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September 2015

I-502 Evaluation Plan and Preliminary Report on Implementation

In November 2012, Washington State voters passed Initiative 502 (I-502) which legalized limited possession and private use of marijuana by adults.[1] Specifically, the initiative authorized the state to regulate and tax marijuana for persons 21 years of age and older and added a new threshold for driving under the influence of marijuana.

The law also directed the Washington State Institute for Public Policy (WSIPP) to conduct benefit-cost evaluations of the implementation of I-502 by examining outcomes related to:

- public health,
- public safety,
- substance use,
- the criminal justice system,
- economic impacts, and
- administrative costs and revenues.

WSIPP is required to produce reports for the legislature in 2015, 2017, 2022, and 2032. This first report provides a plan for the overall study. This report also includes results from preliminary analyses that will serve as the foundation for outcome analyses to be featured in subsequent reports.

[1] Initiative Measure No. 502; Full text available at http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Initiatives/Initiatives/INITIATIVE%20502.pdf

Summary

In 2012, with the passage of Initiative 502, Washington voters legalized limited adult possession and private use of cannabis, as well as its licensed production and sale. The initiative also directed WSIPP to evaluate the effect of the law on Washington's population and economy. This first required report provides a research plan for the overall study.

WSIPP's evaluation of I-502 will be divided into three components:

1) a descriptive study of how the law is being implemented;
2) an outcome study that will identify causal effects of the law; and
3) a benefit-cost study.

This initial report describes the status of I-502 implementation through June 30, 2015. We present information on the number of licensed cannabis businesses, cannabis sales, and historical trends in adult and youth cannabis use.

This report does not contain findings on whether I-502 has had any effects on outcomes. Effects of the law will not be detectable until several years after implementation. The next required report, due September 1, 2017, will include initial results of outcome analyses.

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Introduction

The primary purpose of this first report is to describe the research plan for the overall study. We begin with an overview of three main study components: a descriptive study, an outcome study, and a benefit-cost study. For each component we describe the research methods we intend to use, and we report preliminary data where available.

We want to emphasize that this preliminary report does not contain findings on whether I-502 has had any effects on outcomes. Not enough time has passed since I-502 was enacted for WSIPP to draw any cause-and-effect conclusions. Effects of the law will not be detectable until several years after implementation, and it may take longer for any effects to stabilize.

The next required report, due September 1, 2017, will include initial results of outcome analyses.

Terminology

In this report we use the scientific term "cannabis" instead of "marijuana" to refer to all drug preparations of the cannabis genus of plants. We retain usage of marijuana when that term is used in existing materials. We use the term "non-medical" in place of "recreational" to refer to cannabis consumption that is for the purpose of intoxication and not part of an authorized treatment of a medical condition. Throughout the report, references to non-medical cannabis exclude black market cannabis.

Study Overview

The specific requirements for the study were written into the initiative and are shown in Exhibit 1. Our study plan has been developed to address all of these requirements and has also been influenced by the scientific literature on the effects of cannabis and other drugs, drug policy, and the economic aspects of non-medical drug use. The study plan will continue to be shaped by the input of many individuals who are involved in the implementation of I-502.

Exhibit 1

I-502 Study Requirements Contained in the
Revised Code of Washington (RCW) 69.50.550 (emphasis added)

*(1) The Washington state institute for public policy shall conduct **cost-benefit evaluations** of the implementation of chapter 3, Laws of 2013. A preliminary report, and recommendations to appropriate committees of the legislature, shall be made by September 1, 2015, and the first final report with recommendations by September 1, 2017. Subsequent reports shall be due September 1, 2022, and September 1, 2032.*

(2) The evaluation of the implementation of chapter 3, Laws of 2013 shall include, but not necessarily be limited to, consideration of the following factors:

*(a) **Public health**, to include but not be limited to:*

(i) Health costs associated with marijuana use;

(ii) Health costs associated with criminal prohibition of marijuana, including lack of product safety or quality control regulations and the relegation of marijuana to the same illegal market as potentially more dangerous substances; and

(iii) The impact of increased investment in the research, evaluation, education, prevention and intervention programs, practices, and campaigns identified in RCW 69.50.363 on rates of marijuana-related maladaptive substance use and diagnosis of marijuana-related substance-use disorder, substance abuse, or substance dependence, as these terms are defined in the Diagnostic and Statistical Manual of Mental Disorders;

*(b) **Public safety**, to include but not be limited to:*

(i) Public safety issues relating to marijuana use; and

(ii) Public safety issues relating to criminal prohibition of marijuana;

*(c) **Youth and adult rates** of the following:*

(i) Marijuana use;

(ii) Maladaptive use of marijuana; and

(iii) Diagnosis of marijuana-related substance-use disorder, substance abuse, or substance dependence, including primary, secondary, and tertiary choices of substance;

*(d) **Economic impacts** in the private and public sectors, including but not limited to:*

(i) Jobs creation;

(ii) Workplace safety;

(iii) Revenues; and

(iv)Taxes generated for state and local budgets;

*(e) **Criminal justice impacts**, to include but not be limited to:*

(i) Use of public resources like law enforcement officers and equipment, prosecuting attorneys and public defenders, judges and court staff, the Washington state patrol crime lab and identification and criminal history section, jails and prisons, and misdemeanant and felon supervision officers to enforce state criminal laws regarding marijuana; and

(ii) Short and long-term consequences of involvement in the criminal justice system for persons accused of crimes relating to marijuana, their families, and their communities; and

*(f) **State and local** agency administrative costs and revenues.*

The major headings of RCW 69.50.550 define the six broad categories of outcomes to be evaluated: public health, public safety, youth and adult drug use and maladaptive use, economic impacts, criminal justice, and state and local administrative costs and revenues.

The law calls for comparison of outcomes after I-502 to the condition of criminal prohibition before I-502. In one sense, this is simply a requirement to contrast outcomes before and after the law. This language also provides an occasion to clarify two primary aspects of I-502: 1) legalization of adult cannabis possession and private consumption (the *legal* aspect), and 2) the establishment of commercial production, processing, and retail sales (the *supply* aspect).

I-502 changes the legal and supply aspects differently, and each aspect will have distinct effects on outcomes. Regarding the legal aspect, I-502 brought about various changes to criminal offenses related to cannabis. Adult possession of limited amounts and private use are no longer illegal, and enforcement of new laws, such as the *per se* limit for driving under the influence of cannabis, and existing laws, such as those prohibiting unlicensed production and distribution, are important dimensions of the legal aspect of I-502.

Regarding the supply aspect of I-502, a cannabis supply system existed before the law, and changes in the supply system under commercialization may include changes in availability, product quality, innovations, and advertising, all of which can be expected to influence use of cannabis and subsequent outcomes.[2]

I-502 also directs WSIPP to examine potential mitigating effects of the increased investments in research, education, prevention, and intervention required in the initiative. A portion of our study plan is devoted to identifying the extent to which research is stimulated; intervention technologies are improved as a result; and potentially harmful effects of increased drug use are mitigated by public health education, prevention, and treatment efforts.

The law does not limit the study to the six required outcomes shown in Exhibit 1. We plan to address additional outcomes as well, such as high school graduation and child welfare, that have been identified in the research literature and by stakeholders.

As required by the law, the ultimate aim of the study is to complete a benefit-cost analysis of the net economic impact of I-502 in Washington State. Our benefit-cost analysis will account for an array of monetary aspects of I-502 implementation:

- State and local revenues from excise, sales, and business & occupation taxes, fees, and fines;
- State and local agency costs of implementing the law;
- Effects on substance use, health, traffic safety, criminal justice, workplace safety, etc.; and
- Other economic impacts including employment and wages in the non-medical cannabis industry and ripple effects on the broader economy.

[2] Kilmer, B., Caulkins, J.P., Pacula, R.L., MacCoun, R.J., & Reuter, P.H. (2010). *Altered State? Assessing how marijuana legalization in California could influence marijuana consumption and public budgets.* Santa Monica, CA: RAND Corporation.

To begin, we first need accurate information on the nature of I-502 implementation as it varies throughout Washington and over time. Accurate descriptive information on the status of implementation will inform when and how to test for effects of the law on outcomes, all of which will feed into the benefit-cost analysis of the net economic impact of I-502.

The numerous factors expected to play into I-502's effect on Washington are graphically represented in the logic model in Exhibit 2.

At the upper left, legal and regulatory changes form the policy environment in which all other aspects of the law unfold. I-502 implementation is occurring in a dynamic policy context that continues to change. Many outcomes will be examined over a long period of time during which other policy changes may also come into play. Salient examples of related laws include the 2011 privatization of liquor sales and recently passed legislation which incorporates the medical cannabis market into the non-medical market.[3]

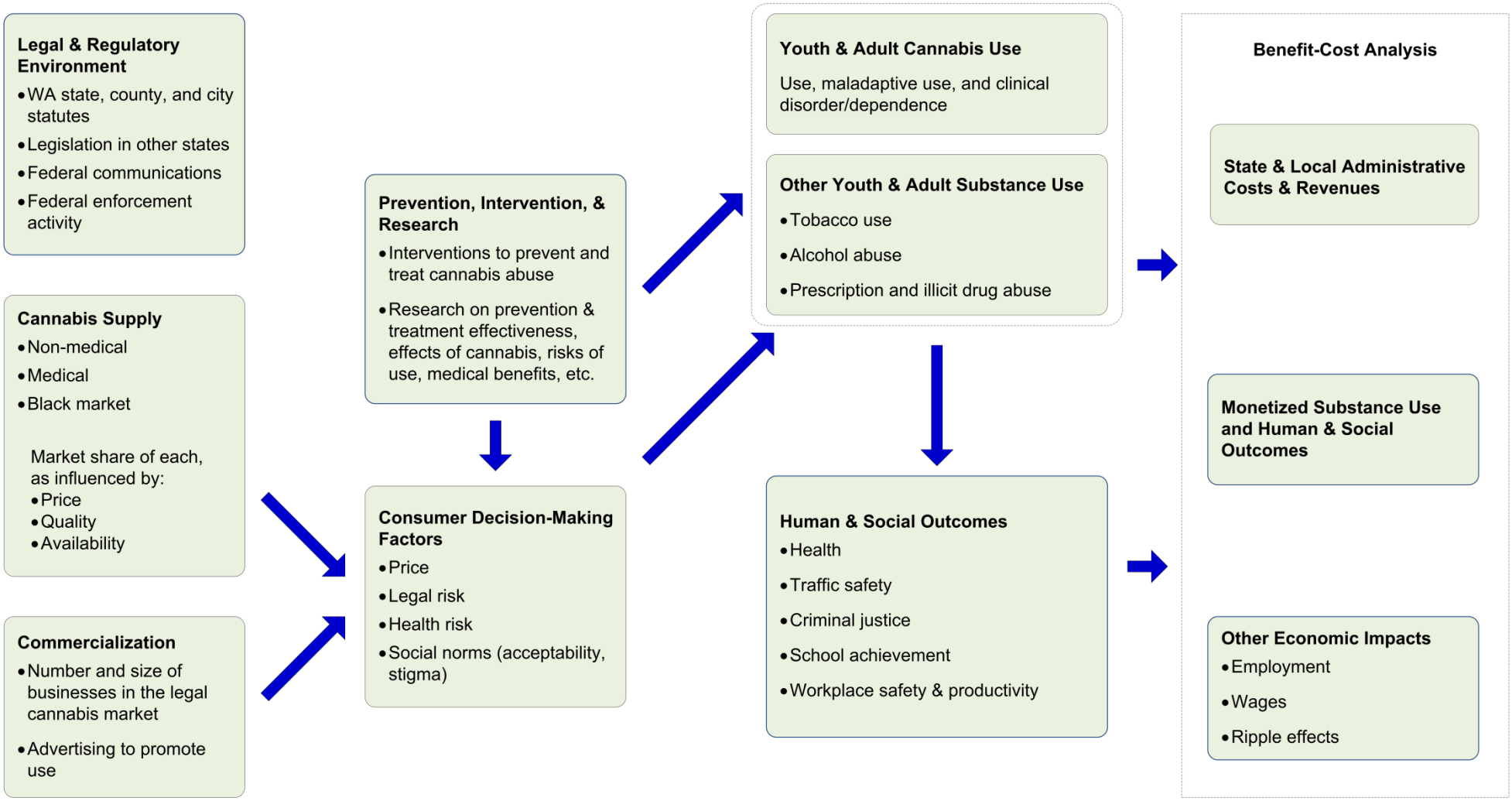
Study Components

- Descriptive study—a description of the policy context and status of I-502 implementation across the state and over time, including the following:
  - The legal and regulatory environment related to non-medical and medical cannabis at national, state, and local levels; and
  - Aspects of implementation of the law related to supply, enforcement, prevention, treatment, and research.
- Outcome study—identification of changes in outcomes that are causally associated with the law, especially outcomes that can be monetized. The study will include the following:
  - Longitudinal analysis of outcomes before and after various aspects of implementation (e.g., law effective date, beginning of retail sales, and full implementation); and
  - Comparisons between Washington and other states, and between localities within Washington.
- Benefit-cost study—identification of the net economic impact of I-502, accounting for revenues, costs of implementing the law, monetized outcomes, and ripple effects on the broader economy.

[3] Second Substitute Senate Bill 5052, Chapter 70, Laws of 2015; and Initiative Measure No. 1183, Chapter 2, Laws of 2012; Full text available at http://lawfilesext.leg.wa.gov/biennium/2011-12/Pdf/Initiatives/Initiatives/INITIATIVE%201183.SL.pdf

Exhibit 2

Logic Model for the WSIPP Evaluation of I-502



As depicted in Exhibit 2, the supply of cannabis through the I-502 system is interrelated with supply through medical and black market systems. As implementation of I-502 progresses, the legal supply system is expected to expand, and factors such as pricing and availability are expected to increase competition and reduce the size of the black market. The legal system may also compete for medical market demand from non-medical users. The ability of the legal market to supplant illegal markets would have direct effects on revenues, as well as downstream effects, such as reduced involvement in criminal activity.

Aspects of commercialization of the legal system, such as the extent to which successful businesses consume a larger market share, may also influence demand for cannabis by lowering price through increased efficiency. As a competing influence, the delivery of prevention and intervention services, and further research—features of I-502's "public health approach" to cannabis legalization—may reduce demand by shifting perceptions of the health risks of cannabis use.[4] These competing influences affect consumer decision-making about whether or not to use cannabis and other drugs and how to use them (i.e., use vs. maladaptive and disordered use).

In the third column of Exhibit 2, youth and adult use of cannabis, including maladaptive and clinically-disordered use, play a central role in the causal logic of I-502. Use of cannabis is expected to be interrelated with use of alcohol, tobacco, and other drugs (ATOD), such as prescription pain relievers.[5] All effects of the law on outcomes flow through changes in use of cannabis and other drugs.

The various human and social outcomes are shown next. Health, public safety, and other outcomes may be affected by substance use.

At the far right of Exhibit 2, we illustrate how all of these factors ultimately feed into the benefit-cost analysis of net economic impact of the law. In estimating the net economic impact of the law we will account for revenues, agency costs, monetized human and social outcomes, and other economic impacts.

In the remainder of this report, we describe in detail the three study components: the descriptive study, the outcome study, and the benefit-cost study.

[4] Hong, G., Speaker, L., & Becker, L. (n.d.). Understanding pathways to youth marijuana engagement to inform prevention program selection in a changing social environment. *Unpublished manuscript.*

[5] Bachhuber, M.A., Saloner, B., Cunningham, C.O., & Barry, C.L. (2014). Medical cannabis laws and opioid analgesic overdose mortality in the United States, 1999-2010. *JAMA Internal Medicine, 174*(10), 1668-1673.

Descriptive Study

In the descriptive study, we examine the policy context of I-502 and aspects of implementation as they unfold over time, at the state, county, and city levels. The following aspects of policy and implementation are being tracked:

- Policy context: passage and enactment of I-502, city and county cannabis ordinances, policies on medical cannabis and alcohol, legalization in other states, and federal legislation and enforcement;
- Regulation of I-502 by the Liquor Control Board (LCB): rulemaking, administration, and enforcement; [6]
- Implementation of I-502: licensing, business locations, and sales;
- Medical cannabis business locations and sales; and
- State and local non-medical cannabis revenues and costs.

Policy Context

This section summarizes the significant federal, state, and local policies that make up the context of I-502 implementation. Many of our outcome analyses will use data that cover a wide span of time, bringing into play a number of policy changes that may influence the same outcomes I-502 is expected to influence.

[6] Effective July 24, 2015 the Liquor Control Board is renamed the Liquor and Cannabis Board (see Second Substitute Senate Bill 5052, Chapter 70, Laws of 2015).

