December 2016

Marijuana Report

Marijuana use, attitudes and health effects in Oregon

Oregon Health Authority
PUBLIC HEALTH DIVISION

Acknowledgments

This publication was prepared by Oregon Health Authority Program Design and Evaluation Services, including:

Julia Dilley, Ph.D., M.E.S.

Steven Fiala, M.P.H.

Erik Everson, M.P.H.

Caislin Firth, M.P.H.

Julie Maher, Ph.D.

Oversight provided by:

Katrina Hedberg, M.D., M.P.H., Health Officer and State Epidemiologist

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Margaret Braun and Debbi Martin, Oregon Youth Authority

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Daniel Estes, Oregon Department of Transportation

Rusha Grinstead and Jon Collins, Oregon Health Authority

Kelly Officer, Oregon Criminal Justice Commission

Melissa Powell, Dagan Wright, Matt Laidler, Isabelle Barbour, David Farrer, Suzanne Zane, Oregon Public Health Division

Deena Ryerson, Oregon Department of Justice

TJ Sheehy, Oregon Liquor Control Commission

Carole Yann and Andre Ourso, Oregon Medical Marijuana Program

Amy Zlot and Paul Lewis, Multnomah County Health Department

For more information contact:

Julia Dilley, Ph.D., M.E.S.

julia.dilley@state.or.us

Katrina Hedberg, M.D., M.P.H.

katrina.hedberg@state.or.us

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Executive summary

Oregon has had a legal medical marijuana system since 1998, and voters approved legalized retail (non-medical, also known as recreational) marijuana in 2014. Marijuana possession and use was decriminalized for adults in July 2015. Early retail sales of marijuana through existing medical marijuana dispensaries began in October 2015, and the state's retail stores opened in October 2016. The Oregon Health Authority's Public Health Division created this report to provide current data from public health surveys, health care and other systems describing marijuana use, attitudes and health effects among Oregonians. These data shed light on the public health impacts of marijuana use and provide information on trends over time.

Key findings from this report

Many young people in Oregon currently use marijuana.

- Nearly one in 10 eighth-graders (8%) and approximately one in five 11th-graders (22%) reported current marijuana use in 2016; this is comparable to youth use in the rest of the United States (U.S.).
- Youth marijuana use did not appear to change in Oregon in early 2016 (just after decriminalization in July 2015 and start of early retail sales in October 2015), in comparison to prior years.
- In 2016, young men and young women have similar rates of current marijuana use.
- More youth currently use marijuana than smoke cigarettes.
- Most youth say they get marijuana from social sources – from friends or at parties.

Many adults in Oregon currently use marijuana.

- Approximately half (51%) of Oregon adults report they have ever used marijuana. One in 10 (12%) Oregon adults report they currently use marijuana. Marijuana use was not significantly different between men (14%) and women (10%) in 2015.
- Adults in Oregon are more likely than adults in the United States to use marijuana.
- Overall, adult marijuana use did not change significantly between 2014 and 2015, which includes post-decriminalization and the beginning of early retail sales in Oregon.

- Although overall use did not change, some changes occurred within some age groups: Marijuana use within the past 30 days among middle-aged adults (ages 25–44 and 45–64 combined) increased between 2014 and 2015.
- Among adults who use marijuana, there was a significant increase in frequent use (55% used 20 or more of the past 30 days in 2015, in comparison to 40% in 2014).
- Multiple methods of marijuana use are practiced (such as eating marijuana-infused foods and "vaping" in electronic vaporizers). Nine of 10 marijuana users report that smoking is the most common method of marijuana use among both youth and adults. However, there was a significant increase in adults who reported recently using more than one method to consume marijuana (from 24% in 2014 to 38% in 2015).
- Monthly sales of retail marijuana increased during the first six months of early retail sales through existing dispensaries. During March 2016, Oregon dispensaries sold 1.7 million grams (approximately 1.9 tons) of retail marijuana.

Many adults use marijuana for medical purposes.

- Approximately one-fourth of total adult marijuana users — or approximately 3% of the Oregon adult population — say they are using marijuana for medical purposes.
- Annual numbers of medical marijuana patients have increased during the last 15 years; 68,032 medical marijuana patients are currently registered in Oregon. The primary indication for use is severe pain. Few children or youth are registered as medical marijuana users.

Youth prevention efforts may be needed.

- Sixty-eight percent of 11th-graders and 32% of eighth-graders report they have easy access to marijuana. Eleventh grade youth report that marijuana is easier to get than cigarettes, and about as easy to get as alcohol.
- Perception of risk from weekly marijuana use as well as belief that either friends or parents think marijuana use is wrong declined modestly for both grades between 2014 and 2016. In 2016, among 11th-graders, nearly four in 10 (39%) personally think weekly marijuana use is harmful, 47% believe their friends think it would be wrong to use marijuana, and 85% believe their parents think it would be wrong.

Many adults report seeing marijuana marketing in communities.

- In fall 2016, approximately half of Oregon adults (48%) said there was a store that sells marijuana in their neighborhood. This is an increase from 32% in fall 2015.
- More than half (60%) of Oregon adults had seen marijuana product or store advertising in their community in the past month; the percentage of adults who saw marijuana ads was similar for people who use marijuana and people who do not.

Gaps exist in public knowledge of marijuana-related health risks.

- Less than one-third of Oregon adults (29%) had seen information about health risks of using marijuana in their community in the past month.
- Current marijuana users reported less agreement than former users or non-users about potential health concerns around marijuana use such as greater long-term health risks for people who start using marijuana early in life.

Some public health impacts have been observed associated with legalization of marijuana.

