1,333	$325	$1,008	($38)	**$1,294**	$34.70	**74%**
Life Skills Training	$1,125	$246	$879	($97)	**$1,028**	$11.58	**84%**
American Indian substance abuse prevention programs	$787	$265	$522	($55)	**$733**	$14.45	**78%**
keepin' it REAL	$646	$201	$445	($48)	**$598**	$13.51	**72%**
ATHENA (Athletes Targeting Healthy Exercise and Nutrition Alternatives)	$503	$127	$376	($37)	**$466**	$13.53	**57%**
Too Good for Drugs	$498	$158	$341	($52)	**$446**	$9.56	**97%**
Lions Quest Skills for Adolescence	$477	$96	$381	($94)	**$383**	$5.06	**79%**
Project ALERT	$504	$176	$329	($147)	**$357**	$3.43	**77%**
Project Towards No Drug Abuse (TND)	$182	$46	$136	($64)	**$118**	$2.86	**53%**
Youth advocacy/empowerment programs for tobacco prevention	($155)	($35)	($120)	($22)	**($178)**	($6.92)	**33%**
Project Success	($178)	($19)	($159)	($155)	**($333)**	($1.15)	**42%**
InShape	($395)	($119)	($276)	($15)	**($410)**	($26.60)	**46%**
Reconnecting Youth	($6,147)	($1,385)	($4,762)	($750)	**($6,897)**	($8.21)	**0%**
Family-based prevention							
Family-based tobacco and substance use prevention	$5,407	$1,357	$4,050	($178)	**$5,229**	$30.46	**93%**
Strengthening Families for Parents and Youth 10- 14	$3,850	$981	$2,869	($1,098)	**$2,751**	$3.51	**66%**
Guiding Good Choices (formerly Preparing for the Drug Free Years)	$1,419	$526	$893	($654)	**$765**	$2.17	**61%**
Family Check-Up (also known as Positive Family Support)	$68	$51	$18	($323)	**($255)**	$0.21	**47%**
Community-based prevention							
Mentoring for students: community-based	$10,694	$3,513	$7,181	($3,193)	**$7,501**	$3.36	**60%**
Project STAR	$4,261	$1,049	$3,212	($499)	**$3,761**	$8.55	**97%**
Communities That Care	$1,826	$561	$1,265	($573)	**$1,253**	$3.25	**85%**
Project Northland	$692	$187	$505	($185)	**$507**	$3.74	**73%**
Computer-based prevention							
Computer-based substance use prevention	$1,390	$349	$1,041	($69)	**$1,321**	$20.26	**68%**

All estimates are in 2013 dollars.

Other Topics

Some tobacco prevention and cessation strategies have not been rigorously evaluated. We searched for, but did not locate, any rigorous evaluation studies for 29 additional programs that focus on tobacco and substance use reduction. Exhibit 3 lists those programs.

The legislation directed WSIPP to examine a particular program, "Friday Night Lights" (also known as "Friday Night Live"). We searched for rigorous research on this program but, unfortunately, did not find any evaluations.

Exhibit 3
Interventions for Which We Could Not Find
Rigorous Evaluations Examining
Tobacco Use Outcomes

Aban Aya Youth Project
Active Parenting of Teens: Families in Action
BrainTrain4Kids
Celebrating Families
Coping Power Program
DARE to be You
Familias Unidas
Friday Night Live
Hip-hop 2 prevent substance abuse and HIV
Lead and Seed
Media Detective
Media Ready
Mobile phone cessation "apps"
Native FACETS
Not on Tobacco
PALS: Prevention through Alternative Learning Styles
Project MAGIC
Project Venture
Reality Tour
Refuse, Remove, Reasons (RRR) High School Education Program
Rock in Prevention, Rock PLUS
Sembrando Salud
SMART Leaders
Stay SMART
Storytelling for Empowerment
TAP- Helping Teens Stop Using Tobacco
Teens Against Tobacco Use (TATU)
TEG-Intervening with Teen Tobacco Users
Tobacco and Alcohol Prevention Program

IV. Scalability of Programs

The legislative study language directed WSIPP to "work with the Department of Health to determine which programs can be brought to scale most efficiently."[16] WSIPP consulted with DOH staff to identify such programs.

DOH indicates that some interventions can be scaled up to the state level more efficiently than others. In particular, DOH identifies mass media campaigns as one strategy that can be scaled and targeted carefully to specific groups using readily available contracts with current media contractors. Media messages can be targeted to a specific age range, gender, ethnic community, or other group. The Centers for Disease Control (CDC) Best Practices guide recommends that a paid media campaign focusing on preventing youth from starting smoking should reach the target audience (youth from age 12-17) at least 12 times per quarter. The CDC recommends a state budget between $1.9 million and $2.8 million per year for paid media.[17]

According to DOH, school-based prevention curricula are more difficult to bring to scale; these programs may also be more difficult than media campaigns to target towards priority populations. Implementation of school-based programs depends on the willingness and ability of specific schools to use curriculum with fidelity.