Cannabis Policy in Washington State

In 1971, the Washington State Legislature passed the Uniform Controlled Substances Act, nearly identical to the federal Controlled Substances Act of 1970, categorizing cannabis as a Schedule I drug with high potential for abuse and no medical uses. The law made distributing, manufacturing, and possessing cannabis illegal in Washington State.

In the 1979 case of *State v. Diana*, however, a Washington Court of Appeals recognized a common-law medical necessity defense for the possession of cannabis in particular circumstances.

This defense was permitted until the 1997 case of *Seeley v. State*, when the Washington State Supreme Court effectively repealed the medical necessity defense for cannabis. The voters of Washington State responded in 1998 by approving Initiative 692 (I-692), providing authorized patients and their designated caregivers an affirmative defense for charges related to the use or possession of medical cannabis.[7]

Washington legislators and courts gradually modified I-692 over the next decade through various laws and court decisions. In 2011, the legislature proposed an overhaul of medical cannabis regulations.[8] The bill created a registry of medical cannabis patients and providers and directed state employees to authorize and license commercial medical cannabis businesses. Those sections of the bill were vetoed due to concerns that they would expose public employees to the risk of federal prosecution.[9] The remaining provisions of the legislation provided an affirmative defense to criminal prosecution for collective gardens, individual cultivation, and possession of medical cannabis by qualified patients and caregivers but eliminated medical cannabis dispensaries as a legally viable model of operation.[10] Despite the 2011 legislation, however, many medical dispensaries continued to operate.

Also in 2011, liquor sales were privatized by passage of Initiative 1183 (I-1183). Effective in June 2012, the initiative removed the state controlled liquor system, allowed liquor sales by private stores, removed uniform pricing, and removed bans on quantity discounts and advertising.[11] I-1183 represents an important part of the policy context because it went into effect less than a year prior to I-502 and could potentially influence common outcomes such as traffic safety.

On November 6, 2012, I-502 passed with 55.7% approval in Washington State, legalizing limited adult possession and private consumption of non-medical cannabis, as well as its licensed production and sale. I-502 also added a new threshold for driving under the influence of cannabis. The law became effective on December 6 of that year.

Following passage of I-502, the legislature passed several bills amending the language of I-502. In 2013, legislation passed clarifying the definition of tetrahydrocannabinol (THC) concentration as given in I-502.[12] Additional

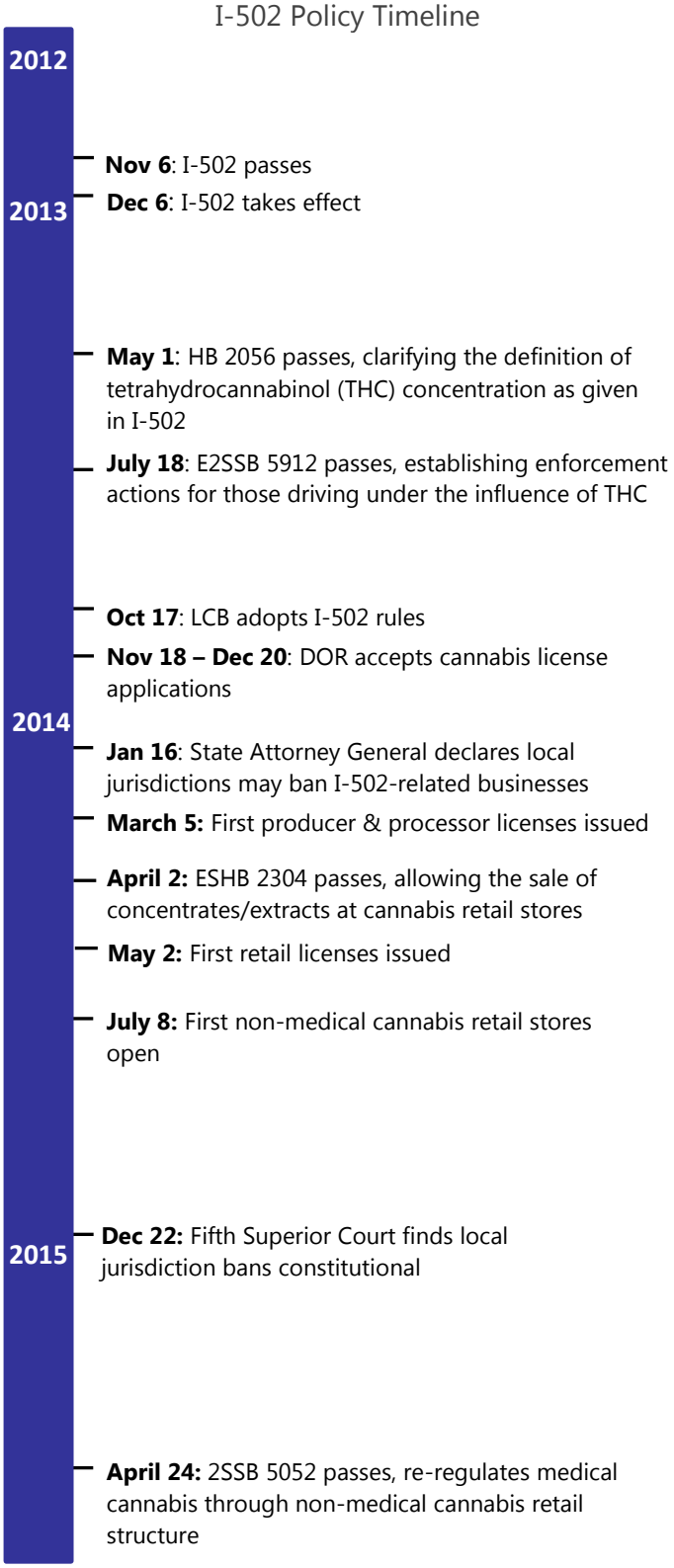
[7] Initiative No. 692; Full text available at http://www.sos.wa.gov/elections/initiatives/text/i692.pdf
[8] Engrossed Second Substitute Senate Bill 5073, Chapter 181, Laws of 2011, partial veto.
[9] http://lawfilesext.leg.wa.gov/biennium/2011-12/Pdf/Bills/Vetoes/Senate/5073-S2.VTO.pdf
[10] Engrossed Second Substitute Senate Bill 5073, Chapter 181, Laws of 2011, partial veto.
[11] Initiative Measure No. 1183, Chapter 2, Laws of 2012; Full text available at http://lawfilesext.leg.wa.gov/biennium/2011-12/Pdf/Initiatives/Initiatives/INITIATIVE%201183.SL.pdf
[12] Engrossed House Bill 2056, Chapter 116, Laws of 2013.

legislation established enforcement actions to be taken against persons driving under the influence of THC.[13] In 2014, the legislature passed a bill allowing the sale of concentrated forms of cannabis (i.e., concentrates, extracts) at I-502 retail stores.[14]

In October 2013, the LCB adopted the first set of rules regarding cannabis licenses, the application process, requirements, and reporting. License applications were accepted from November to December 2013. The first producer and processor licenses were issued in March 2014. In May, the first 34 retail applications were approved, using a procedure for allotment of stores based on population size and demand, and incorporating random selection when the number of applicants exceeded the allotment for a county. The first non-medical cannabis retail stores opened on July 8, 2014.

As we explore in more detail below, 72 Washington cities and counties have prohibited non-medical cannabis businesses within their jurisdiction. In January 2014, the Washington State Attorney General released a memo affirming that local jurisdictions may regulate and/or ban I-502-related businesses. In December 2014, a Fifth Superior Court judge also found local jurisdiction bans constitutional.

Exhibit 3
I-502 Policy Timeline



[13] Engrossed Second Substitute Senate Bill 5912, Chapter 35, Laws of 2013.
[14] Engrossed Substitute House Bill 2304, Chapter 192, Laws of 2014.

Exhibit 4

Timeline of Medical Cannabis Policy in Washington

1998

Nov 1998: I-692 passes in WA

2008

Nov 2008: Department of Health (DOH) sets medical cannabis supply for 60 days at 24 oz. of usable cannabis plus 15 plants

2009

Oct 2009: US Deputy Attorney General Ogden releases memo declaring the sale/use of med. cannabis in legal states is a low priority for federal prosecutors

2011

Apr 2011: Federal Drug Enforcement Agency (DEA) cracks down on Spokane medical cannabis dispensaries

E2SSB 5073 partially vetoed, eliminating dispensaries and establishing collective gardens

Nov 2011: DEA raids 14 Seattle area medical dispensaries

2014

Mar 2014: *Cannabis Action Coalition v. City of Kent* declares the use and possession of medical cannabis, including collective gardens, is illegal under state law

2015

Apr 2015: 2SSB 5052 passes creating voluntary registry of patients, eliminating collective gardens, and re-regulating medical cannabis through non-medical cannabis retail structure

In 2014, the Washington State Court of Appeals declared that state law only provided an affirmative defense for medical cannabis patients and that the use and possession of medical cannabis, including collective gardens, were still illegal. The 2015 Legislature passed legislation regulating medical cannabis through the current non-medical cannabis regulatory structure and creating a voluntary registry of medical cannabis patients.[15]

[15] Second Substitute Senate Bill 5052, Chapter 70, Laws of 2015.

The 2015 Legislature also passed legislation establishing cannabis research licensing and authorizing the governor to enter into agreements concerning cannabis with American Indian tribes.[16] The 2015 Legislature also eliminated the previous three-tier tax structure, replacing it with a single excise tax of 37% on retail sales (patients in the voluntary registry are exempt from the excise tax).[17] The new law also provides for distribution of excise tax revenues to local jurisdictions and allows jurisdictions to reduce the required buffer zones around cannabis businesses, granting stores the opportunity to expand into denser neighborhoods. The 2015 Legislature also passed a bill prohibiting open containers of cannabis in vehicles.[18]

Cannabis Policy in Other States

In November 2012, Colorado voters also legalized the limited adult possession and private consumption of non-medical cannabis, as well as its licensed production and sale. The first non-medical cannabis retail stores opened in Colorado on January 1, 2014. In November 2014, voters in Alaska, Oregon, and the District of Columbia also passed forms of non-medical cannabis legalization.

As of June 30, 2015, 23 states and the District of Columbia had legalized medical cannabis, and four states and the District of Columbia had legalized non-medical cannabis in some form (Exhibit 5).[19]

[16] Senate Bill 5121, Chapter 71, Laws of 2015 and House Bill 2000, Chapter 207, Laws of 2015.

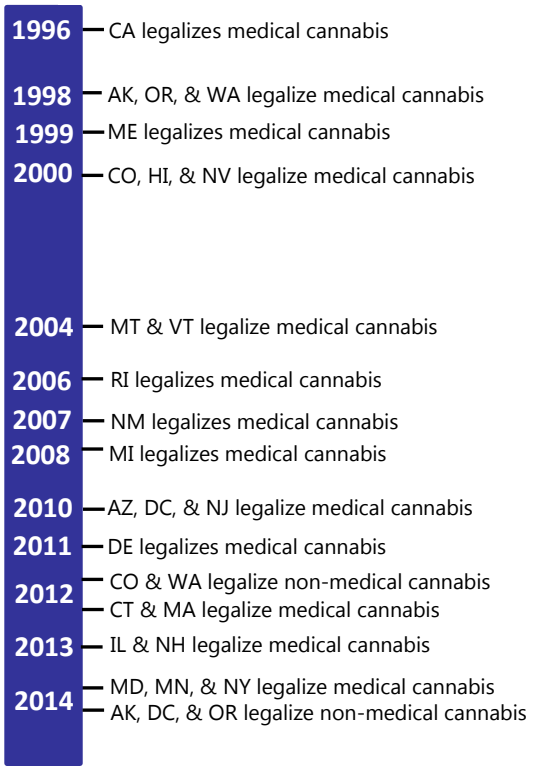
[17] Second Engrossed Second Substitute House Bill 2136, Chapter 4, Laws of 2015.

[18] Second Engrossed Second Substitute House Bill 1276, Chapter 3, Laws of 2015, partial veto.

[19] National Conference of State Legislatures: http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx

Exhibit 5

Timeline of Other States' Cannabis Laws



Federal Cannabis Policy

The possession, cultivation, and distribution of cannabis remain criminal activities under federal law.[20] In 2005, the US Supreme Court upheld the Controlled Substances Act and the power of Congress to prohibit the possession and cultivation of cannabis.

In October 2009, US Deputy Attorney General David Ogden released a memo declaring that the sale and use of non-medical cannabis in states where it is legal is a low priority for federal prosecutors.[21] US Deputy Attorney General James Cole released an additional memo in August 2013, listing the eight cannabis enforcement priorities of federal prosecutors, emphasizing that the states will be the primary means of cannabis law enforcement if they have strong and effective regulatory and enforcement systems.[22] The eight priorities of the Cole memo include preventing:

- distribution of marijuana to minors;
- revenue from the sale of marijuana from going to criminal enterprises, gangs, and cartels;
- diversion of marijuana from states where it is legal under state law to other states where it is illegal;
- state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity;
- violence and the use of firearms in the cultivation and distribution of marijuana;
- drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use;
- the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public land; and
- marijuana possession or use on federal property.

[20] Controlled Substances Act (21 U.S.C. § 811).

[21] David W. Ogden, *Investigations and Prosecutions in States Authorizing the Medical Use of Marijuana,* October 19, 2009. Full text available at: http://www.justice.gov/sites/default/files/opa/legacy/2009/10/19/medical-marijuana.pdf

[22] James M. Cole, *Guidance Regarding Marijuana Enforcement*, August 29, 2013. Full text available at: http://www.justice.gov/iso/opa/resources/3052013829132756857467.pdf

There are several notable consequences of the discrepancy between state and federal cannabis law. First, many banks have been hesitant to interact with state-legal cannabis businesses because the production and sale of cannabis is a federal crime. The US Department of the Treasury released a memo in February 2014, clarifying the expectations of bank rules for cannabis businesses.[23] Several bills have been proposed in Congress to resolve this issue but none have passed as of June 30, 2015. The result is that financial transactions within the legal market are conducted in cash to a large extent, though some financial institutions are beginning to work with legal cannabis businesses.[24]

A second consequence of the discrepancy between state and federal cannabis laws derives from Internal Revenue Code 280E. This code prevents state-legal cannabis businesses from deducting expenses related to sales of cannabis from their federal tax liability (though costs of goods are deductible) because cannabis is illegal under federal law.[25] For an I-502 retailer, this means that expenses such as rent and wages are not deducted from the business' annual revenues so it appears as profit in a federal return and is taxed. For many retailers this means operating at a loss, without a substantial price mark-up.[26] Producers and processors are also affected by 280E but to a lesser extent because non-deductible expenses constitute a much smaller portion of their operating expenses.

A third consequence of conflicting state and federal cannabis law is that states tend to avoid exposing state employees and agencies to federal legal risk, so supply systems under state legalization tend toward private supply solutions.[27] Thus far, no state non-medical legalization effort has included a state-owned supply system.

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[23] Department of the Treasury, *BSA Expectations Regarding Marijuana-Related Businesses,* February 14, 2014. Full text available at: http://www.fincen.gov/statutes_regs/guidance/pdf/FIN-2014-G001.pdf

[24] Hotakainen, R. (2015, July 17). All-cash marijuana businesses push for change in banking law. *Idaho Statesman.* Retrieved from http://www.idahostatesman.com/2015/07/17/3899596_all-cash-marijuana-businesses.html?rh=1

[25] 26 U.S. Code § 280E.

[26] Zamarra, L. (2013). *Modeling marijuana businesses and costs of legal compliance.* BOTEC Analysis Corp. available at: http://liq.ssv.wa.lcl/publications/Marijuana/BOTEC%20reports/5b-Modelling-Marijuana-Businesses-Final.pdf

[27] Caulkins, J.P., Kilmer, B., Kleiman, M.A.R., MacCoun, R.J., Midgette, G., Oglesby, P., Pacula, R.L., & Reuter, P.H. (2015). *Considering marijuana legalization: Insights for Vermont and other jurisdictions.* Santa Monica, CA: RAND Corporation.

City and County Cannabis Policies

City and county governments have enacted their own policies concerning zoning regulations for cannabis businesses, prohibition of such businesses, and punishment for public consumption. Public Health–Seattle and King County (PHSKC) examined local ordinances in effect on July 1, 2014, pertaining to non-medical and medical cannabis in Washington's 39 counties and in cities with more than 3,000 residents.[28]

Regarding non-medical cannabis, PHSKC identified localities that adopted moratoria temporarily prohibiting cannabis businesses or that permanently banned such businesses. As of July 2014, the ten counties prohibiting non-medical cannabis businesses are shown in Exhibit 6. Sixty-two cities had similar laws in place.

Non-Medical Cannabis Businesses

Having summarized the history of I-502 policy and the timing of various legislative and regulatory events, we now present descriptive information on the current status of implementation across the state. Implementation indicators include the number of non-medical and medical businesses operating in each county and cannabis sales activity.