- Marijuana-related calls to the Oregon Poison Center were stable from 2013 through mid-2015, then increased in the second half of 2015 and early 2016 (the same time period that retail sales began in Oregon). The most common marijuana-related reasons for calling the Poison Center were tachycardia (racing heartbeat), excessive drowsiness, agitation and nausea/vomiting.
- Beginning in October 2015, there was a steady increase in emergency department visits with marijuana indicated in diagnosis codes or chief complaint documentation. From January 2016 through September 2016, there were more than 8,000 marijuana-involved emergency department visits.

Although increases in traffic crashes have not been observed, many adults and youth report driving after using marijuana.

- Nearly half of 11th-graders currently using marijuana who drive a car report they drove within three hours of using marijuana in the past month.
- Two separate surveys asked adults if they had driven a vehicle after using marijuana: In one survey, 21% of Oregon adults who use marijuana said they had driven within three hours of using marijuana in the past year; in the other survey, 34% said they had done so.

- There were no clear, consistent changes in drug-related traffic collisions from 2010 through 2014. Traffic crash data for the post-legalization period (since 2015) were not yet available in Oregon.
- The rate of Oregon fatal traffic crashes associated with marijuana remained stable from 2012 through 2014.
- Three in four (76%) adults agreed driving under the influence of marijuana increases the risk of a traffic crash. This is significantly fewer than the 95% of adults who agreed driving after using alcohol increases the risk of a crash.

Marijuana-related crime rates continue to decline among adults; however, youth incidents may be increasing.

- Marijuana-related arrests among adults decreased from peak rates in 2011 through early 2016. Between January 2015 and August 2016 (post-legalization), marijuana arrests accounted for 4% of all drug-related arrests in Oregon in comparison to 15% pre-legalization.
- Rates of marijuana arrests have declined among all adult race groups, but the rate of arrests among African American or Black adults was still more than 50% higher than the rate of arrests among Whites in 2015.
- Numbers of youth referrals to the juvenile justice system for possession of small amounts (less than one ounce) of marijuana increased in 2014 and 2015 compared to prior years.

This is the second report providing data on marijuana use, attitudes and health effects in Oregon. New information will be reported as it becomes available from these or other potential sources that provide greater understanding about marijuana and public health.

Purpose

Oregon has had a legal medical marijuana system since 1998, and voters approved legalized retail (non-medical, also known as recreational) marijuana in 2014. As marijuana distribution systems have become more publicly governed, the state and policymakers need information to support decision making about how best to serve public interest.

The Oregon Health Authority Public Health Division serves to protect Oregon's public health. The role of the Public Health Division relevant to marijuana includes:

- Understanding and minimizing the possible negative public health impacts of retail and medical marijuana products;
- Educating the public about health issues related to marijuana use;
- Protecting children and vulnerable populations from marijuana exposure;
- Preventing youth from starting to use marijuana;
- Monitoring marijuana use, attitudes and health effects.

The purpose of this report is to provide a description of marijuana-related public health metrics for Oregon. A first "baseline report" of these indicators was published in January 2016; this report provides updated data and includes some data collected following key changes in Oregon's law, as described in the "Background" section.

This report provides data that can be used by public health and community leaders to identify where action is needed to protect public health, and to monitor progress of those actions.

Terms used in report

The following definitions guide readers in understanding the terms used throughout this document.

Confidence interval: Much of this report's data came from surveys. Surveys represent populations but because surveys used here do not query every member of a population, we do not know the population's "true value." We use 95% confidence intervals when reporting survey data. This means we can be 95% sure that this confidence interval contains the "true value" for a population. In other words, if the survey sampling was done in the population 100 times, we would expect the confidence interval to capture the "true value" 95 times. The larger the sample, the narrower the confidence intervals.

Confidence intervals also help to compare whether results from one group are significantly different from another group. In this report, when you see that the ends of gray "barbell" lines (representing the confidence interval) do not overlap between two groups, those measures are significantly different. Sometimes the barbell lines between two groups slightly overlap, but the measures are still significantly different when we do a formal statistical test. See Appendix A for more information about confidence intervals.

Current use: Current use of marijuana means any use of marijuana products, in any form, within the past 30 days. This is the standard definition on national and state health surveys for both youth and adults.

Marijuana: Marijuana (sometimes known as cannabis, weed or pot) is derived from the plant *Cannabis sativa.* The main psychoactive compound in marijuana is tetrahydrocannabinol (THC). Unless otherwise specified in this report, the term marijuana refers to any marijuana products, intended for either medical or recreational purposes.

Marijuana use: Unless otherwise specified, this means use of marijuana in any form. Marijuana is most commonly used by smoking dried flowers and leaves; it also can be consumed through ingesting infused foods or liquids, inhaling vapors from concentrates using an electronic device (e.g., "vaping"), inhaling smoke from extracts heated on a hot surface (e.g., "dabbing") or applying infused lotions or oils to skin.

Medical marijuana: This term refers to marijuana used for treatment of diseases, conditions or symptoms as recommended by a physician (see page 29–30 for the list of allowable conditions specified in statute). Medical marijuana products may not differ from non-medical products.

Substance use: Consumption of alcohol or drugs as a general group is sometimes called "substance use." In this report, the term is used in discussions about marijuana, alcohol and tobacco.

Modes of use: Marijuana plant flowers and leaves (sometimes called "usable marijuana") are typically dried and consumed. Common methods for consumption include:

- Smoking: inhaling smoke from a rolled joint, pipe, blunt or bong;
- Eating: consuming "edibles" or foods with marijuana ingredients (e.g., brownies or cakes);
- Drinking: consuming marijuana-infused beverages (e.g., teas or sodas);
- Vaping: inhaling vapor from an electronic cigarette-like vaporizer or electronic device;
- Dabbing: heating a concentrate on a hot surface and inhaling the smoke from a vessel;
- Topical: applying infused lotions or oils to the skin.