DOH indicates that scaling school curricula to the state level would have high costs. For example, DOH estimates it would take over $10 million per year to implement Life Skills Training for public school students in grades seven through ten with uncertainty regarding fidelity of implementation.[18]

DOH notes that tobacco cessation interventions can also be scaled. According to DOH, population-based strategies such as phone- or computer-based counseling can be targeted to provide outreach to populations with the highest need.

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[16] Engrossed Substitute Senate Bill 6002, Chapter 221, Laws of 2014 PV.

[17] Centers for Disease Control and Prevention. *Best Practices for Comprehensive Tobacco Control Programs – 2014.* Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

[18] We find this estimate by multiplying the yearly cost of Life Skills Training ($32) and the number of students statewide in grades 7, 8, 9, and 10 as reported by Office of Superintendent of Public Instruction's Enrollment by Grade Reports for 2014-15. Retrieved from http://www.k12.wa.us/DataAdmin/default.aspx

V. Electronic Cigarettes

The 2014 Legislature directed WSIPP to research "e-cigarette prevention programs."[19] We searched extensively for rigorous outcome evaluations of e-cigarette prevention and cessation programs. Unfortunately, perhaps because e-cigarettes are a relatively new phenomenon, we were unable to locate any studies that met our research standards.

While we did not find outcome evaluations, we did collect information about prevalence and other aspects of e-cigarettes.

Prevalence

Surveys suggest that e-cigarette use is on the rise. Among adults nationally, e-cigarette use grew from 1% in 2009 to over 6% in 2011.[20] Among adolescents, use rates increased from 3% to 7% between 2011 and 2012.[21]

According to the ongoing national Monitoring the Future project, as of 2014, 16% of 10th graders used e-cigarettes. More than twice as many 8th and 10th graders in the United States are using e-cigarettes than smoking traditional cigarettes.[22]

Defining Electronic Cigarettes

Electronic cigarettes (e-cigarettes), also known as Electronic Nicotine Delivery Systems (ENDS), are battery operated inhalers containing nicotine. The battery heats liquid in the cartridge (called a cartomizer), turning it into a vapor that can be inhaled. The process of puffing on an e-cigarette is often called "vaping."

As the electronic cigarette market grows, the range of products offered has expanded. These products have been generally grouped into three categories:

- Small e-cigarettes similar in appearance to traditional cigarettes.
- Medium-sized vaping pens with refillable tanks, also known as e-hookahs, hookah pens, or eGos.
- Large vaping devices known as Mods or Advanced Personalized Vaporizers.

Huang, J., Tauras, J., & Chaloupka, F.J. (2014). The impact of price and tobacco control policies on the demand for electronic nicotine delivery systems. *Tobacco control, 23*(suppl 3), iii41-iii47.

Zhu, S.H., Sun, J.Y., Bonnevie, E., Cummins, S.E., Gamst, A., Yin, L., & Lee, M. (2014). Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation. *Tobacco control, 23*(suppl 3), iii3-iii9.

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[19] Engrossed Substitute Senate Bill 6002, Chapter 221, Laws of 2014 PV.

[20] Hajek, P., Etter, J., Benowitz, N., Eissenberg, T., & McRobbie, H. (2014). Electronic cigarettes: review of use, content, safety, effects on smokers and potential for harm and benefit. *Addiction, 109*(11), 1801-1810.

[21] Centers for Disease Control and Prevention (CDC). (2013). Notes from the field: electronic cigarette use among middle and high school students–United States, 2011-2012. *Morbidity and Mortality Weekly Report, 62*(35), 729-730.

[22] Miech, R.A., Johnston, L.D., O'Malley, P.M., Bachman, J.G., & Schulenberg, J.E. (December 16, 2014). *E-cigarettes surpass tobacco cigarettes among teens.* University of Michigan News Service: Ann Arbor, MI. Retrieved from http://www.monitoringthefuture.org

Product Contents

E-cigarette cartridges generally include nicotine extracted from tobacco (although some do not), glycerol, flavorings, and propylene glycol.[23] Metals, cotinine, and other ingredients have also been identified in e-cigarettes.[24] There are currently no federal requirements for disclosing product ingredients to the Federal Drug Administration (FDA).