In October 2013, approximately ten months after enactment of I-502, the LCB adopted rules for the non-medical cannabis market, defining license requirements for three types of businesses: producers, processors, and retailers.[29] Applications for cannabis business licenses were accepted in November and December, and the first licenses were issued in March 2014.

The number of active non-medical cannabis businesses of each type across Washington's 39 counties is shown in Exhibit 6. Note that producer and processor licenses can be held alone or in combination by the same business, whereas retailer licensees cannot be combined with any other type of cannabis license.

In Exhibit 6 we also indicate whether the county has passed a local ban on non-medical cannabis businesses. Some non-medical cannabis businesses are located in counties that have banned such businesses. These businesses may be located within the boundaries of cities that have not passed such bans, because county zoning regulations do not apply within incorporated cities. In future analyses, to account for the intersection of city and county zoning regulations, we will represent local policy as the percentage of the population residing under the jurisdiction of a ban.

[28] Public Health–Seattle and King County: http://www.kingcounty.gov/healthservices/health/data/PolicyTracker.aspx and Municipal Research Services Corporation; See also: http://mrsc.org/Home/Explore-Topics/Legal/Regulation/Recreational-Marijuana-A-Guide-for-Local-Governmen.aspx

[29] http://liq.ssv.wa.lcl/marijuana/initiative_502_proposed_rules

Exhibit 6

Number of Cannabis Businesses and Presence of Local Ban, by County

	Producers[a]	Processors	Producer/ processors[b]	Retailers	Medical[c]	Current ban[d]
Adams					1	
Asotin				2		
Benton	3	2	6	1	5	
Chelan	9	1	11	5	3	
Clallam			6	3	6	
Clark			8	7	7	Yes
Columbia						Yes
Cowlitz	3	1	9	5	4	
Douglas			6	1	1	
Ferry			4			
Franklin			1			Yes
Garfield						Yes
Grant	1	1	3	3		
Grays Harbor	1		4	3	5	
Island		1		3	3	
Jefferson		1	3	2	5	
King		8	22	34	158	
Kitsap			6	6	11	
Kittitas	2	1	7	1		Yes
Klickitat	3	2	10	3		
Lewis				1		Yes
Lincoln	1		3			
Mason	2		12	3	4	
Okanogan	4		21	3	1	
Pacific			5	2		
Pend Oreille			2		1	
Pierce		1	7	12	77	Yes
San Juan	2		2	1	1	
Skagit	1		3	5	8	
Skamania				1		
Snohomish	3	2	26	15	40	
Spokane	22	9	49	14	33	
Stevens	2		11	2	1	
Thurston	6	5	17	8	26	
Wahkiakum			1			Yes
Walla Walla			3			Yes
Whatcom	1	1	24	9	13	
Whitman	1		1	2		
Yakima			2	5	5	Yes
State total	67	36	295	162	419	10

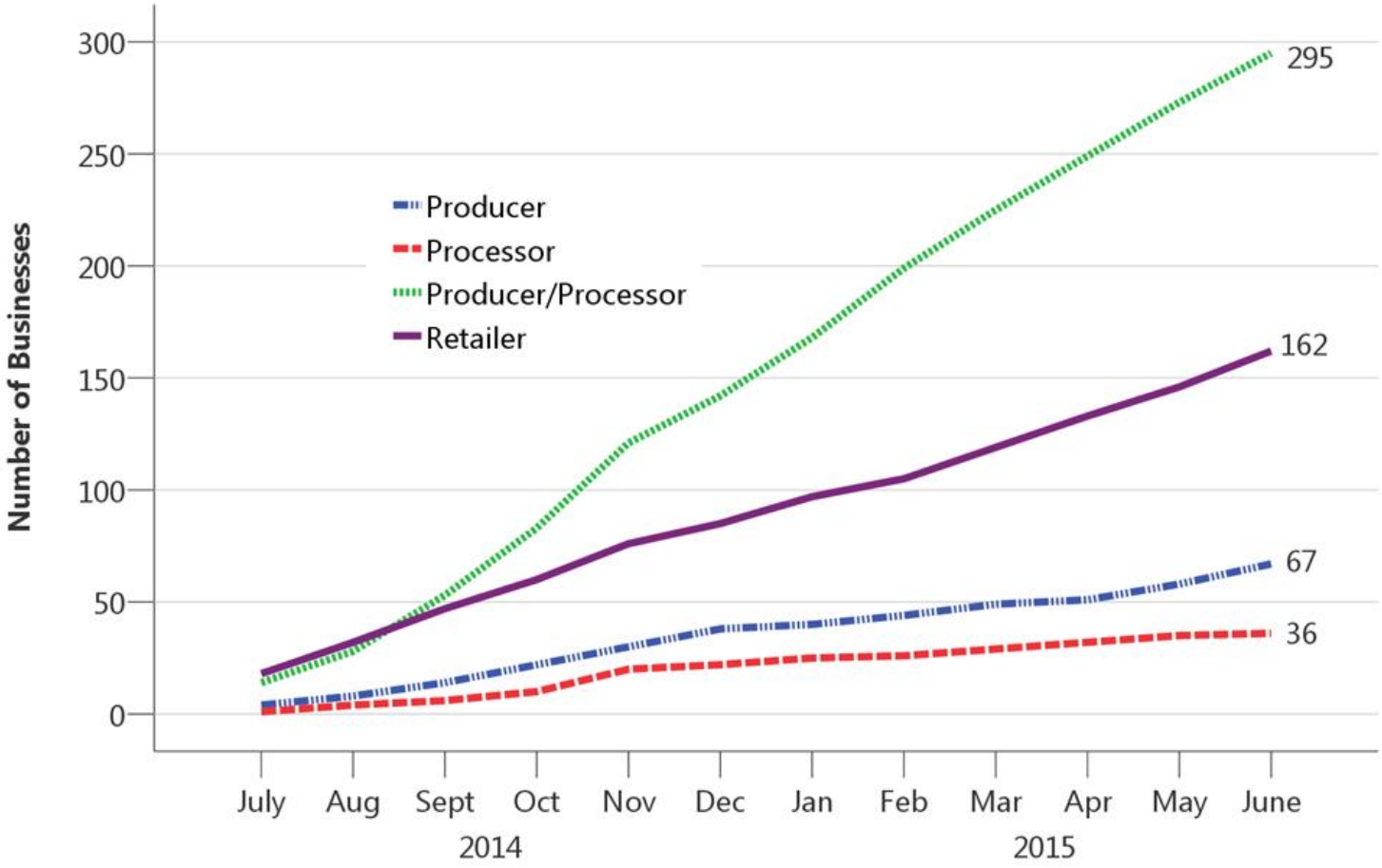
[a] Source: Liquor Control Board, Marijuana Sales Activity by License Number. Counts based on licensees with sales by June 30, 2015.
[b] Producer/processors hold two licenses, so the count of active licenses issued is twice the numbers in this column.
[c] Source: Department of Revenue, medical cannabis businesses remitting taxes in state fiscal year 2013-2015 that could be geographically located with certainty.
[d] Source: Public Health–Seattle and King County; current to 07/01/14; counties adopting a permanent ban in state fiscal year 2014, or a moratorium that was not superseded. Sixty-two cities similarly prohibited non-medical cannabis retail businesses. Non-medical cannabis businesses located in prohibiting counties may be located in incorporated areas without similar prohibitions.

Growth in the number of non-medical cannabis businesses since July 2014 is shown in Exhibit 7.

The location of non-medical cannabis businesses is shown in the maps in Exhibits 8 and 9. The maps also indicate cities and counties that have banned cannabis businesses (shaded in gray).

Exhibit 7

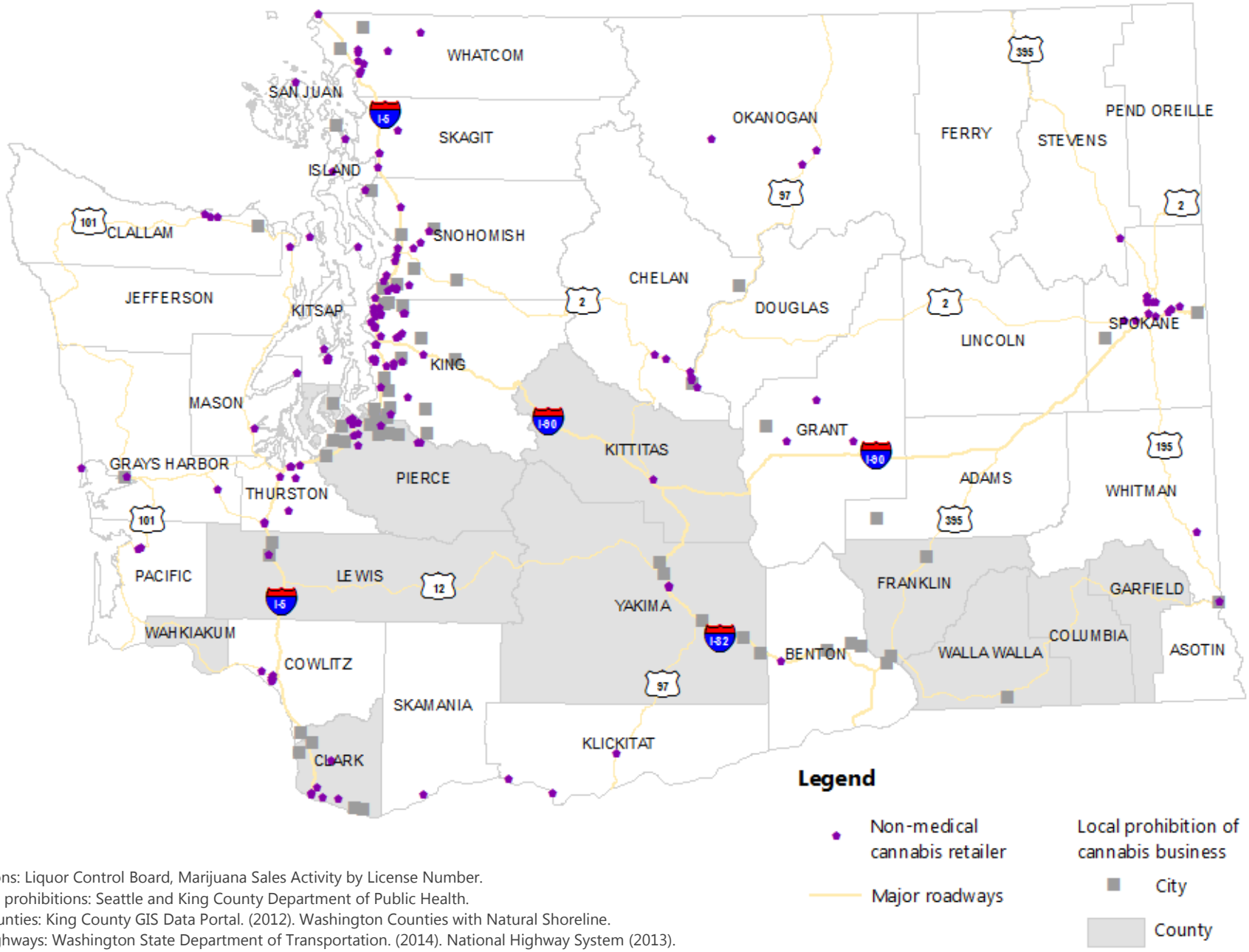
Non-Medical Cannabis Active Business Counts, by License Type



Source: Liquor Control Board, Marijuana Sales Activity by License Number.

Exhibit 8

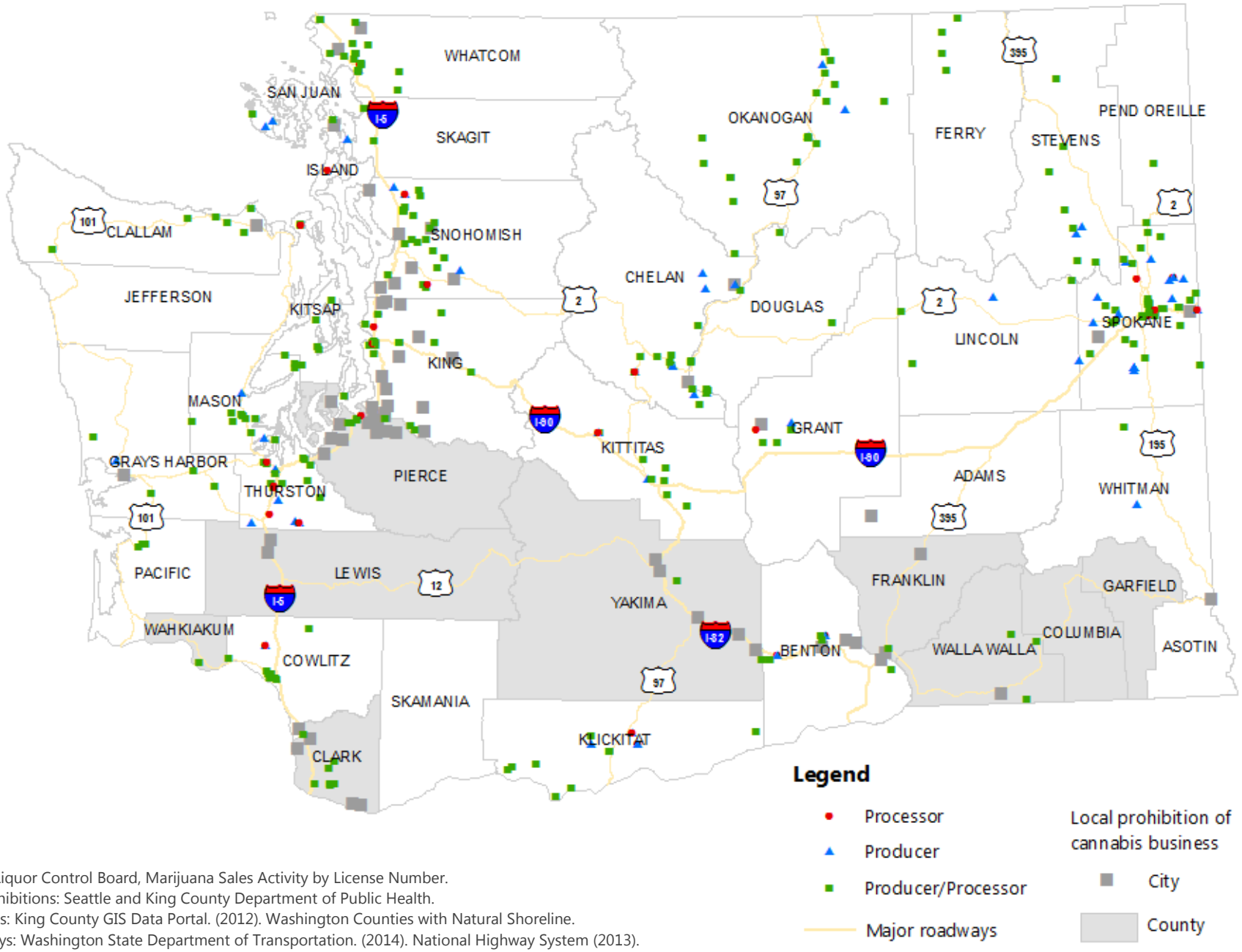
Non-Medical Cannabis Retail Locations and Local Bans on Retail Sales



Source:
Business locations: Liquor Control Board, Marijuana Sales Activity by License Number.
County and city prohibitions: Seattle and King County Department of Public Health.
Washington counties: King County GIS Data Portal. (2012). Washington Counties with Natural Shoreline.
Washington highways: Washington State Department of Transportation. (2014). National Highway System (2013).

Exhibit 9

Non-Medical Cannabis Producer and Processor Locations and Local Bans on Producers and Processors



Source:
Business locations: Liquor Control Board, Marijuana Sales Activity by License Number.
County and city prohibitions: Seattle and King County Department of Public Health.
Washington counties: King County GIS Data Portal. (2012). Washington Counties with Natural Shoreline.
Washington highways: Washington State Department of Transportation. (2014). National Highway System (2013).