THC (delta 9-tetrahydrocannabinol): The main psychoactive compound in marijuana. Marijuana product "dose" or "concentration" is frequently considered in terms of the number of milligrams of THC.

Trends. Trends (changes in rates or levels of public health indicators over time) were assessed to determine whether they were increasing, decreasing or not changing significantly. Trends are described in this report as "significant" if they meet criteria for statistical significance at the 95% confidence level.

Background

Oregon has had a legal medical marijuana system since 1998, and voters approved legalized retail (non-medical, also known as recreational) marijuana in 2014. As a result of retail marijuana legalization, possession and use of limited amounts of marijuana by people aged 21 years and older became legal in Oregon; possession and use of non-medical marijuana by youth (under age 21), driving under the influence of marijuana and using marijuana in public places remain illegal.

Implementation of marijuana legalization

The implementation of a legalized medical and retail marijuana system has occurred as a series of gradual steps. Major policy implementation actions to date include:

- **Nov. 3, 1998.** Medical Marijuana Act approved by 54.6% of Oregon voters, legalizing medical use and establishing the Oregon Medical Marijuana Program.
- **July 3, 2013.** Possession of more than one ounce of marijuana changed from a Class B felony to a misdemeanor.
- **March 3, 2014.** Oregon House Bill 3460 took effect, creating regulations for the state to begin licensing medical marijuana dispensaries.
- **Nov. 4, 2014.** Measure 91 approved by 56.1% of Oregon voters, legalizing retail (non-medical) marijuana possession, use and sales for people 21 and older.
- **July 1, 2015.** Decriminalization of marijuana use and possession by adults (age 21 and older).
- **Oct. 1, 2015.** Early retail sales of "usable marijuana" (bud or flower and leaf only – not including edibles or concentrates) started through Oregon's licensed medical marijuana dispensaries. Sales were tax-free from October through December 2015; a marijuana sales tax began Jan. 1, 2016.
- **June 2, 2016.** Early retail sales of low-dose edible and concentrate marijuana products through licensed medical marijuana dispensaries began.
- **Oct. 1, 2016.** Licenses were granted and sales of all types of marijuana products started through retail marijuana stores.

Regulating legalized marijuana

Multiple entities play a role in the regulation of marijuana in Oregon. Currently, medical marijuana dispensaries are registered with the Oregon Medical Marijuana Program (OMMP) and retail marijuana facilities are licensed through the Oregon Liquor Control Commission (OLCC). Some cities and counties have passed ordinances that prohibit medical or retail marijuana business activities. The "Resources" section at the end of this report provides links to additional information about the law and oversight of Oregon's medical and retail marijuana systems.

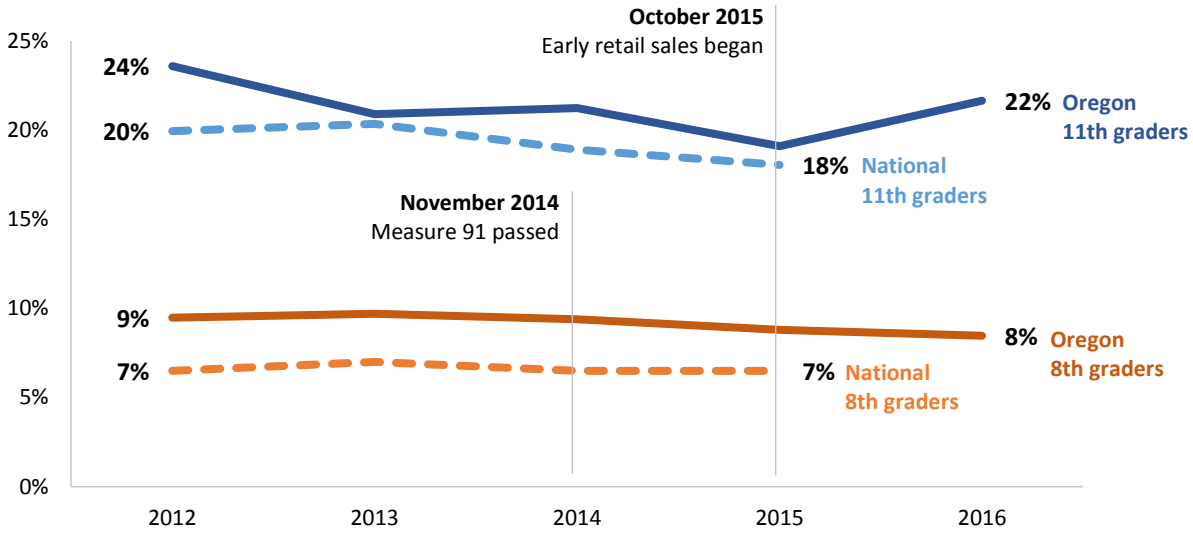
Behaviors

Youth use

Oregon's Student Wellness Survey (SWS) and Oregon Healthy Teens Survey (OHT) are anonymous, school-based surveys conducted by the Oregon Health Authority. Both surveys contain multiple marijuana-related measures, including patterns of use. National youth data were obtained from Monitoring the Future (MTF), a similar school-based survey of U.S. secondary school students. Oregon's surveys collect data among eighth-graders and 11th-graders during alternating years. MTF results for 10th-graders and 12th-graders were averaged to provide a national comparison for Oregon's 11th-graders.

Note: All youth surveys define "current use" as using marijuana on one or more of the past 30 days. This is the nationally accepted definition for "current use" among youth.