The devices can contain varying levels of nicotine; 18mg/ml is the most popular level.[25] One study found that the actual amount of nicotine in the cartridge often varies from the labels by up to 50%.[26]

Health Impacts

Research on the short- and long-term health effects of e-cigarettes is just beginning to emerge.

The particulate matter emitted from e-cigarettes has been found to be smaller than in traditional combustible cigarettes.[27] However, the health impacts of some ingredients detected in e-cigarettes (including propylene glycol) remain unknown.[28] For these reasons, it is unclear whether e-cigarettes are a safer alternative to traditional cigarettes. To reach an evidence-based conclusion, more research will be needed.

Advertising

E-cigarette advertising is unregulated; in contrast, advertising for most tobacco products is strictly regulated. The primary sources of e-cigarette advertising are the internet and social media outlets, but print and television advertising appear to be growing.[29]

Some companies have advertised e-cigarettes as a cessation tool, although they have not been approved as such by the FDA.[30]

Cessation Aid

Some tobacco smokers use e-cigarettes in a manner similar to nicotine replacement therapies such as the patch or nicotine gum in quit attempts. The smoking aspect of the device may provide smokers with a similar sensation to combustible cigarettes.

To date, relatively little research has been conducted on e-cigarettes as a cessation tool. WSIPP identified only two rigorous studies that examine the effectiveness of e-cigarettes as a cessation aid; both were conducted outside of the United States. These studies found that users of e-cigarettes with nicotine had higher quit success rates compared with users of "placebo" e-cigarettes (without nicotine).[31] Neither study analyzed health impacts.

[23] Callahan-Lyon, P. (2014). Electronic cigarettes: human health effects. *Tobacco Control, 23,* ii36-ii40.
[24] Callahan-Lyon, (2014) and Grana, R., Benowitz, N., & Glantz, S. (2014). E-cigarettes: A scientific review. *Circulation, 129*(19), 1972-1986.
[25] Hajek et al., (2014).
[26] Callahan-Lyon, (2014).
[27] McAuley, T.R., Hopke, P.K., Zhao, J., & Babaian, S. (2012). Comparison of the effects of e-cigarette vapor and cigarette smoke on indoor air quality. *Inhalation toxicology, 24*(12), 850-857.
[28] Callahan-Lyon, (2014).

[29] Bailey, L., Kalkhoran, S., & Ling, P. (2014). Cessation treatment and e-cigarettes: A report on current literature and quitline practices.Phoenix, AZ: North American Quitline Consortium.
[30] Grana, R. A. & Ling, P. M. (2014). "Smoking Revolution": A content analysis of electronic cigarette retail websites. *American Journal of Preventive Medicine, 46*(4), 393-403.
[31] Bullen, C., Howe, C., Laugesen, M., McRobbie, H., Parag, V., Williman, J., & Walker, N. (2013). Electronic cigarettes for smoking cessation: a randomised controlled trial. *The Lancet, 382*(9905), 1629-1637; Caponnetto, P., Campagna, D., Cibella, F., Morjaria, J.B., Caruso, M., Russo, C., & Polosa, R. (2013). Efficiency and safety of an electronic cigarette (ECLAT) as tobacco cigarettes substitute: A prospective 12-month randomized control design study. *Plos One, 8*(6), 1-12.

Current and Proposed Regulation

At the federal level, e-cigarettes are not currently regulated unless they are marketed for therapeutic uses, in which case they are regulated as drugs or devices by the FDA Center for Drug Evaluation and Research.

The FDA proposed regulations in April 2014 that would include coverage of e-cigarettes under their tobacco authority.[32] The proposed rules include the following:

- Setting the federal minimum age of 18 for sales (requiring ID for purchase);
- Banning vending machine sales;
- Mandating warning labels;
- Prohibiting free samples; and
- Requiring companies to register with the FDA to monitor compliance and quality.

In addition to federal regulatory proposals, some states have implemented their own regulations. As part of this study we collected information about other states' e-cigarette policies. We used information from the National Conference of State Legislatures in October 2014 as a basis for our summary, and verified regulations through states' websites.[33]

The regulations in place for each state as of October 2014 are listed in Appendix A.

The majority of states (42) have prohibited sales of e-cigarette products to minors. In Washington State, e-cigarette sales to minors under 18 are prohibited.[34] Internet sales of e-cigarettes are unregulated throughout the United States.

No state, including Washington, has issued a complete statewide ban on e-cigarette use. Some states have banned e-cigarette use in certain locations (e.g., schools or restaurants).

Some local governments around the country have also enacted such bans. In Washington, King County, Pierce County, and the city of Pasco have included e-cigarettes in their clean air legislation, banning the use of e-cigarettes in public places and workplaces.