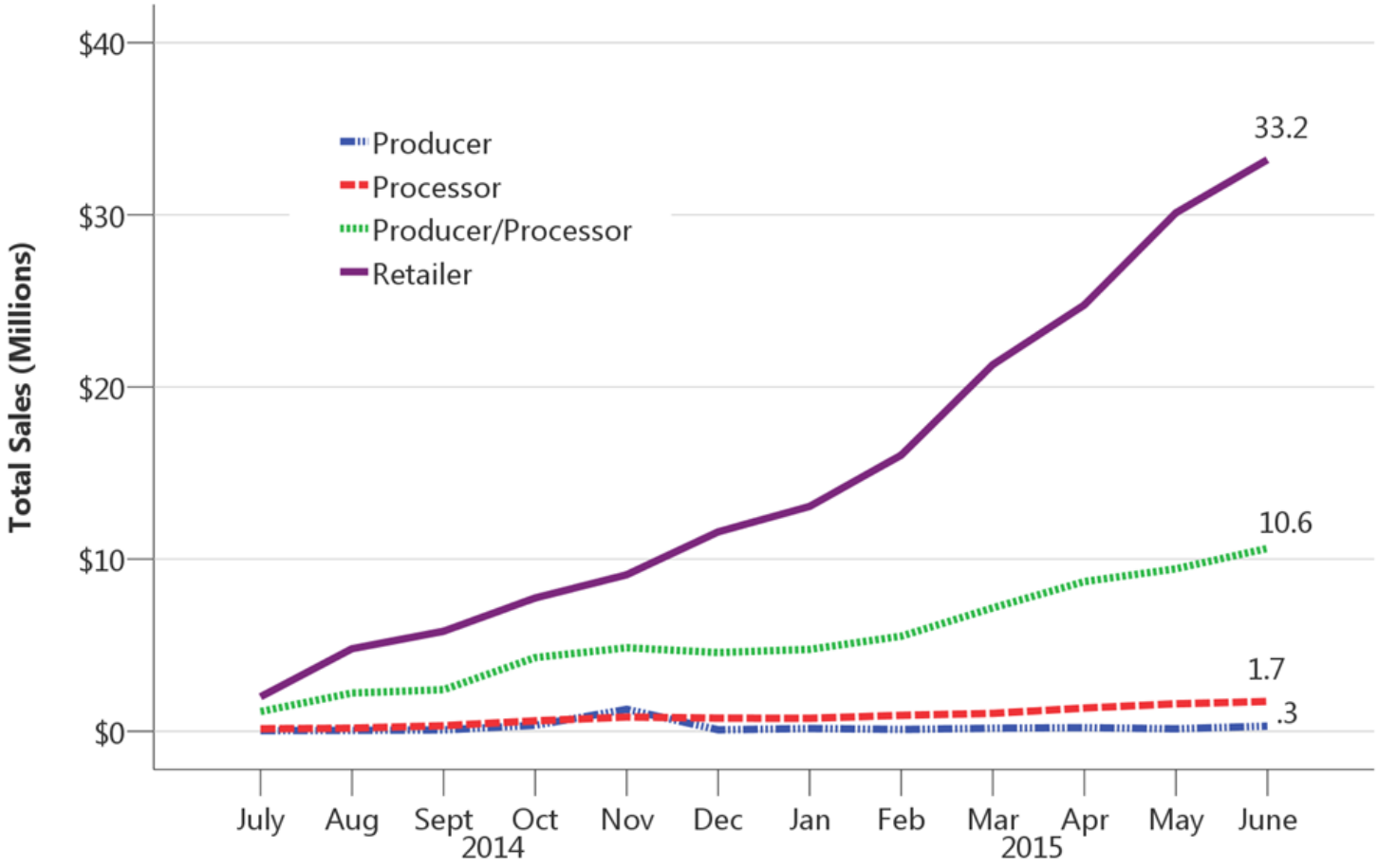
Non-Medical Cannabis Sales

Total statewide non-medical cannabis sales are shown for each type of business in Exhibit 10.

As the exhibit shows, there has been continuous growth in sales, especially for retailers and producer/processors.

Exhibit 10

State Total Monthly Non-Medical Cannabis Sales, by License Type



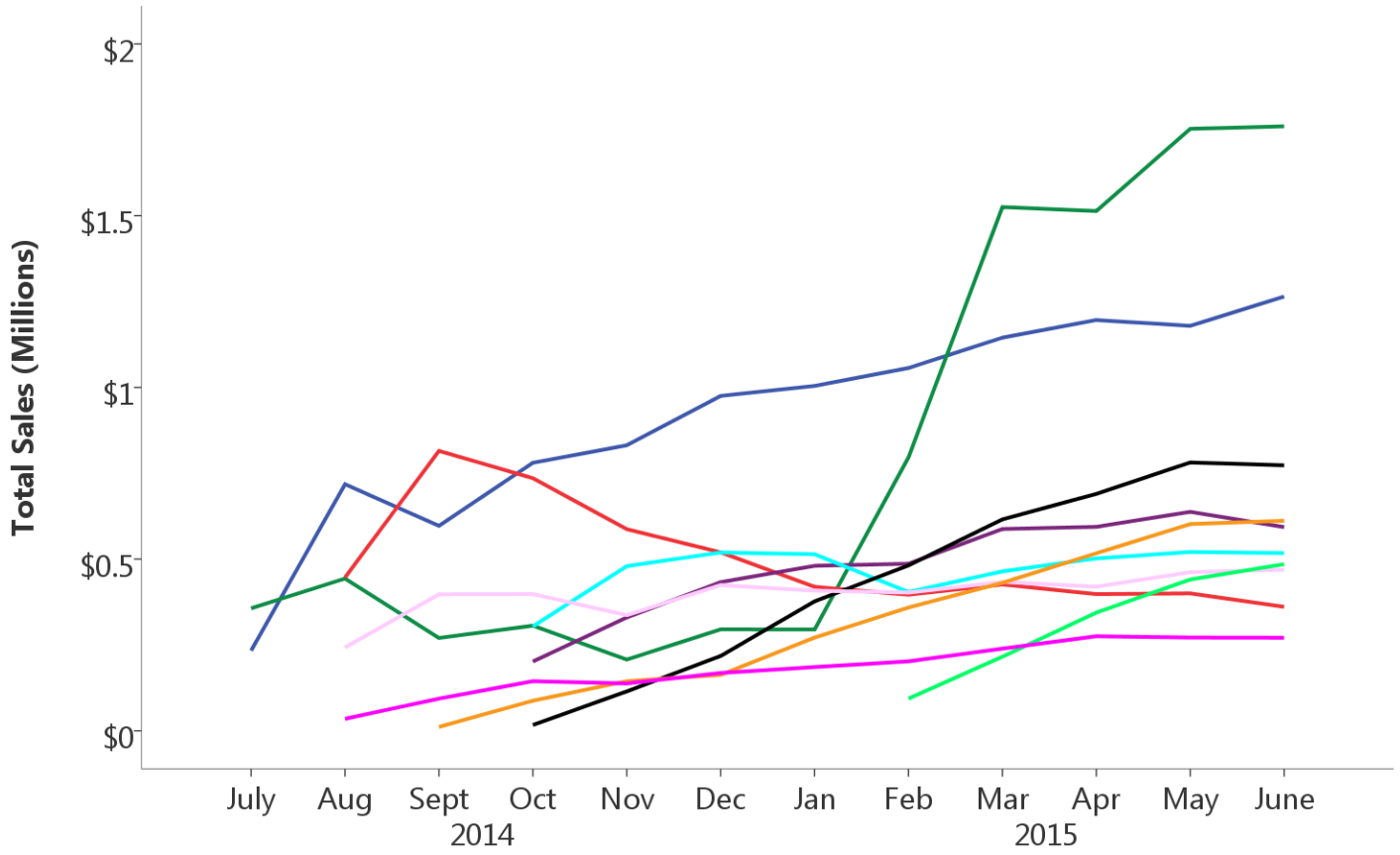
Source: Liquor Control Board, Marijuana Sales Activity by License Number. Data do not include black market sales, as is the case throughout the report for all references to "non-medical" cannabis.

The statewide total sales in Exhibit 10 conceal large variation in sales volumes of individual businesses. Focusing on retail sales, Exhibit 11 displays sales volumes for a sample of ten retailers.

The dark green line at the top of Exhibit 11 in March 2015 reflects rapidly increasing sales in one location (eventually topping $1.5 million in sales per month). In contrast, the red line several lines below had peak sales much earlier, in September 2014, after which its sales have declined.

Exhibit 11

Non-Medical Cannabis Retail Sales Vary Widely Between Selected Stores



Source: Liquor Control Board, Marijuana Sales Activity by License Number. Sample of 10 of 162 retailers selected to illustrate variation.

To provide a clearer sense of geographic variation in sales, retail sales by county are shown in Exhibit 12.

Of course, more populous counties tend to have higher total sales. They also tend to have more retailers, because the LCB apportioned retail licenses in part on the basis of population. There are, however, exceptions. Among Washington's five most populous counties (King, Pierce, Snohomish, Spokane, & Clark), Spokane and Clark are the smallest but have the highest per capita sales rates by a large margin ($47.14 and $56.93, respectively, compared to the next highest rate at $24.39). The three counties with the highest per capita sales rates are Klickitat, Clark, and Jefferson, though these counties have a relatively smaller number of retailers (3, 7, and 2, respectively).

Exhibit 12

Non-Medical Cannabis Retail Sales by County: July 2014 through June 2015

	Total Sales[a]	Per Capita Sales[b]	Average Sales among Retailers	# of Retailers[c]
Asotin	$78,390	$3.60	$39,195	2
Benton	$2,840,375	$15.87	$2,840,375	1
Chelan	$1,387,908	$19.00	$277,582	5
Clallam	$1,400,405	$19.52	$466,802	3
Clark	$24,625,881	$56.93	$3,517,983	7
Cowlitz	$4,562,059	$44.68	$912,412	5
Douglas	$1,668,086	$42.98	$1,668,086	1
Grant	$1,325,700	$14.70	$441,900	3
Grays Harbor	$978,614	$13.57	$326,205	3
Island	$1,185,035	$15.04	$395,012	3
Jefferson	$1,530,906	$51.23	$765,453	2
King	$48,165,054	$24.39	$1,416,619	34
Kitsap	$4,907,633	$19.42	$817,939	6
Kittitas	$1,374,389	$33.29	$1,374,389	1
Klickitat	$1,351,236	$65.80	$450,412	3
Lewis	$208,480	$2.76	$208,480	1
Mason	$365,731	$6.03	$121,910	3
Okanogan	$617,733	$15.01	$205,911	3
Pacific	$348,064	$16.75	$174,032	2
Pierce	$16,425,732	$20.39	$1,368,811	12
San Juan	$251,106	$15.91	$251,106	1
Skagit	$4,403,722	$37.43	$880,744	5
Skamania	$351,594	$31.60	$351,594	1
Snohomish	$17,451,819	$24.08	$1,163,455	15
Spokane	$22,337,229	$47.14	$1,595,516	14
Stevens	$650,613	$14.95	$325,307	2
Thurston	$5,889,800	$23.00	$736,225	8
Whatcom	$8,005,488	$39.39	$889,499	9
Whitman	$2,017,669	$44.33	$1,008,835	2
Yakima	$2,808,902	$11.48	$561,780	5

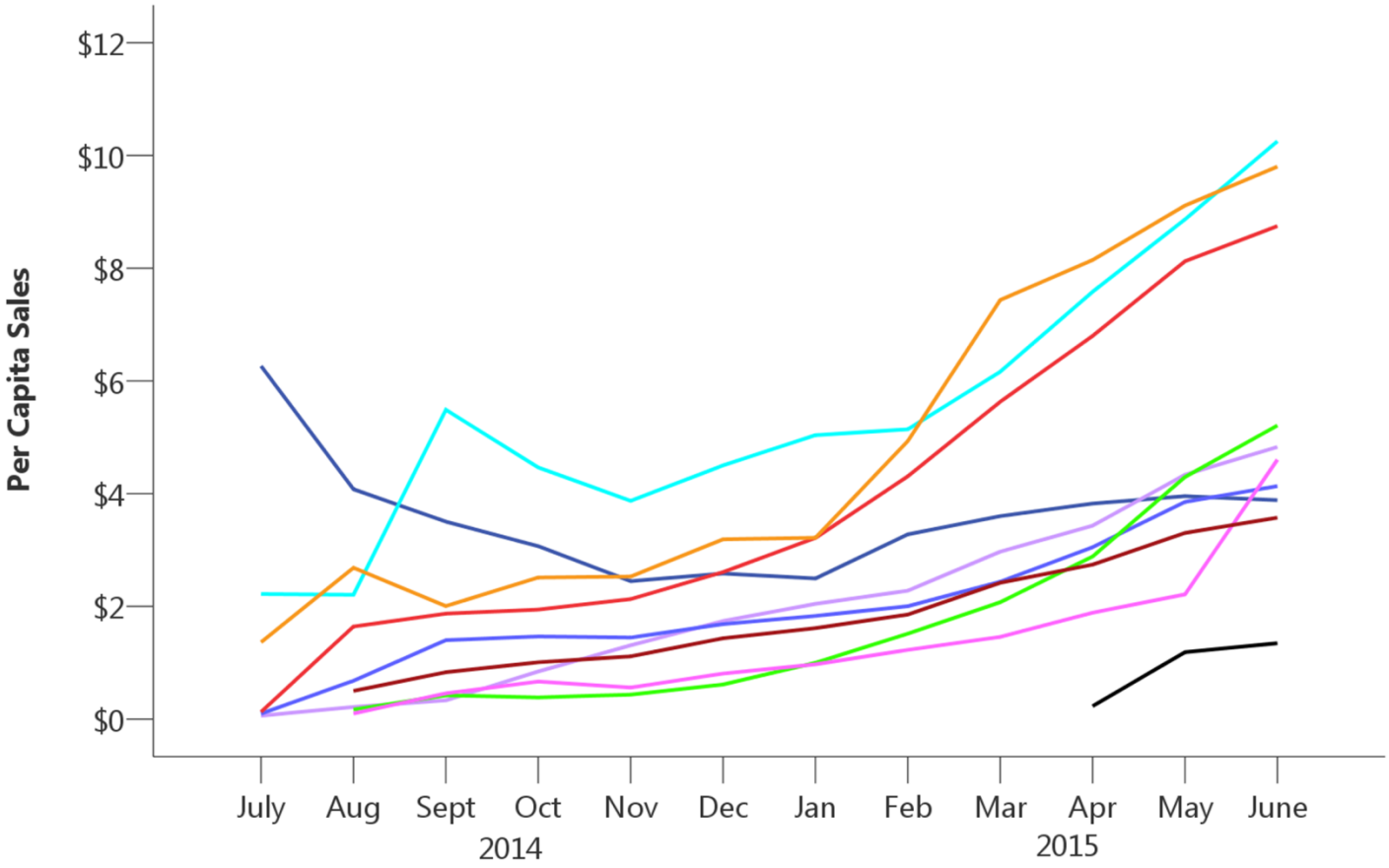
[a] Source: Liquor Control Board, Marijuana Sales Activity by License Number. Total retail sales from July 2014 through June 2015. Nine counties had no retail sales: Adams, Ferry, Franklin, Garfield, Lincoln, Pend Oreille, Wahkiakum, Walla Walla.
[b] Per capita sales based on county population from most recent five-year estimates (2009-2013) from the American Community Survey, US Census Bureau.
[c] Based on retail licenses issued by LCB with sales reported by June 30, 2015.

Exhibit 13 displays per capita non-medical cannabis sales for ten selected Washington counties. The exhibit reflects differences in the timing of first legal sales in each county (e.g,. the late starter at the bottom right of the exhibit), differences in overall sales levels, and differences in the pattern of change in sales over time.

Change over time in aspects of cannabis supply at the county level will be one of the primary predictor variables in outcome analyses. Data from the LCB Traceability System, which contains rich information on products sold within the legal system, will also be examined in future reports.

Exhibit 13

Per Capita Non-Medical Cannabis Retail Sales in Selected Washington Counties Vary Widely



Source: Liquor Control Board, Marijuana Sales Activity by License Number. Sample of 10 of 39 counties selected to illustrate variation.