Figure 1. Current marijuana use among Oregon and U.S. youth, 2012–2016



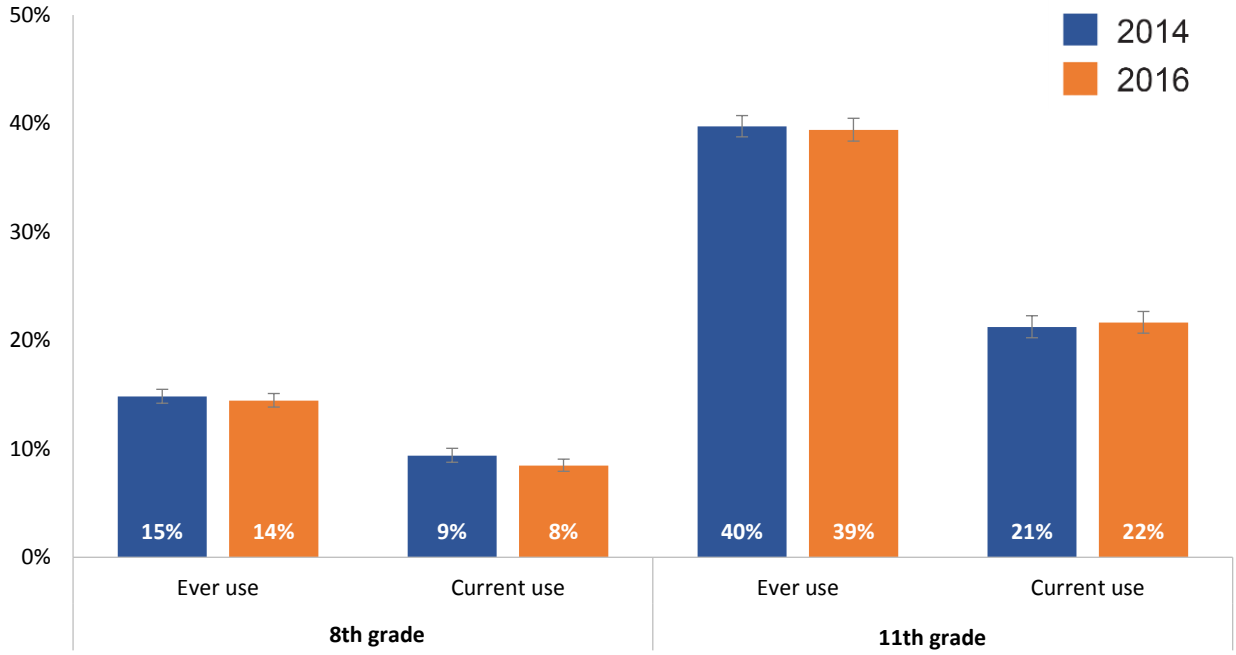
Note: "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data sources: Oregon data are from Oregon Healthy Teens Survey (2013 and 2015) and Student Wellness Survey (2012, 2014 and 2016). National data are from Monitoring the Future Survey (2012–2015).

As shown in Figure 1:

- In 2016, 8% of Oregon eighth-graders and 22% of Oregon 11th-graders reported marijuana use in the past 30 days.
- Current marijuana use among Oregon eighth- and 11th-graders is slightly higher than national estimates.
- Marijuana use prevalence in 2016 is similar to the prevalence in prior years among both eighth- and 11th-graders in Oregon and the United States.

Figure 2. Ever and current marijuana use among Oregon youth, 2014 and 2016



Notes: "Ever" marijuana use is defined as any marijuana use in a lifetime. "Current" marijuana use is defined as any marijuana use in the past 30 days.

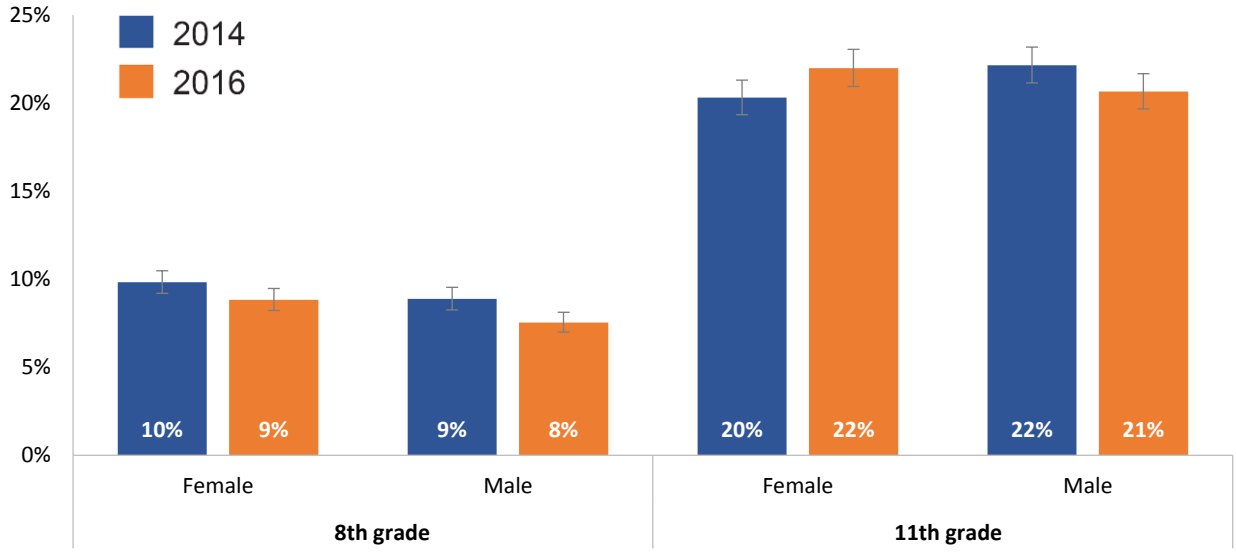
Data source: Oregon Student Wellness Survey (2014 and 2016).