Two states (Minnesota and Michigan) have included e-cigarettes under tobacco excise taxes.

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[32] U.S. Food and Drug Administration. FDA proposes to extend its tobacco authority to additional tobacco products, including e-cigarettes [Press Release]. Retrieved from http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm394667.htm

[33] National Conference of State Legislatures (NCSL) (November 2014). Alternative Nicotine Products: Electronic Cigarettes. Retrieved December 18, 2014 from http://www.ncsl.org/research/health/alternative-nicotine-products-e-cigarettes.aspx#1

[34] RCW 26.28.080.

VI. Conclusion

For this report, we identified 40 topics with research of sufficient rigor to allow us to draw conclusions about effectiveness. Of the 40, we found that 33 produce, on average, reductions in tobacco use. We identified a few programs that have undesirable effects on outcomes.

These findings apply to *tobacco* prevention and cessation strategies. For *e-cigarettes*, unfortunately, we were unable to locate any rigorous evaluations that measure the impact of prevention strategies.

The legislature directed WSIPP to consult with DOH about which policies and programs can be scaled up statewide most feasibly. According to DOH, population-level strategies such as mass media campaigns and phone- or computer-based counseling can be most feasibly scaled up. DOH provided additional comments regarding tobacco prevention and cessation; those comments are in Appendix B.

Appendix

Appendix A
2014 State Regulations for Electronic Cigarettes

State	Banned in non-hospitality workplaces	Banned in restaurants	Banned in bars	Banned in schools	Banned in other locations	Specifically excluded from clean indoor air laws	E-cigarette sales to minors prohibited	E-cigarettes included in tobacco excise taxes
Alabama							X*	
Alaska							X	
Arizona							X	
Arkansas		X					X	
California							X	
Colorado		X					X	
Connecticut							X	
Delaware							X	
Florida							X	
Georgia							X	
Hawaii					Dept. of Health		X	
Idaho							X	
Illinois							X	
Indiana							X	
Iowa							X	
Kansas					Dept. of Corrections	X	X	
Kentucky							X	
Louisiana							X	
Maine								
Maryland					Commuter rail trains		X	
Massachusetts								
Michigan								X
Minnesota							X	X
Mississippi							X	
Missouri							X	

State	Banned in non-hospitality workplaces	Banned in restaurants	Banned in bars	Banned in schools	Banned in other locations	Specifically excluded from clean indoor air laws	E-cigarette sales to minors prohibited	E-cigarettes included in tobacco excise taxes
Montana								
Nebraska							X	
Nevada							X	
New Hampshire				X			X	
New Jersey	X	X	X				X*	
New Mexico								
New York							X	
North Carolina							X	
North Dakota	X	X	X		Gambling facilities			
Ohio							X	
Oklahoma				X	Dept. of Corrections		X	
Oregon					State agency buildings & grounds			
Pennsylvania								
Rhode Island							X	
South Carolina							X	
South Dakota					Dept. of Corrections		X	
Tennessee							X	
Texas								
Utah	X	X	X				X*	
Vermont				X			X	
Virginia				X			X	
Washington							X	
West Virginia							X	
Wisconsin							X	
Wyoming							X	

* indicates laws that ban sales to minors under 19.
Note: Most clean indoor air laws were enacted prior to the growth of the e-cigarette market, therefore e-cigarettes are not explicitly included, however, many smoke-free laws are interpreted to include e-cigarettes.
Data Source: NCSL, (November 2014). Information was verified from states' websites.

Appendix B

The Department of Health prepared the following statement for inclusion in this report

Department of Health Statement

The Centers for Disease Control (CDC) publishes a guide for state comprehensive tobacco control programs. The CDC writes that:

> *Evidence-based, statewide tobacco control programs that are comprehensive, sustained, and accountable have been shown to reduce smoking rates as well as tobacco-related diseases and deaths. A comprehensive statewide tobacco control program is a coordinated effort to establish smokefree policies and social norms, promote cessation and assist tobacco users to quit, and prevent initiation of tobacco. Investing in comprehensive tobacco control programs and implementing evidence-based interventions have been shown to reduce youth initiation, tobacco-related disease and death, and tobacco-related health care costs and lost productivity.*[1]

The following summarizes the CDC recommendations for state tobacco control programs.

Best Practices

According to the CDC, state tobacco control programs should include a mix of educational, clinical, regulatory, economic and social strategies:

- Increasing the price of tobacco products.
- Enacting comprehensive smokefree policies.
- Funding hard hitting, culturally appropriate mass-media campaigns.
- Supporting programs and policies that encourage and support tobacco-free norms.
- Providing access to cessation services for all users.
- Promoting health systems change within health organizations that support behavior change.
- Expanding health insurance coverage.