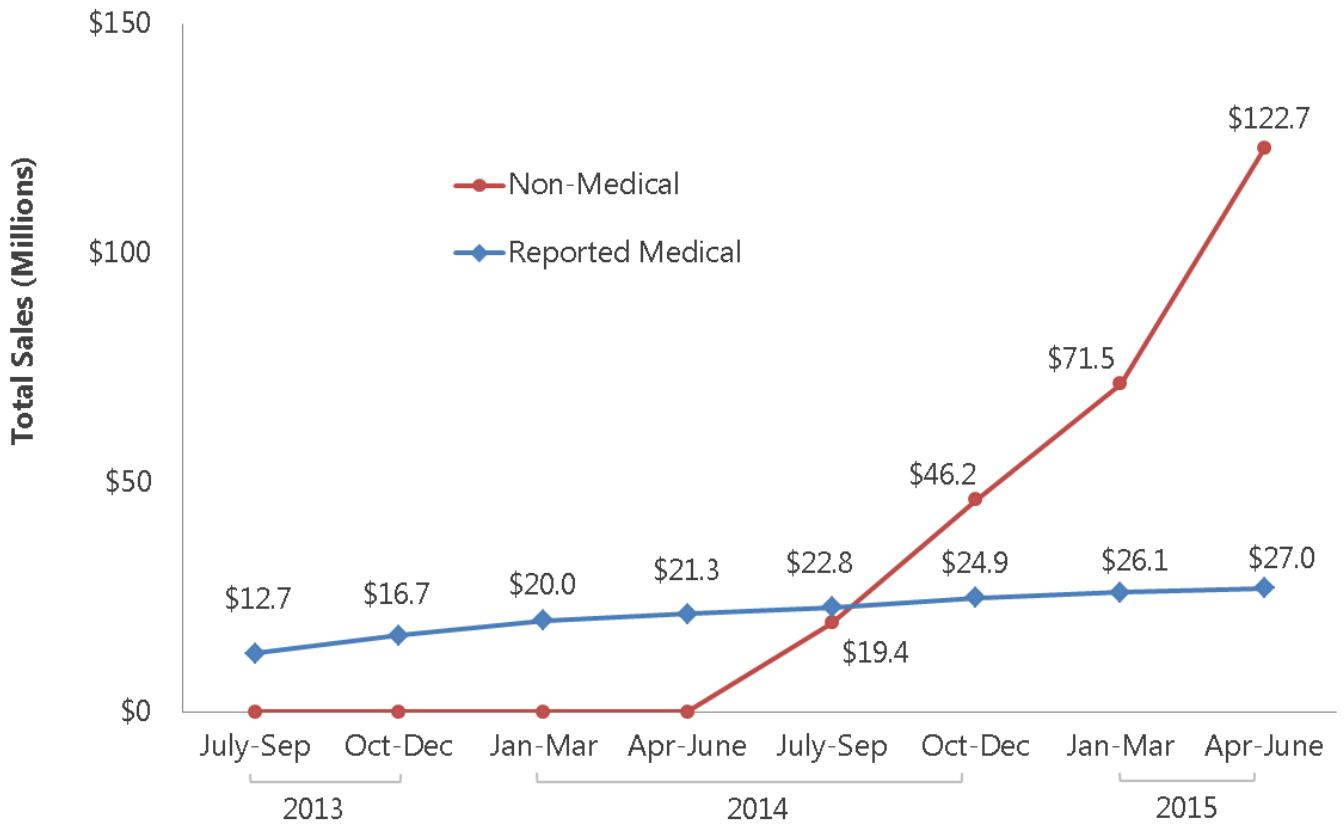
Medical Cannabis Sales

Data on medical cannabis businesses are not as readily available as for businesses in the non-medical system. The Department of Revenue (DOR) reports that 487 medical cannabis businesses paid the state sales and use tax from 2013 through 2015.[30]

In Exhibit 6, we reported the number of medical cannabis businesses in each county, based on DOR data. Since these data are limited to businesses that registered with DOR, we have also obtained data from commercial websites that track cannabis businesses.[31] These data will allow us to identify other medical cannabis businesses that are not registered with DOR (we have not yet analyzed these data).

Exhibit 14

State Quarterly Non-Medical and Reported Medical Cannabis Sales



Source: Medical sales based on tax filings with DOR. Non-Medical sales based on LCB Marijuana Sales Activity by License Number. Data are not limited to retail sales.

[30] The number of medical marijuana businesses that could be geographically located with certainty is 419, as reported earlier in Exhibit 6.

[31] https://wheresweed.com and https://www.leafly.com.

In Exhibit 14, we report taxable sales of medical cannabis businesses based on DOR data, along with sales of non-medical cannabis businesses from the LCB. There are several important caveats to this comparison:

- Non-medical cannabis sales represent all businesses within the legal system, whereas the medical sales data are available only for medical businesses registered with DOR. The number of actual medical cannabis businesses in Washington is unknown.
- Total sales for medical businesses are a function of how many businesses report to DOR. The increase in total medical sales could be the result of an increase in the number of medical businesses reporting their activities to DOR or an increase in sales.
- Under I-502, non-medical cannabis businesses can only sell cannabis, cannabis-infused products, and products for the storage or use of cannabis or cannabis-infused products. Medical cannabis businesses are not constrained in the same way so their reported sales amounts may include products other than cannabis or paraphernalia.

With these caveats in mind, the data reflect recent changes in taxable sales in the two markets. Non-medical sales increased sharply from 2014 to 2015, while reported medical sales trended slightly upward.

Outcome Study

It is too early in the history of I-502 to evaluate outcomes. WSIPP's second I-502 report is due September 1, 2017 and will include initial results of the outcome analyses described in this section.

The 2017 and subsequent outcome studies will examine differences between Washington and other states over time, as well as differences among counties within Washington. Data from the descriptive study concerning the policy context and implementation of I-502 will be represented in outcome analyses in a variety of ways. Dates of policy events, such as the effective date of I-502, can be represented simply by distinguishing whether longitudinal outcome measurements fall before or after the policy event. Other implementation factors are quantitative variables (e.g., cannabis sales volume) that vary geographically within the state of Washington and can be examined for their relationship to county-level differences in outcome variables.

Outcome Variables

We organize the potential outcomes of I-502 into the following categories:

- Substance use: Youth and adult use and abuse of cannabis, alcohol, and other drugs (ATOD);
- Health: Physical and mental health problems associated with substance use;
- Traffic safety: Traffic accidents and fatalities involving impaired drivers;
- Criminal justice: Arrests, convictions, and sanctions for charges involving cannabis, and alcohol;
- Education: Standardized test scores, disciplinary actions, grade retention, and high school graduation; and
- Workplace safety and productivity: Accidents, injuries, and absenteeism.

A complete listing of outcome variables in each category is shown in Appendix A.

Analysis Plan

Identifying causal effects of I-502 poses major research challenges. Even if an association between I-502 and outcomes can be identified, demonstrating a causal effect of the law will entail eliminating numerous alternative possible causes. Among the more obvious of these are the increased availability of cannabis through the medical market and increased availability of alcohol through private liquor sales, both of which occurred at a similar time as I-502. Relatedly, pre-existing conditions that led to passage of the law, such as favorable attitudes toward cannabis, may have influenced outcomes on their own, whether the law was passed or not.

To approach these challenges, our analysis plan includes two main components:

1. a between-state component that focuses on effects of I-502 at the state level incorporating data for comparison states that prohibit non-medical cannabis, and
2. a within-state component that focuses on Washington alone and examines effects of county-level differences in I-502 implementation on outcomes.

We will develop a number of statistical models for each of the aforementioned outcomes. The specific analytic models will vary to suit the strengths of the available data for each outcome.

In the following sections, we describe the general characteristics of the two approaches, and then, for purposes of illustration, focus on a specific substance use outcome, to describe the analysis plan. Finally, we report baseline results for two primary substance use data sources, Washington's Healthy Youth Survey (HYS) and the Behavioral Risk Factor Surveillance System (BRFSS).

Between-State Analyses

When data are available for Washington and other states, we will conduct between-state analyses to examine changes in outcomes in Washington compared to states that have not legalized non-medical cannabis. For example, outcomes in Washington before and after the enactment of I-502 can be contrasted to outcomes in states that have not legalized. Statistical methods will be used to maximize comparability to other states' data.[32]

The other main design feature of our between-state analyses will be the temporal arrangement of predictor variables representing legal and supply aspects of I-502 in relation to outcome variables. An uncertain amount of delay in the effects of the law on outcomes can be expected, and leading effects may also occur. For some outcomes, such as population health, effects of the law may occur long after enactment of the law, the beginning of the commercial supply system, or the commercial supply system reaching full capacity. For other outcomes, such as criminal offenses for possession or use, effects of the law can be expected to occur immediately or even prior to the law's enactment. In contrast, criminal offenses related to cannabis misuse (e.g., public consumption and DUI), may have more delayed effects, though perhaps less delayed than health effects.

Within-State Analyses

Many outcome variables will not be available for both Washington and other states. In that case, the analysis will focus on variation between Washington counties in the aspects of commercial supply of cannabis under I-502, using data from 2014 and beyond as soon as they are available (2014 is the first year effects could conceivably be observed because retail sales did not begin until July 2014). Aspects of commercial supply include medical and non-medical retail business counts, non-medical sales volume, and the presence of local bans on cannabis retail businesses. We will examine the relationship between these county-level variables and outcomes among residents of those counties.

As in the between-state analysis, the longitudinal aspect of the data will be essential to identifying effects of the law's implementation within the state. Predictor variables representing commercial supply can be measured differently to allow for different lag times for the effect to appear.

For example, a variable representing the number of I-502 retail licensees operating in a county can be set up to reflect the count of stores immediately after they open, or the count of stores that have been in business for a year or longer. The latter allows more time for business operations before a change in outcomes is expected.

[32] Wooldridge, J.M. (2010). *Econometric analysis of cross section and panel data, 2nd Edition.* Cambridge, MA: MIT Press.

Within-state analyses will also control for a variety of characteristics of individual survey respondents (e.g., age, gender, race/ethnicity) and characteristics of the counties they live in (e.g., population size, unemployment rate, demographic composition; see Appendix B for a complete list).

Detailed Between-State Analysis Plan for Substance Use: An Example

Substance use outcomes are a central factor in the causal logic of I-502 and will be a major focus of our outcome analyses. To illustrate our analytic methods, we describe in detail a between-state analysis plan for a single outcome variable: cannabis use in the past 30 days.

We received approval from the US Substance Abuse and Mental Health Services Administration to access the restricted-use data from the National Survey of Drug Use and Health (NSDUH), a nationally representative sample of the US population age 12 or older. The outcome variable representing past 30-day frequency of use is currently available for years 2004 through 2013.

Data from all years and all states will be pooled and year and state will be modeled as fixed effects to account for any differences in outcomes between states and years. State-specific linear trends will also be added as indicated. The effect of I-502 will be represented by a binary variable (based on the survey date) representing whether each outcome was measured before or after I-502 was enacted.

Because 2013 is the most recent year of data available from NSDUH, there are limited data available to represent the post-I-502 enactment period and none to represent outcomes after the beginning of retail sales. Our outcome analyses will be increasingly productive as time goes on, allowing for greater flexibility to account for delays in implementation and effects on outcomes that take more time to appear.

The sample will include data from states that have not legalized non-medical cannabis. Colorado will be excluded from the data for one analysis (for estimates of the effect of I-502 specifically) and then included in another (for estimates of the more general effect of legalization of non-medical cannabis and commercial supply in two states). The sample of comparison states will be heterogeneous in terms of related cannabis policies, such as decriminalization and medical. Existing research has suggested that medical cannabis policy affects substance use outcomes, although the direction of the effects has been mixed.[33]

To account for potential effects of prior medical cannabis policy, an additional binary variable will be included that operates in the same way as the I-502 binary variable but identifies whether each outcome was measured before or after a medical cannabis law was enacted. We will explore several different ways to specify this variable to account for differences in the specific aspects of state medical cannabis policy (e.g., registry, non-specific pain qualifying condition).[34]

Other specifications of the comparison group may also be explored, including selection of a set of comparison states matched on medical cannabis policy

[33] Chu, Y.L. (2014). The effects of medical marijuana laws on illegal marijuana use. *Journal of Health Economics, 38*(1), 43-61.

[34] Pacula, R.L., Powell, D., Heaton, P., & Sevigny, E.L. (2015). Assessing the effects of medical marijuana laws on marijuana use: The devil is in the details. *Journal of Policy Analysis and Management, 34*(1), 7-31.

characteristics and demographic characteristics. Propensity score weighting of the sample of comparison states may also be applied to maximize the comparability of states. With the medical cannabis policy effect accounted for, the estimate of the I-502 variable will represent the effect of I-502 above and beyond the effect of medical cannabis policy.

Outcome models will also include characteristics of survey respondents such as gender, race/ethnicity, marital status, and level of education so that estimates of the law's effect will represent the average effect on a typical sample member. We will also test for the possibility of differential effects of the law on certain types of people by including interaction terms for gender (e.g., Does I-502 affect males differently than females?), age (e.g., Does I-502 affect adults differently than adolescents?), and race/ethnicity (e.g., Does I-502 affect Whites differently than African Americans?). In cases where the effect of I-502 does differ by a certain demographic characteristic, results will be reported separately for different demographic groups.

In these analyses, standard errors will be clustered by state to account for the serial correlation of observations for the same state over multiple years. The analysis will also be repeated without state clustering, instead accounting for the complex sampling design (survey weights and clustering by primary sampling unit), which is the standard treatment of the data for producing unbiased estimates of the US population.

Relationship between Use of Cannabis and Other Drugs

The relationship between use of cannabis and other substances, especially alcohol and tobacco, will likely be a major factor in the ultimate economic impact of the law. Researchers have noted that the potential effect of cannabis legalization on use of alcohol and tobacco, even if small, may outweigh the economic impact of increased cannabis use, given the greater negative health effects of alcohol and tobacco use.[35]

We will take several different approaches to examining potential effects of I-502 on other substance use. First we will examine outcomes concerning use and disordered use of alcohol, tobacco, and other drugs as outcomes of I-502, just as we do with outcome models for cannabis. For example, if we find causal evidence that binge drinking increases following I-502 implementation, we can monetize that effect and weigh its economic impact alongside that of cannabis use.

Alternatively, focusing directly on use of multiple substances, NSDUH includes an item addressing simultaneous use of alcohol and cannabis. A developing area of research examines the effects of simultaneous use of cannabis and alcohol on outcomes such as health problems and impaired driving. This line of research may eventually support monetization of such a simultaneous use outcome.[36]

Another analytic approach would be to examine indicators of other drug use (e.g., alcohol, tobacco) as moderators of the effect of I-502, or vice versa. For example, I-502 may be more likely to increase cannabis use among binge drinkers or less

[35] Caulkins, J.P., Hawken, A., Kilmer, B., & Kleiman, M.A.R. (2012). *Marijuana Legalization: What Everyone Needs to Know.* New York: Oxford University Press.
[36] Subbaraman, M.S. & Kerr, W.C. (2015). Simultaneous versus concurrent use of alcohol and cannabis in the National Alcohol Survey. *Alcoholism: Clinical and Experimental Research, 39*(5), 872-879.

likely to increase binge drinking among heavy cannabis users. Such findings would be used to refine our analyses of the net economic impact of the law.

Correcting Response Bias in Survey Measurement

A familiar feature of survey data on substance use is that use tends to be underreported.[37] A common strategy for addressing this problem is to apply a correction, based on estimates of prevalence from more objective measures such as drug tests. Some researchers note that established correction factors are dated and need to be updated with more current information that is specific to location, such as state, because response biases vary across settings.[38]

We plan to correct for response bias by incorporating findings from a study conducted by researchers at the University of Puget Sound and the University of Washington that will use wastewater sampling of cannabis metabolites to estimate actual cannabis use in a Washington city.[39] The researchers will compare estimates from this method to common survey estimates from the same area to explore discrepancy over a span of time before and after passage of I-502. This sensitivity to the time-varying nature of the response bias will allow us to account for the possibility that reporting of cannabis may increase following I-502 due to the increased acceptability of cannabis use, beyond any actual increase in use. Change in the difference between wastewater and survey estimates of prevalence can potentially be used to create time-specific correction factors for survey data in Washington.

Detailed Within-State Analysis Plan for Substance Use: An Example

Using the same NSDUH outcome variable, frequency of past 30-day cannabis use, here we illustrate a complementary within-state analysis plan. The approach is very similar to the between-state analysis plan but on a lower geographic level and a slightly later schedule due to the delay in implementation following passage of the law. Retail sales did not begin until July 2014, so 2014 is the first year of outcome data that could plausibly be affected by commercial supply. Similarly, 2015 is the first year of outcome measurement that will be entirely after the beginning of commercial supply.

An individual's frequency of past 30-day cannabis use will be modeled as a function of county and year fixed effects, to control for differences between counties in each year. Fixed effects representing county-specific linear trends will be included where appropriate. The effect of commercial cannabis supply under I-502 can be represented with dichotomous variables constructed to contrast outcomes measured before a given definition of commercial supply system development—for example, one year after retail sales begin in a county or one year after retail sales reach full capacity (as defined by the retail licensee allotment assigned to the county by the LCB).

As in between-state analyses, our within-state analyses will account for a series of individual-level covariates (age, gender,

[37] Kilmer, B., Caulkins, J.P., Midgette, G., Dahlkemper, L., MacCoun, R.J., & Liccardo Pacula, R. (2013). *Before the grand opening: Measuring Washington State's marijuana market in the last year before legalized commercial sales.* Santa Monica, CA: RAND Corporation.
[38] Ibid.
[39] Burgard & Banta-Green (personal communication, June 17, 2015).

race/ethnicity, employment status, level of education). Within-state analyses will also incorporate other key features of the between-state analysis plan, including accounting for the complex design of survey data sources, incorporating the methods for examining the influence of I-502 effects on other drugs, and correcting response bias for survey data sources.

Extending the example to model frequency of past 30-day cannabis use as a function of quantitative aspects of commercial supply such as retail store counts or sales volume, a different analytic approach will be used. Multilevel modeling will be used to account for the shared variance among individual respondents (Level I) nested within counties (Level II) nested within repeated annual cross-sectional administrations of the survey (Level III).