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 2:

- Fourteen percent of eighth-graders and 39% of 11th-graders have ever used marijuana.
- Ever and current marijuana use among Oregon eighth- and 11th-graders did not meaningfully change from 2014 to 2016 (pre- to post-retail marijuana legalization).
- Eleventh-grade ever and current marijuana use was more than double that of eighth-graders in both 2014 and 2016.

Figure 3. Current marijuana use among Oregon youth by grade and gender, 2014 and 2016



Note: "Current" marijuana use is defined as any marijuana use in the past 30 days.

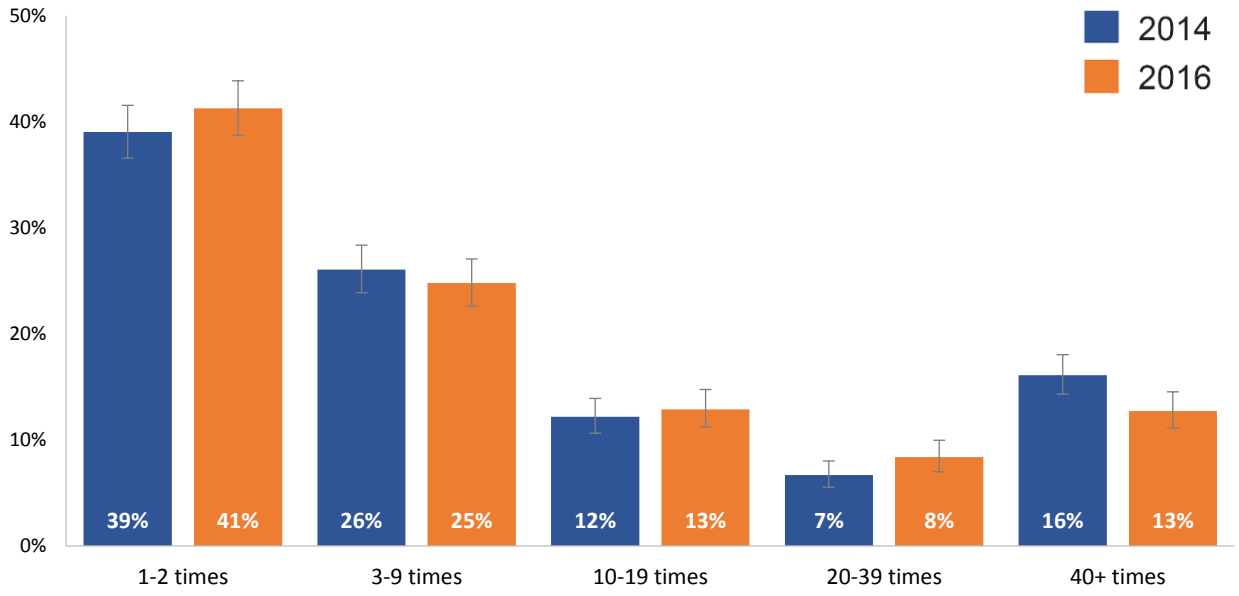
Data source: Oregon Student Wellness Survey (2014 and 2016).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 3:

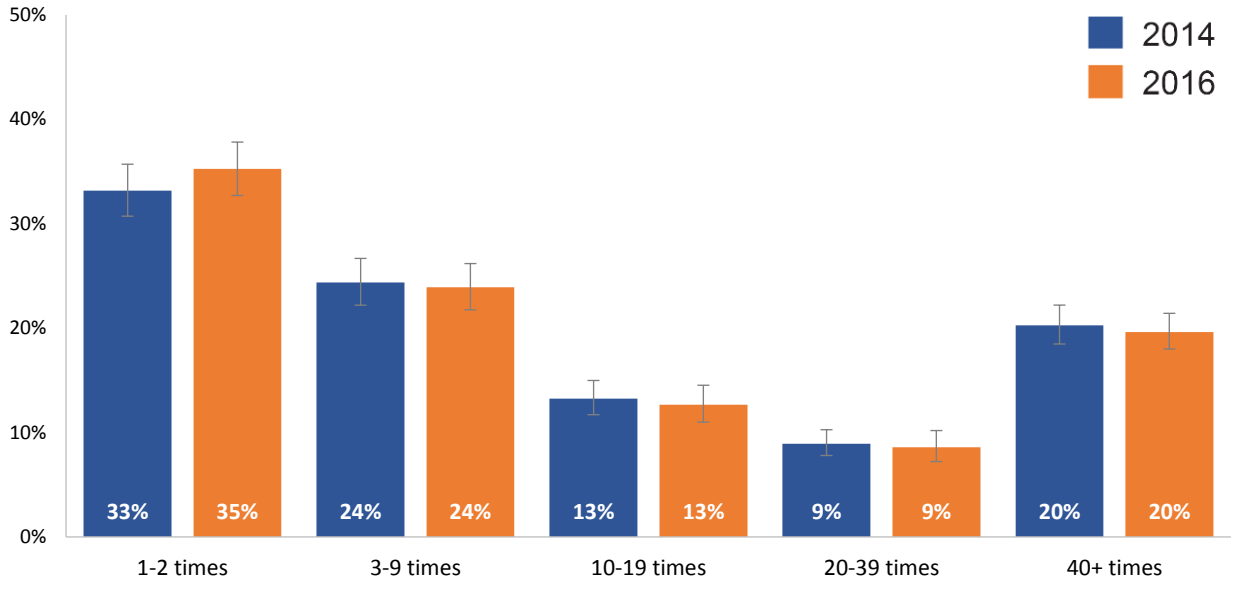
- In 2016, 9% of female and 8% of male eighth-graders, and 22% of female and 21% of male 11th-graders reported current marijuana use.
- There were no notable changes from 2014 to 2016 in current marijuana use among male and female eighth- and 11th-graders.