These practices can help prevent initiation for youth and young adults, promote cessation, and reduce tobacco-related disparities.

Preventing Initiation for Youth and Young Adults

Intervening during adolescence and young adulthood is critical. Specific activities to prevent youth from using tobacco include:

- Increasing the unit price of tobacco products.
- Conducting mass-media education campaigns in combination with other community interventions.
- Mobilizing the community to restrict minors' access to tobacco products in combination with additional interventions.
- Passing stronger local laws directed at retailers, active enforcement of retailer sales laws, and retailer education with reinforcement.

Cessation

Successful cessation begins with access to comprehensive cessation services for all tobacco users, promoting health systems change within health organizations, and expanding insurance coverage for comprehensive cessation that includes all evidence-based cessation treatments, including individual, group and telephone counseling; all 7 Food and Drug Administration (FDA) approved cessation medications (Bupropion, Varenicline and five forms of nicotine replacement therapy (NRT) including patch, gum, inhaler, lozenge and nasal spray) with no co-pay or cost sharing for two quit attempts per year; and four counseling sessions per quit attempt with no lifetime limits. This also includes proactively promoting coverage so that providers and those that smoke are aware of it. Additionally, until all grandfathered health plans under ACA are eliminated, support for quitline capacity for the uninsured and underinsured (grandfathered health plans) is vital.

CDC's Best Practices dissuade charging higher insurance premiums to smokers. Although higher premiums on tobacco users may motivate them to quit, it can also lead smokers to misrepresent their status, avoid seeking cessation assistance, or forego health insurance and is a burden to low-income populations.

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[1] Centers for Disease Control and Prevention. Best Practices for Comprehensive Tobacco Control Programs – 2014. Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Department of Health Statement (cont.)

<u>Reducing tobacco-related disparities</u>

Although the state has seen significant declines in tobacco use among the general population, smoking is still prevalent in certain populations, as noted on page 4 of the WSIPP report. Therefore, state tobacco control strategies and interventions should reflect the principles of inclusion, cultural competency, and health equity.

Reducing tobacco-related disparities is a critical component of a comprehensive program and is one of four national tobacco prevention and control goals. To ultimately eliminate disparities, tobacco control programs and policies must be implemented in a way that achieves benefits for all. Strategies and activities focused on achieving equity and eliminating disparities can help accelerate the decline in the prevalence of tobacco use and increase access to evidence based cessation treatments. This would alleviate the disproportionate health and economic burden experienced by some population subgroups.[2]

CDC has developed guidance on addressing tobacco-related disparities based on state practices, scientific studies, and input from external partners and experts. Strategies include:
1) Creating partnerships including partnering with population groups and community-based organizations that serve populations affected by disparities;
2) Developing culturally competent interventions and materials;
3) Reducing exposure to targeted tobacco industry advertising, promotion and sponsorship;
4) Evaluating intervention efficacy and refining efforts; and
5) Integrating efforts to eliminate tobacco related disparities in all chronic disease prevention areas.

The CDC also recommends that state surveillance systems and infrastructure include the capacity to enhance the collection and use of data to correctly identify disparities.

<u>More to do</u>

One study found that taxpayers bear 60% of the cost of smoking-attributable diseases through publicly funded programs such as Medicare and Medicaid.[3] Despite declines in the rates of smoking in recent years, the costs on society due to smoking persist.

The study concludes that "comprehensive tobacco control programs and policies are still needed to continue progress toward ending the tobacco epidemic in the U.S. 50 years after the release of the first Surgeon General's report on smoking and health."

<u>Summary</u>

In conclusion, a comprehensive tobacco prevention and control program has been proven to keep kids from starting to smoke, protect people from secondhand smoke, and help people quit. The components of that comprehensive program include policies that protect people from secondhand smoke exposure, make tobacco products expensive, reduce youth access to tobacco products, and provide help to people who want to quit along with public education on the health risks of tobacco. A comprehensive tobacco prevention and control program is needed to combat new and emerging tobacco products and the normalization of smoking in society.

There are a number of components of the comprehensive program detailed in the WSIPP report. When those activities are part of a fully funded tobacco prevention and control program, we can expect to continue our progress on reducing the prevalence of tobacco use in populations carrying a disproportionate health burden of tobacco use and dependence.

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[2] CDC 2014.
[3] http://insurancenewsnet.com/oarticle/2014/12/18/georgia-state-cdc-study-us-taxpayers-bear-financial-burden-of-smoking-related-d-a-580349.html#.VJQnnJ9A

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