This approach offers the ability to incorporate county-level predictors of the NSDUH outcome variable, such as population size, racial/ethnic composition, and unemployment. These community characteristics may have their own effects on individual-level substance abuse outcomes beyond the effects of individual-level demographic characteristics. In the same fashion, within-state analyses can also control for medical cannabis, for example with a county-level variable representing the number of dispensaries in a county, or the presence of local government policy banning such businesses.

Within-state analyses will also examine effects of certain aspects of Washington's public health approach to commercial marijuana legalization. Elements of I-502 that are consistent with a public health model of legalization include state agency regulation of the number of stores, operating hours, security, quality control, and labeling; tight controls on youth access; restrictions on advertising; public health advertising; and evidence-based prevention and treatment for substance abuse.[40]

I-502 requires WSIPP to examine effects of increased investments in research, prevention, and treatment. As an example of how we will analyze these effects, data from the Washington Division of Behavioral Health and Recovery provide information on the amount and type of substance abuse prevention programming in each county. For example, the total number of recipients of evidence-based prevention programming in a county will be treated as a predictor of county average 30-day use, controlling for prior trends in use and other aspects of community context.

[40] American Public Health Association (2014); http://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2015/01/23/10/17/regulating-commercially-legalized-marijuana-as-a-public-health-priority

Youth Cannabis Attitudes and Use – Washington's Healthy Youth Survey

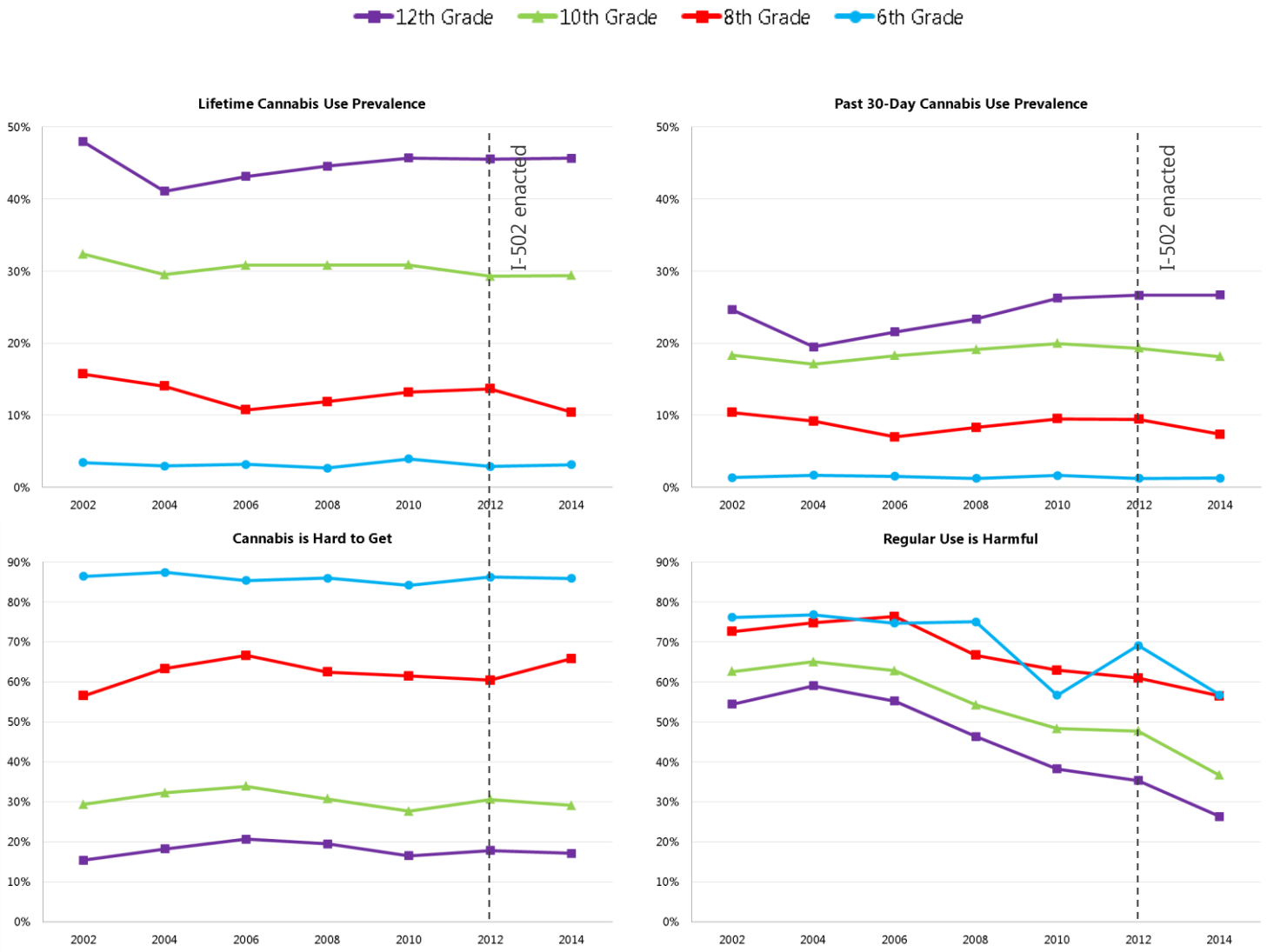
In this section we report baseline values for Washington's Healthy Youth Survey (HYS). The HYS is administered biennially on even-numbered years to a representative sample of students in grades 6, 8, 10, and 12 in Washington schools. The HYS addresses a range of risk behaviors that contribute to the health and safety of youth in Washington State.

In this section, we report statewide HYS results concerning cannabis for years 2002 through 2014, separated by grade level.

Exhibit 15 below illustrates that cannabis use and access among students in 6th through 12th grades have changed little from 2002 through the most recent survey in 2014. In contrast, the perception of the risk of harm of regular use has generally declined since 2004.

Exhibit 15

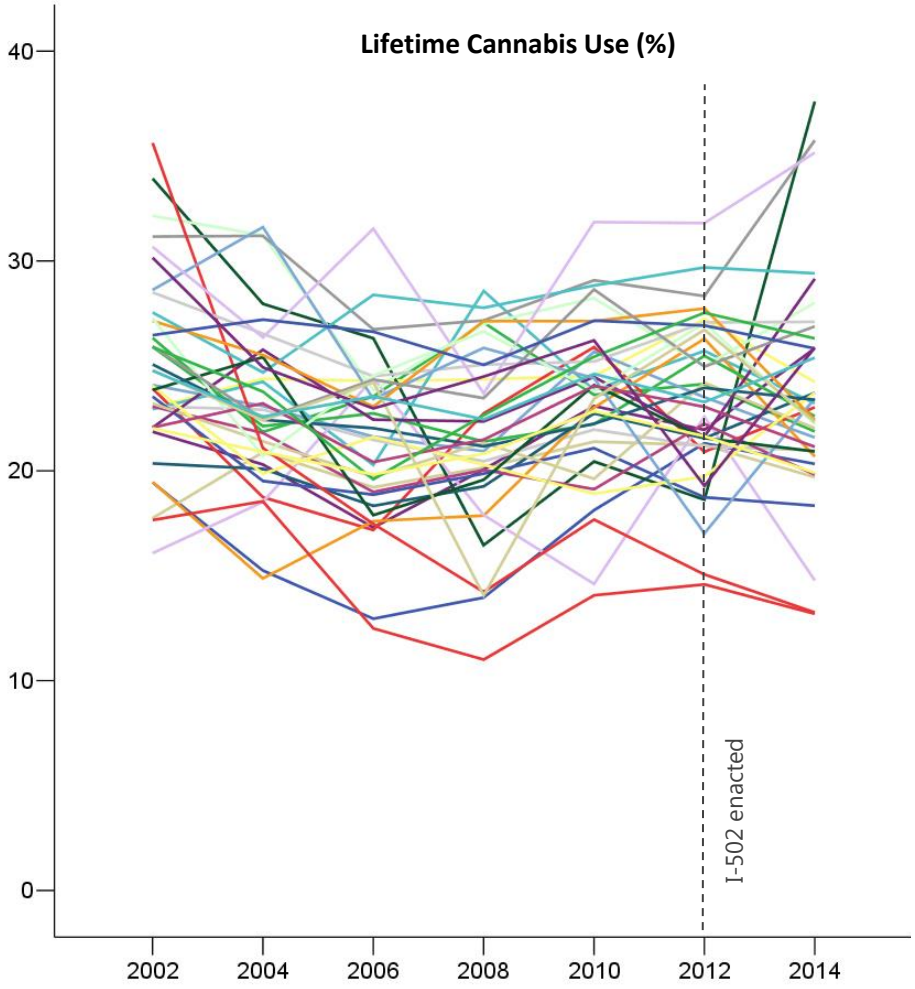
Youth Cannabis Attitudes and Use, by Grade Level

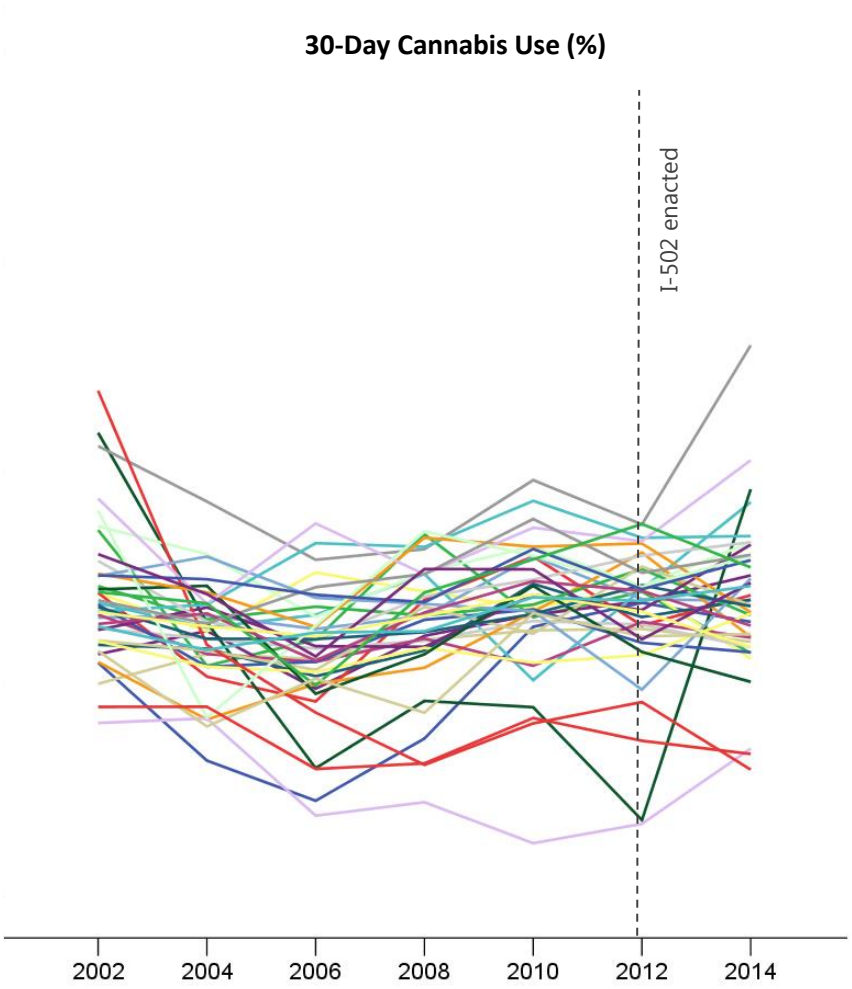


Source: Department of Health. Results are based on survey design specifications for state sample analysis from Washington State DOH. (2013). *Data Analysis and Technical Assistance Manual. Retrieved from: http://www.doh.wa.gov/portals/1/Documents/Pubs/210-088_HYSDataAnalysisManual.pdf.*
"Cannabis is hard to get" reflects percentage of youth responding "very" hard.
"Regular use is harmful" reflects percentage of youth responding "great risk" of harm from regular use.
Dotted line does not imply causal effect of I-502.

Exhibit 16

Youth Cannabis Use Prevalence Varies Widely Between Washington Counties





Source: Department of Health, Healthy Youth Survey.
County-year means computed using state census dataset and survey design specifications for all-county analysis from Washington State Department of Health. (2013). *Data Analysis and Technical Assistance Manual. Retrieved from: http://www.doh.wa.gov/portals/1/Documents/Pubs/210-088_HYSDataAnalysisManual.pdf*.
County-year sample size range: 11-15,920.

Exhibit 16 illustrates county-level differences in HYS results for prevalence of lifetime and 30-day cannabis use. There are substantial differences between counties in prevalence of cannabis use, ranging from just over 10% to above 30% of youth reporting lifetime use and approximately 5% to 20% of youth reporting use in the past 30 days.

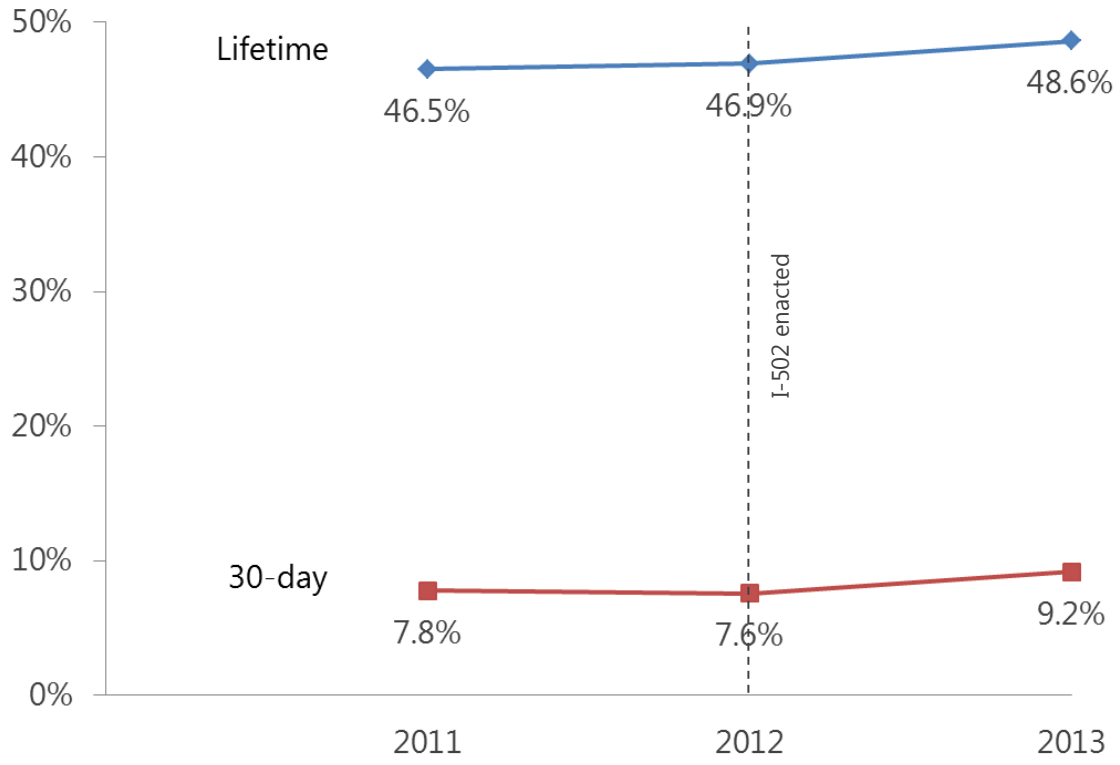
There are also differences in the pattern of change over time in each county, with some counties trending upwards in recent years and some counties declining. Such county differences will be the focus of within-state analyses. We have shown that there are substantial differences in counties in terms of implementation of I-502, and our within-state analyses will examine whether these differences in implementation are related to county differences in outcomes.

Adult Cannabis Use – Washington's Behavioral Risk Factor Surveillance System

Washington State administers the national Behavioral Risk Factor Surveillance System (BRFSS), an annual telephone survey of adults that provides epidemiological data on modifiable risk factors for chronic disease. Items addressing cannabis use were added to the survey in 2011. Statewide BRFSS results concerning cannabis in Exhibit 17 indicate that in 2013, compared to the prior two years of the survey, slightly larger percentages of respondents indicated using cannabis in their lifetime and in the past 30 days.