Figure 4. Frequency of marijuana use among eighth- and 11th-grade current marijuana users, 2014 and 2016

Eighth-grade



11th-grade



Notes: Frequency of marijuana use is determined with the question, "During the past 30 days, how many times did you use marijuana." "Current" marijuana use is defined as any marijuana use in the past 30 days.

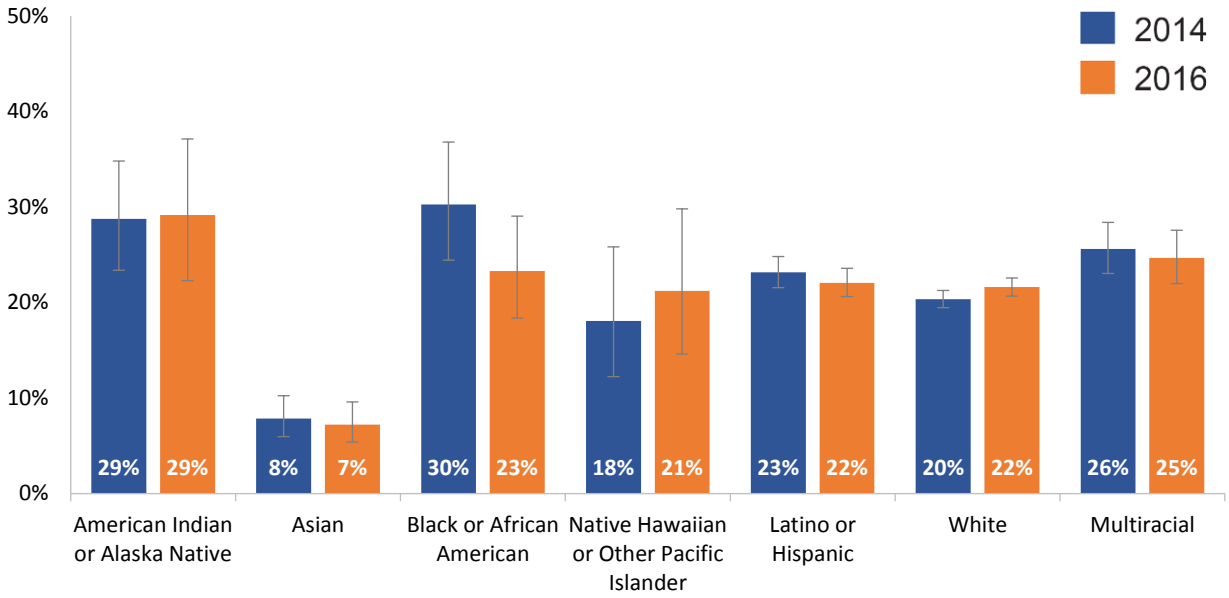
Data source: Oregon Student Wellness Survey (2014 and 2016).

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 4:

- There were no meaningful changes from 2014 to 2016 in the frequency of marijuana use among eighth- and 11th-graders who currently use marijuana.
- Higher frequency use (40+ times in past month) was more common among 11th-graders compared to eighth-graders in 2016.

Figure 5. Current marijuana use among Oregon 11th-graders by race and ethnicity, 2014 and 2016



Notes: All racial groups exclude Latino or Hispanic ethnicity. Racial groups are defined based on students' self-reported race. Latino or Hispanic youth can be of any race. "Current" marijuana use is defined as any marijuana use in the past 30 days.

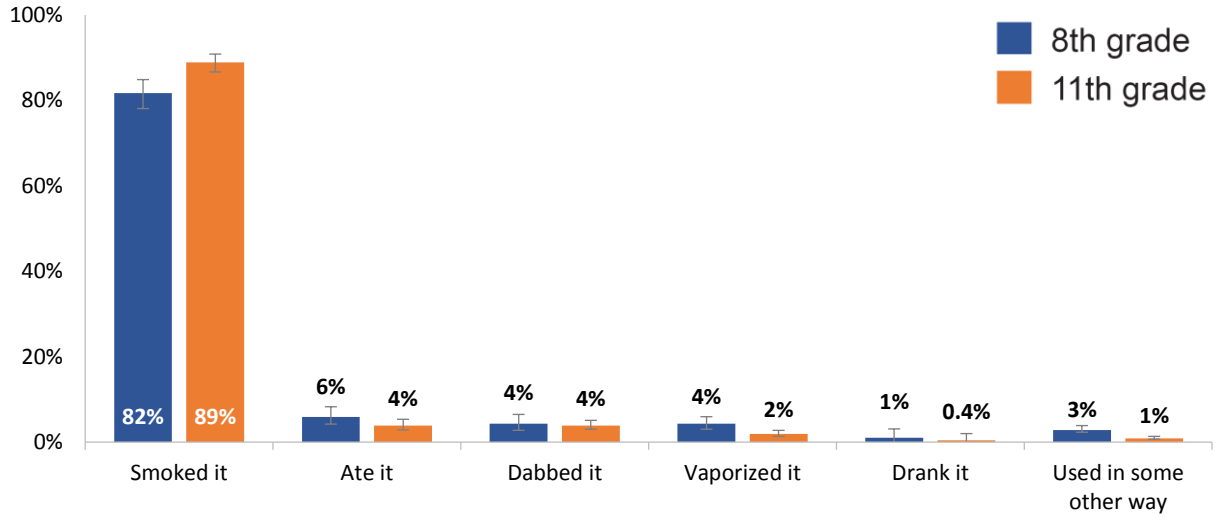
Data source: Oregon Student Wellness Survey (2014 and 2016).

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 5:

- Among 11th-graders in 2016, marijuana use was not significantly different among American Indian or Alaska Native, Black or African American, Native Hawaiian or other Pacific Islander, Latino or Hispanic, White and Multiracial youth. Asian youth reported lower marijuana use prevalence than any other group.
- Among eighth-graders in 2016, those who identified as American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, Black or African American, Multiracial, and Latino had higher marijuana prevalence compared to non-Latino White eighth-graders; Asian youth had lower prevalence (data not shown).
- From 2014 to 2016, current marijuana use did not change significantly in any racial or ethnic group for either grade.

Figure 6. Usual mode of marijuana use among Oregon youth who currently use marijuana, 2015



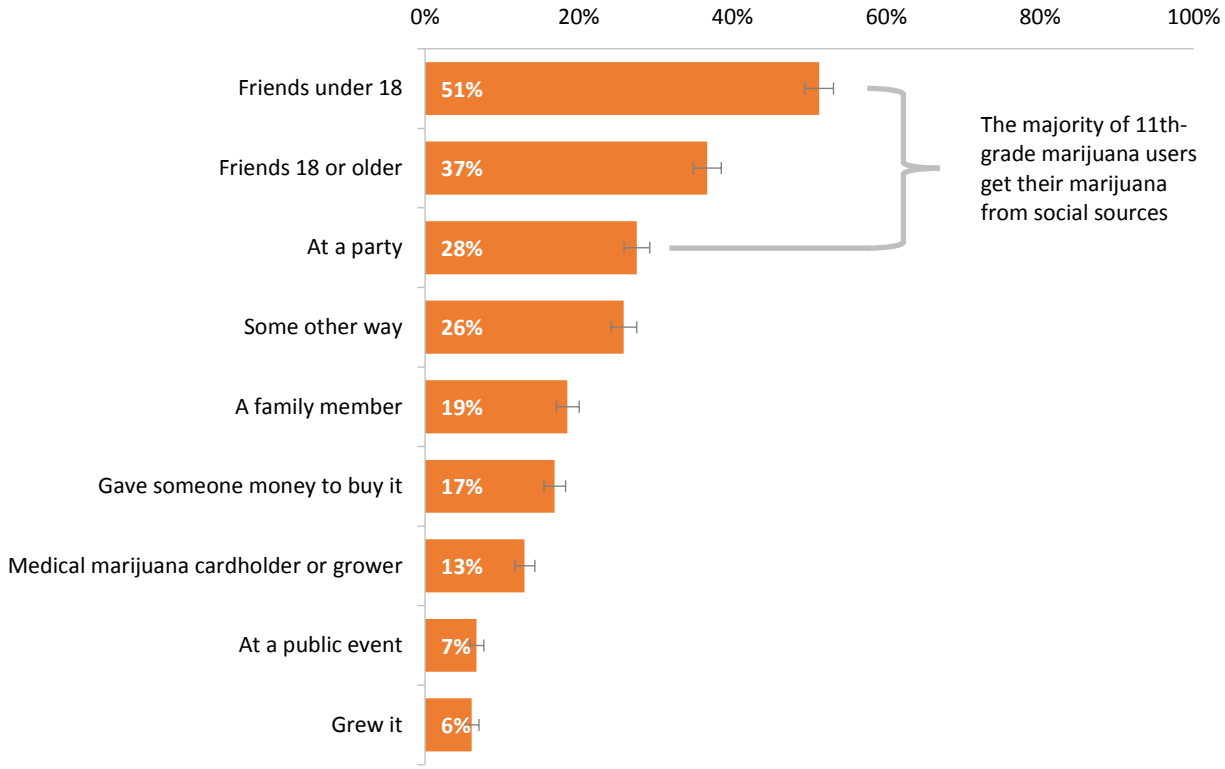
Notes: Oregon students were asked, "During the past 30 days, if you used marijuana, how did you usually use it?" Students had to choose a single answer. "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Healthy Teens Survey (2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 6:

- The vast majority of both eighth- and 11th-graders reported smoking as their usual mode of marijuana use, followed by eating (edibles), dabbing (heating concentrate on a hot surface and inhaling smoke from a vessel) and vaping (inhaling vapors from an electronic cigarette-like vaporizer or electronic device). Very few students reported drinking marijuana-infused products.
- A higher proportion of 11th-grade current marijuana users reported most often smoking marijuana compared to eighth-grade users.

Figure 7. Source of marijuana among 11th-grade current marijuana users in Oregon, 2016



Notes: Oregon students who used marijuana in the past month were asked, "During the past 30 days, from which of the following sources did you get marijuana?" Students could choose multiple answers. "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Student Wellness Survey (2016).