Exhibit 17

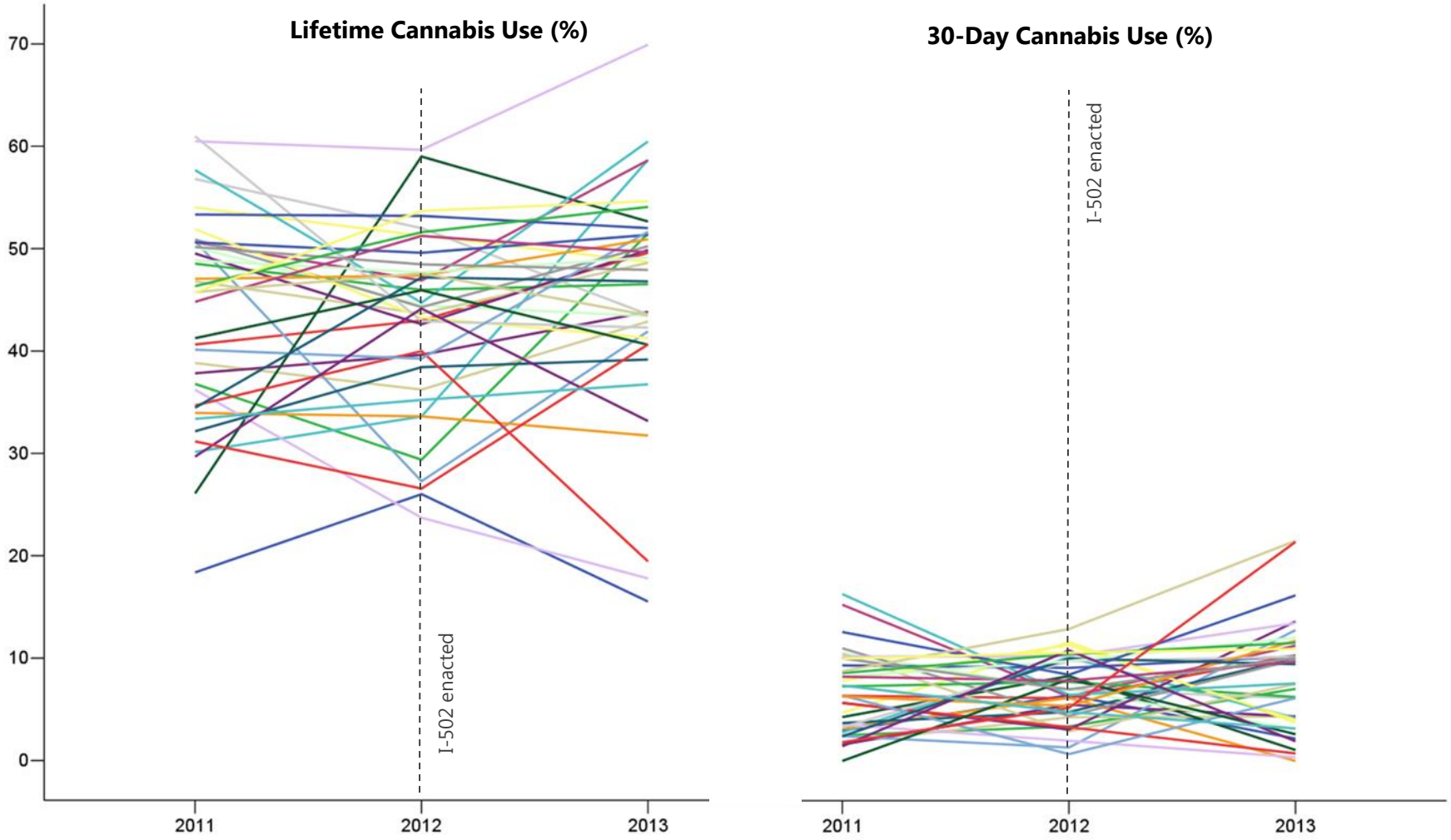
BRFSS Statewide Prevalence of Adult Cannabis Use



Source: Department of Health, Center for Health Statistics, Behavioral Risk Factor Surveillance System, supported in part by Centers for Disease Control and Prevention, Cooperative Agreement U58/SO000047-1 through 3 (2011-2013).
Cannabis items added to survey in 2011.
Estimates computed accounting for complex sampling weights, primary sampling units, and strata.

Exhibit 18

Adult Cannabis Use Prevalence Varies Widely Between Washington Counties



Source: Department of Health, Behavioral Risk Factor Surveillance System. Estimates computed accounting for complex sampling weights, primary sampling units, and strata. County-year sample size range: 9-3,632.

As shown in Exhibit 18, there are substantial differences between Washington counties in the prevalence of adult cannabis use. County lifetime prevalence levels range from under 20% to over 60%, and 30-day prevalence rates range from less than 5% to approximately 20%. These differences will be the focus of within-state analyses, examining whether county differences in implementation (e.g., sales volumes, average potency) are related to county differences in outcomes. Within-state analyses will also account for the commonality of cannabis use among residents in a county and identify the unique effect of county predictors, such as cannabis sales, above and beyond the county average prevalence.

Questions about cannabis are not a requirement in the national BRFSS, so these data are not available for most other states. Therefore BRFSS data on cannabis use will not be used for between-state analysis, although similar items from the NSDUH will.

In summary, WSIPP's outcome study will comprise a full set of analyses to identify causal effects of I-502 on the following outcomes:

- Use and disordered use of cannabis, alcohol, and other drugs;
- Deaths attributable to use of cannabis, alcohol, and other drugs;
- Substance abuse treatment admissions involving cannabis;
- Emergency department visits involving cannabis;
- Motor vehicle accidents and fatalities involving cannabis impairment;
- Criminal charges and infractions involving cannabis, alcohol, and other drugs, including DUI/DWI;
- School achievement and discipline; and
- Workplace accidents, injuries, and absenteeism.

Benefit-Cost Study

Outcome analyses that produce causal evidence of the effects of I-502 will be entered into an overall benefit-cost analysis as described in more detail in this section.

We will estimate the net economic impact of the law by accounting for cash flows in the following four categories:

- State and local revenues from excise, sales, and business & occupation taxes, fees, and fines;
- State and local agency costs of implementing the law;
- Monetized effects of I-502 on substance use, health, traffic safety, criminal justice, workplace safety, etc.; and
- Other economic impacts of I-502, including employment and wages in the non-medical cannabis industry and ripple effects on the broader economy.

Revenues

I-502 created cannabis excise taxes equal to 25% of the selling price on each wholesale sale and retail sale of cannabis from a licensed producer, processor, or retailer.[41] Other sources of revenue include license fees, product testing fees, late tax payment penalties, regulatory violation penalties, fees and fines paid by impaired drivers, and forfeitures.

All such revenues flow into the Dedicated Marijuana Fund created by the initiative.[42] The fund balance was $48.3 million through June 2015, which represents the cumulative total revenue to the fund, less expenditures (Exhibit 19). Through July 2014, few taxable sales had occurred, so very little excise tax was collected and license fees were the primary source of revenue. As a result, expenditures exceeded revenues resulting in a negative fund balance in some months.

The state sales and use tax (6.5%) applies to retail cannabis sales. The state business and occupation tax (B&O) is also levied on retail sales (0.47%) and wholesale sales by processors (0.48%). These taxes are deposited into the State General Fund.

Cannabis retail sales are also subject to local government sales and use tax rates—which average 2.4% of taxable sales—and business and occupation taxes—which average 8.6% of the state B&O rate. These revenues can be spent at the discretion of local jurisdictions.

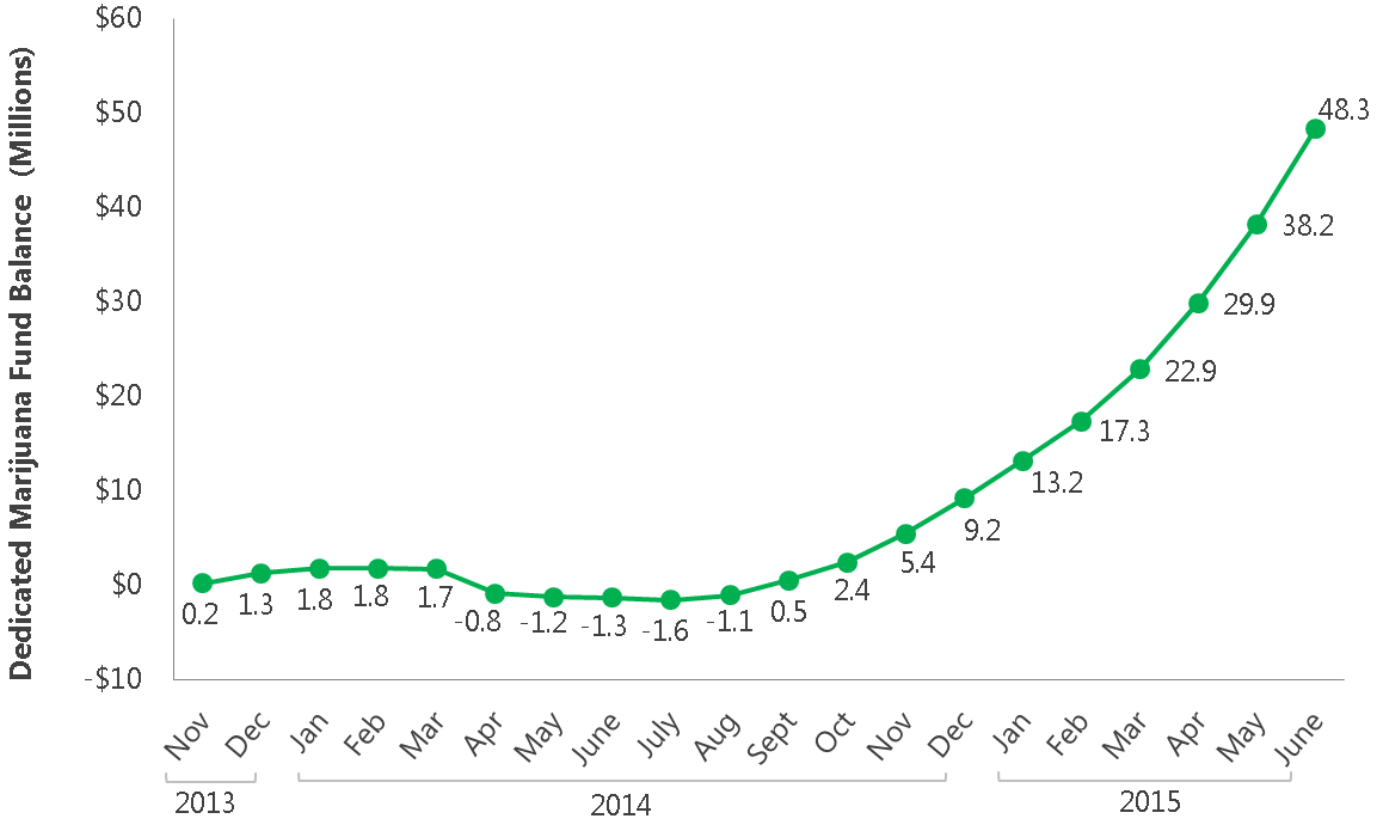
Both state and local sales and use and B&O taxes are levied on taxable retail sales which include excise tax (which are added directly to initial product price). Under legislation passed in 2015, excise tax will not be counted in taxable sales.[43]

In the first two years of I-502, transfers of excise tax revenues were not made to local jurisdictions. Under current law, a portion of excise tax revenues to be distributed to counties, cities, and towns, in an amount based on retail sales, population, and other factors.[44]

[41] Now, under Second Engrossed Second Substitute House Bill 2136, Chapter 4, Laws of 2015, there is a single excise tax of 37% levied at the point of retail sale.
[42] Renamed Dedicated Marijuana Account (2E2SHB 2136).
[43] Second Engrossed Second Substitute House Bill 2136, Chapter 4, Laws of 2015.
[44] Ibid.

Exhibit 19

Dedicated Marijuana Fund Balance



Source: OFM, Agency Financial Reporting System. Fund balances ignore liabilities and deferred inflows of resources.

State revenues will be directly observed in existing records at the Office of Financial Management (OFM) and DOR. Revenues to city and county governments will be calculated based on cannabis sales amounts recorded by the LCB. New transfers of state revenue to local governments can also be readily identified. Data on local revenues from other sources, such as local fees and fines, may be collected on a case-by-case basis from local governments.

Costs of Implementing I-502

This category consists of directly observable costs of implementing the law. OFM has identified the following sources of implementation costs to the state:[45]

- Rulemaking, licensure, and enforcement by the LCB;
- Development of testing laboratory accreditation standards by the Department of Agriculture;
- Background checks for cannabis license applicants by the Washington State Patrol;

[45] OFM (2012) I-502 Fiscal Impact Statement.

- Hearing appeals of LCB licensing actions (denial, suspension, and revocation) by the Office of Administrative Hearings;
- Legal advice to the LCB by the Office of the Attorney General;
- Administering tax collection from those licensed under the initiative by DOR;
- Health Care Authority implementation of a program similar to the subsidized Basic Health Plan with increased eligibility to enroll;
- Department of Social and Health Services and Department of Health implementation of programs and services required in the initiative;
- University of Washington and Washington State University public education and research activities required in the initiative;
- Employee training on cannabis impaired driving by Washington State Patrol;
- Blood testing for driving under the influence cases by Washington State Patrol Toxicology Laboratory;
- Administrative activities by the Department of Licensing to suspend or revoke driver's licenses for driving under the influence;
- Legal defense by the Office of the Attorney General of judicial appeals of DOL driving under the influence decisions; and
- Information technology changes to the Judicial Information System by the Administrative Office of the Courts.

State agency costs will be measured by the amount of funding allocated from the Dedicate Marijuana Fund to the agency by transfer or state budget appropriation, and by inquiries to state agencies.

In addition, many of the above state costs have analogs in local jurisdictions. For example, costs of training for cannabis impaired driving enforcement can be expected for cities and counties. We are currently exploring methods for collection of data on I-502 implementation costs to local governments.

Costs to state, city, and county criminal justice systems resulting from arrest, prosecution, and corrections for cannabis-related offenses will be accounted for in the monetization of criminal justice system outcomes. Change in criminal justice outcomes, such as arrests and incarcerations for cannabis-related charges, have known costs to law enforcement, courts, jails, and prisons that are accounted for in the WSIPP benefit-cost model.

Monetized Human and Social Outcomes

This category includes the monetary impact of potential effects of the law on health, criminal behavior, traffic safety, education, and other outcomes. The WSIPP benefit-cost modeling approach will be used to project the long-term economic impact of these outcomes, following three steps:

1. The direct effects of the policy or program on each outcome will be estimated when possible. Typically, effect size estimates are obtained from systematic reviews of the research literature to establish an average effect of a given program or policy on a particular outcome, based on all available studies that

meet WSIPP criteria for research quality. In this study, ideally most effect size estimates will be drawn from our outcome study as described earlier in this report. If we are unable to directly measure a particular outcome, we will review the research literature and conduct a meta-analysis to estimate an expected effect. The end result of this step is the identification of effects of the law on a comprehensive set of outcome variables, to the extent that evidence is available.

2. Next, we will identify the indirect effects of these outcomes on other long-term outcomes. For example, if we measure a change in school-age substance use, our meta-analysis of the research literature can help us estimate the amount of change we would also expect in high school graduation, criminal behavior, and future substance abuse and dependence, all causally linked from school-age initiation of substance use.

3. Next, we will estimate the price of each outcome, answering the question: *How much is it worth to the people of Washington State to achieve improvements in outcomes?* The WSIPP benefit-cost model estimates how much an outcome is worth from a societal perspective, including both taxpayer and non-taxpayer viewpoints.

   For example, if our evaluation can measure a change in crime rates that results from the law, those crimes have an economic worth both to the criminal justice system (funded by taxpayers) and to the citizens of Washington (who may be victims of crime).

   Likewise, substance abuse has an economic value to taxpayers (e.g., through publicly-funded health care costs) and to others in society (e.g., those who can avoid substance abuse tend to earn higher wages than those who abuse substances).

   We will use a variety of sources to determine the price of outcomes: primary data from Washington State and national sources, as well as the research literature that estimates the causal relationship between outcomes and their economic value to society.[46]

The WSIPP benefit-cost model will continue to be developed over time as evidence from the research literature accumulates. In its current state of development, the model is capable of estimating the benefits and costs of several substance abuse outcomes, including school-age use and disordered use of alcohol, cannabis, opioids, and other drugs, and regular use of tobacco. This analysis will allow us to account for the economic effects of the law on cannabis as well as alcohol, tobacco, and other drug use.

Over the course of this study, we expect the research literature to continue to grow and develop; we will be tracking these developments and incorporating new findings into our benefit-cost modeling approach.

[46] WSIPP's benefit-cost technical documentation available here: http://www.wsipp.wa.gov/TechnicalDocumentation/WsippBenefitCostTechnicalDocumentation.pdf

Other Economic Impacts of I-502

The benefit-cost analysis will account for other economic impacts of the law such as employment and wages of non-medical cannabis businesses. We also aim to account for so-called indirect and induced impacts of non-medical cannabis business. Indirect impacts would include increases in business for suppliers of non-medical cannabis businesses—secondary industries such as lighting, agricultural products, real estate, energy, transportation, packaging, testing, certification, and advertising. In addition, induced impacts would include the broader impact of personal spending of wages and earnings from non-medical cannabis business.

A major challenge of estimating broader economic impacts of I-502 will be determining the extent to which jobs, earnings, and indirect and induced impacts in the non-medical cannabis sector represent *net* changes in the Washington economy. For instance, jobs in the non-medical cannabis industry could represent additional jobs for the economy, or they could be accompanied by losses of jobs in competing industries.

Similarly, expenditures by non-medical cannabis businesses to secondary industries could be net new inputs for those secondary industries, or could be accompanied by losses of other inputs to those secondary industries. For example, suppliers of lighting may have new business from non-medical cannabis producers but may lose business from black market producers.

The net impact of the law depends heavily on whether I-502 results in increased consumption of cannabis and how alternate types of recreation are affected by changes in cannabis consumption. For example, if cannabis use increases, and cannabis tends to be used instead of alcohol (rather than in combination), the effect of I-502 could be negative—jobs, wages, and indirect and induced impacts of the cannabis industry would be outweighed by decreases in the same quantities in the alcohol industry.

We are currently exploring methods for estimating these broader economic impacts of the law. The federal Quarterly Census of Employment and Wages will be used to identify the number of employees and wages of non-medical cannabis businesses.[47] Indirect effects on non-medical cannabis suppliers could potentially be identified by expenditures of non-medical cannabis businesses. To estimate induced impacts, it will likely be necessary to assume spending and savings rates for different levels of income in the non-medical cannabis sector.

We will also consider applying economic impact modeling tools such as the Washington State Office of Financial Management's Input-Output model, or commercial products such as REMI (Regional Economic Models, Inc.) and IMPLAN (IMpacts for PLANning), which have been used to estimate the economic impact of various industries and policies in Washington State. We will investigate whether these models are applicable to this study.[48]

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[47] http://www.bls.gov/cew/cewover.htm

[48] OFM Input-Output Model: http://ofm.wa.gov/economy/io/2007/default.asp; IMPLAN: http://www.implan.com/; REMI: http://www.remi.com/

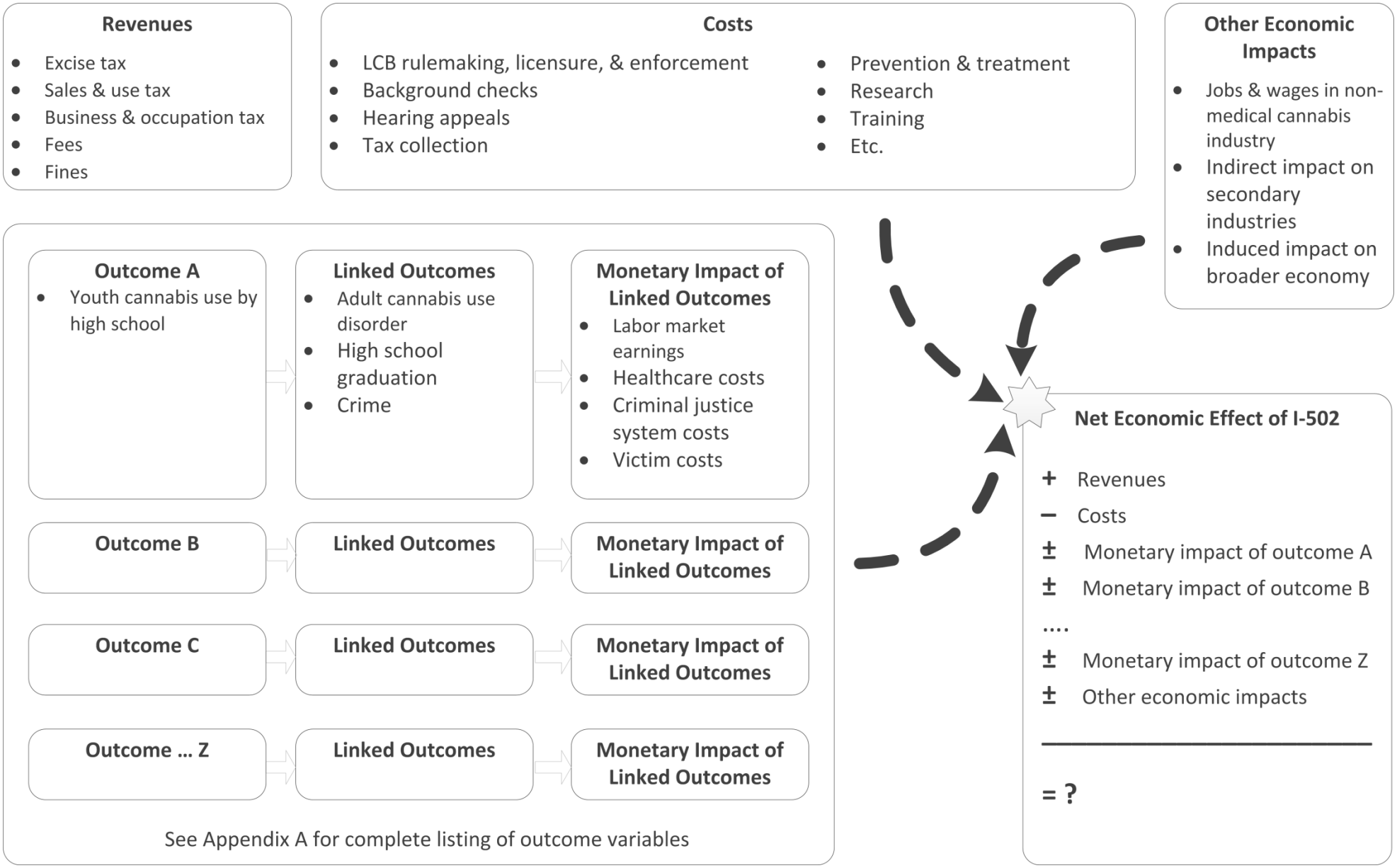
We will also consider methods to account for externalities of the non-medical cannabis industry, such as the environmental impact of cannabis production. Water and power usage, pesticides, and waste disposal present potentially costly environmental effects of I-502.

The four categories of cash flows to be accounted for in the benefit-cost study are shown in Exhibit 20. Estimates of revenues, agency costs, monetized outcomes, and broader economic impacts will be summed to produce an overall estimate of the net economic impact of I-502.

As a final note, it is possible that when all outcome analyses are completed there will be insufficient evidence to establish a causal effect of I-502 on outcomes. In that case, a more limited benefit-cost analysis would be conducted focusing on state and local agency costs and revenues.

Exhibit 20

Components of the Benefit-Cost Study of I-502



Project Timeline

Our schedule for subsequent reports is as follows:

Date of required report in I-502	Contents
September 1, 2017	This report will include initial results of our outcome study, based upon outcomes observed in approximately the first three years of I-502 implementation (July 2014–June 2017).
September 1, 2022	This report will include extended results of our outcome study, repeated with an additional five years of follow-up data. Preliminary results of the benefit-cost analysis will also be presented.
September 1, 2032	The final report will include results of our outcome study over the entire 18-year follow-up period (20 years since enactment of the law). The report will also include the final results from the benefit-cost analysis.
TBD	The report dates above are those required in I-502. We also expect to produce additional report(s) between now and 2032 as pertinent information is produced.

Technical Appendix

I-502 Evaluation Plan and Preliminary Report on Implementation

A. Outcome Variables.....45
B. Community Contextual Covariates 49
C. Status of Data Access.....50

A. Outcome Variables

Substance use: Youth and adult use and abuse of cannabis, alcohol, and other drugs (ATOD)

Data sources:

- The Washington Behavioral Risk Factor Surveillance System (BRFSS) is a telephone survey administered annually to a representative sample of the Washington state population age 18 and older.
- The Washington Healthy Youth Survey (HYS) is a survey administered biennially to a representative sample of Washington students attending 6th to 12th grades in public schools.
- The National Survey of Drug Use and Health (NSDUH) is a computer-assisted survey administered to a representative sample of the US population age 12 and older. Data from NSDUH can be used for between-state analyses.

Cannabis variables

BRFSS

- Lifetime use
- Age of initiation
- Past 30-day frequency of use
- Past 30-day frequency of medical use (added in 2013)

HYS

- Lifetime use
- Age of initiation
- Past 30-day frequency of use

NSDUH

- Lifetime use
- Age of initiation
- Past 30-day frequency of use
- Use of cannabis with last alcohol use

Alcohol variables

BRFSS

- Binge drinking in past 30 days
- Heavy drinking in past 30 days

HYS

- Frequency of use in past 30 days
- Binge drinking frequency in past 2 weeks

NSDUH

- Frequency of drinking in past year
- Frequency of drinking in past 30 days
- Lifetime binge drinking
- Frequency of binge drinking in past 30 days
- Age of first binge drinking

Maladaptive use of cannabis and alcohol variables

HYS

- Problems with school, social, family due to ATOD

NSDUH

- Cannabis dependence
- Alcohol dependence
- Spent a lot of time getting or using cannabis(alcohol)
- Set limits on cannabis(alcohol) use
- Keep limits on cannabis(alcohol) use
- Need to use more to get the desired effect
- Try to cut down or stop using cannabis(alcohol)
- Able to cut down or stop using cannabis(alcohol)
- Have emotional/mental health problems caused or made worse by cannabis(alcohol)
- Continued using cannabis(alcohol) despite emotional problems
- Have physical health problems caused or made worse by cannabis(alcohol)
- Continued using cannabis(alcohol) despite physical problems
- Cannabis(alcohol) use caused spending less time on important activities
- Cannabis(alcohol) use caused problems at home, work, or school
- Cannabis(alcohol) use caused trouble with the law
- Cannabis(alcohol) use caused problems with family or friends
- Used cannabis(alcohol) despite problems with family or friends
- Needed treatment for cannabis(alcohol)

Tobacco variables

BRFSS

- Current smoking status (everyday, someday, former and quit, never smoked)

HYS

- Frequency of use in past 30 days

NSDUH

- Tobacco lifetime and 30-day use
- Cigarettes lifetime and 30-day use and everyday use
- Cigarettes with alcohol past 30-day use
- Nicotine dependence past year

Heroin and prescription opioids variables

BRFSS

- Use of prescription pain killers to get high in past 30 days

HYS

- Lifetime heroin use
- Frequency of use of pain killers to get high in past 30 days

NSDUH

- Frequency of heroin use in past 30 days
- Prescription pain reliever abuse past year
- Heroin dependence past year
- Treatment for heroin/prescription pain reliever past year

Health: Physical and mental health associated with drug use

Vital statistics

- Deaths attributable to cannabis, alcohol, opioids

Pregnancy Risk Assessment Monitoring System (PRAMS)

- Prenatal maternal ATOD use

Health service utilization

- Emergency Department (ED) visits with cannabis, alcohol involvement
  - Drug Abuse Warning Network (DAWN; national), Emergency Department Information Exchange (EDIE; state; not currently available), Provider One (P1; Medicaid-paid ED visits), and Seattle and King County Syndromic Surveillance System (SSSS)
- Inpatient hospital admissions and discharges
  - Comprehensive Hospital Abstract Reporting System (CHARS; all payer inpatient hospitalizations; identifies cannabis and alcohol as primary or secondary drug of abuse, or casual vs chronic user)
  - P1 (Medicaid-paid health services)
  - Drug involvement is identified with ICD-9/10 diagnostic codes
- Inpatient substance abuse treatment admissions and discharges
  - WA Division of Behavioral Health and Recovery, Treatment and Assessment Report Generation Tool (TARGET)—public-paid substance abuse treatment admissions in Washington identifying cannabis as primary or secondary drug of abuse
  - Treatment Episode Data Set (TEDS)—national public-paid substance abuse treatment admissions identifying cannabis as primary or secondary drug of abuse; Data from TEDS can be used for between-state analyses.

BRFSS

- Overall health rating
- Past 30 days of poor physical health
- Past 30 days of poor psychological health
- Past 30 days of functional impairment due to health

Traffic Safety

Washington Traffic Safety Commission

- Fatal crashes
- Fatal crashes involving impaired drivers (cannabis and alcohol)

Washington State Department of Transportation

- All crashes
- Single vehicle night-time crashes (proxy for DUI less prone to testing artifacts)

Criminal Justice

Criminal justice data from WSIPP's Criminal History Database (CHD) which combines criminal charge records from the Administrative Office of the Courts and the Department of Corrections

- Filings and convictions on cannabis-related charges: misdemeanor or felony possession, selling, public consumption, medical cannabis fraud
    - Any other charges associated with arrests for above charges
- Citations/tickets for minor cannabis infractions (e.g., public consumption)
- Driving under the influence/Driving while intoxicated (DUI/DWI)

Education

Washington Office of Superintendent for Public Instruction

- Grade retention
- Graduation rates
- Unexcused absences
- Short-term suspension
- Long-term suspension
- Expulsions
- Standardized test scores

Workplace safety and productivity

U.S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries (CFOI) and Survey of Occupational Injuries and Illnesses (SOII), pending approval of on-site license application

- Workplace injuries and fatalities involving cannabis and other drugs

Other Economic Impact

Washington Employment Security Department, Quarterly Census of Employment and Wages

- Count of employees of non-medical cannabis businesses
- Wages per employee of non-medical cannabis businesses

B. Community Context Covariates

Community context variables that may affect outcomes and will be controlled for in outcome models include:

Demographics

- Population
- Population median age
- Population <5 years old
- Population by gender
- Population by race/ethnicity

Community Risk Factors (CORE, RDA)

- Alcohol- or drug-related deaths
- Alcohol retail licensees
- Teen births
- Child mortality
- Divorce
- Existing home sales
- Unemployment
- Voter registration
- Free or reduced-price meals eligibility

Other

- Voter support for I-502

C. Status of Data Access

Our progress obtaining access to the various data sources for the study is reported below.

Date source	Status
I-502 business locations and sales	Data extracted periodically from public website of Liquor Cannabis Board (LCB).
LCB enforcement activity	To be obtained from LCB's public website
LCB Traceability System	Data extraction in progress.
Medical store locations and sales from Department of Revenue	Data sharing agreement in place and data received
Medical store locations from Leafly.com	Data extracted periodically from Leafly public website.
Medical store locations from Where'sWeed.com	Data sharing agreement in place and data received.
Local policy data from Seattle and King County Public Health Department	Data are publicly available and have been extracted
Local policy data from Municipal Research Services Corporation	Data are publicly available and have been extracted
American Community Survey (ACS)	Data are publicly available and have been extracted
Community Outcome and Risk Evaluation (CORE) System	Data request from DSHS in progress
Youth and adult use and abuse of cannabis, alcohol, and other drugs (ATOD)	
Behavioral Risk Factor Surveillance System (BRFSS)	IRB approval and data sharing agreement in place with WA Department of Health and data received.
Healthy Youth Survey (HYS)	IRB approval and data sharing agreement in place with WA Department of Health and data received.
National Survey of Drug Use and Health (NSDUH)	License for access to restricted-use data approved by US Substance Abuse and Mental Health Services Administration. Access subsequently suspended indefinitely for all users due to unspecified administrative issues.
Physical and mental health associated with drug use	
Vital statistics	To be obtained
Pregnancy Risk Assessment Monitoring System (PRAMS)	To be obtained

Physical and mental health associated with drug use (cnt'd)	
Drug Abuse Warning Network (DAWN)	To be obtained
Emergency Department Information Exchange (EDIE)	To be obtained
Provider One (P1)	To be obtained
Seattle-King County Syndromic Surveillance System (SSS)	To be obtained
Comprehensive Hospital Abstract Reporting System (CHARS)	To be obtained
Treatment and Assessment Report Generation Tool (TARGET)	IRB approval and data sharing agreement in place with WA Department of Social and Health Services and data received.
Treatment Episodes Data Set (TEDS)	To be obtained
Public safety	
Fatal accidents	Data sharing agreement with WA Traffic Safety Commission in progress
All crash data	To be obtained
Criminal justice	
Criminal History Database (CHD)	Data have been extracted
Education	
Comprehensive Education Data and Research System (CEDARS)	To be obtained

Workplace safety & productivity	
Census of Fatal Occupational Injuries (CFOI)	Application for license for on-site access to restricted data to be submitted
Survey of Occupational Injuries and Illnesses (SOII)	Application for license for on-site access to restricted data to be submitted
Other economic impact	
Quarterly Census of Employment and Wages	Data sharing agreement with Employment Security Department in progress

Acknowledgements

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Washington State Institute for Public Policy

The Washington State Legislature created the Washington State Institute for Public Policy in 1983. A Board of Directors—representing the legislature, the governor, and public universities—governs WSIPP and guides the development of all activities. WSIPP's mission is to carry out practical research, at legislative direction, on issues of importance to Washington State.