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

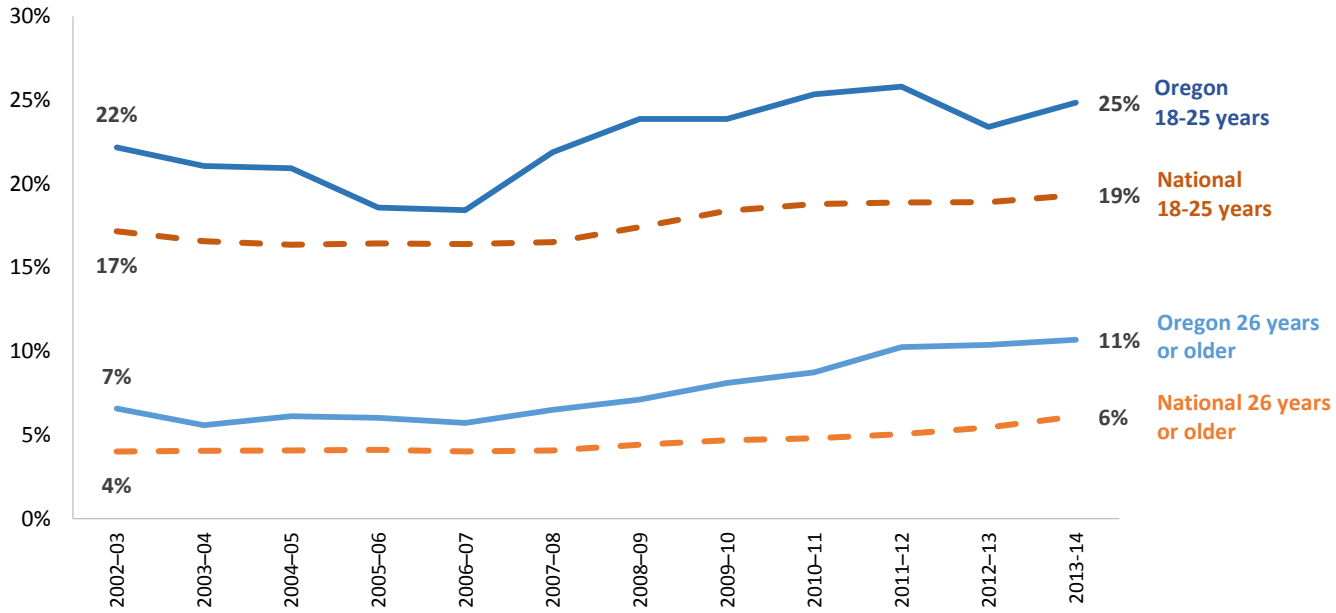
As shown in Figure 7:

- In 2016, most 11th-grade current marijuana users get their marijuana from social sources including friends under 18 years old (51%), friends older than 18 (37%), and at parties (28%).
- Of note, 26% of 11th-grade marijuana users reported getting their marijuana "some other way," which could require additional follow-up with youth to clarify. The survey did not ask whether youth got marijuana directly from a dispensary or retail store.

Adult use

The National Survey on Drug Use and Health (NSDUH) is a federally sponsored survey that provides national and state-level data on the use of tobacco, alcohol and illicit drugs and mental health in the United States. This survey has measured adult marijuana use for multiple years.

Figure 8. Current marijuana use among Oregon and U.S. adults by age group, 2002–2014



Note: "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: National Survey on Drug Use and Health (2002–2014).

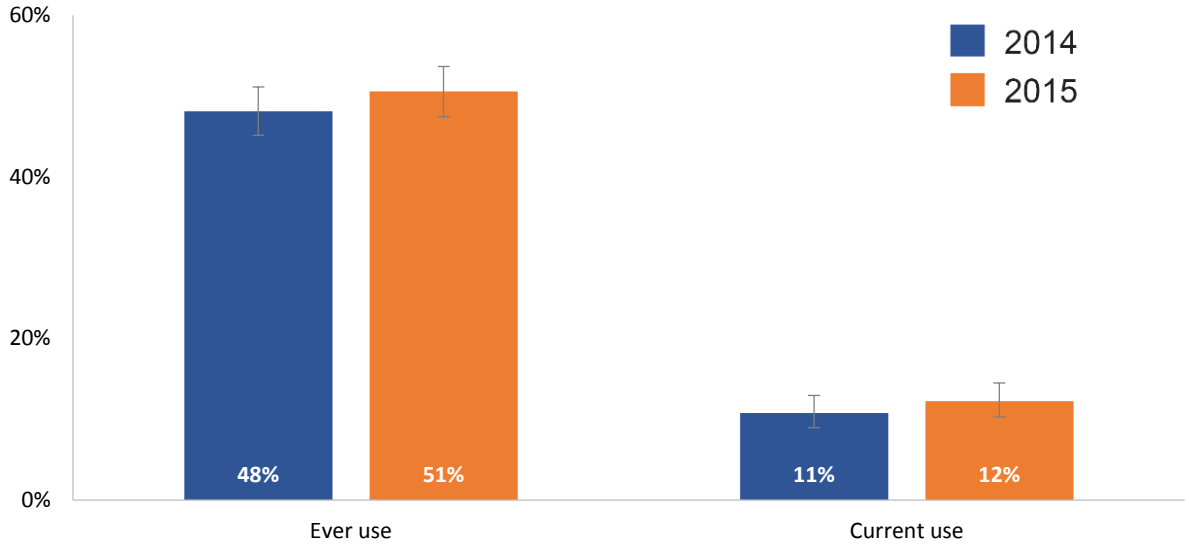
As shown in Figure 8:

- Current marijuana use is consistently higher for young adults (ages 18–25 years) compared to older adults (ages 26+ years) in both Oregon and the United States.
- Oregon marijuana use has been higher than national use in both age groups for the last decade.

The Oregon Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing telephone survey of health behaviors among Oregon adults. Marijuana use questions were added to Oregon's BRFSS beginning in 2014. BRFSS data are collected every month, throughout the year; therefore, some BRFSS 2015 data were collected after the start of early retail sales in October 2015.

Note: As with national surveys, adults are defined as "current marijuana users" if they report using on one or more of the past 30 days.

Figure 9. Ever and current marijuana use among Oregon adults, 2014 and 2015



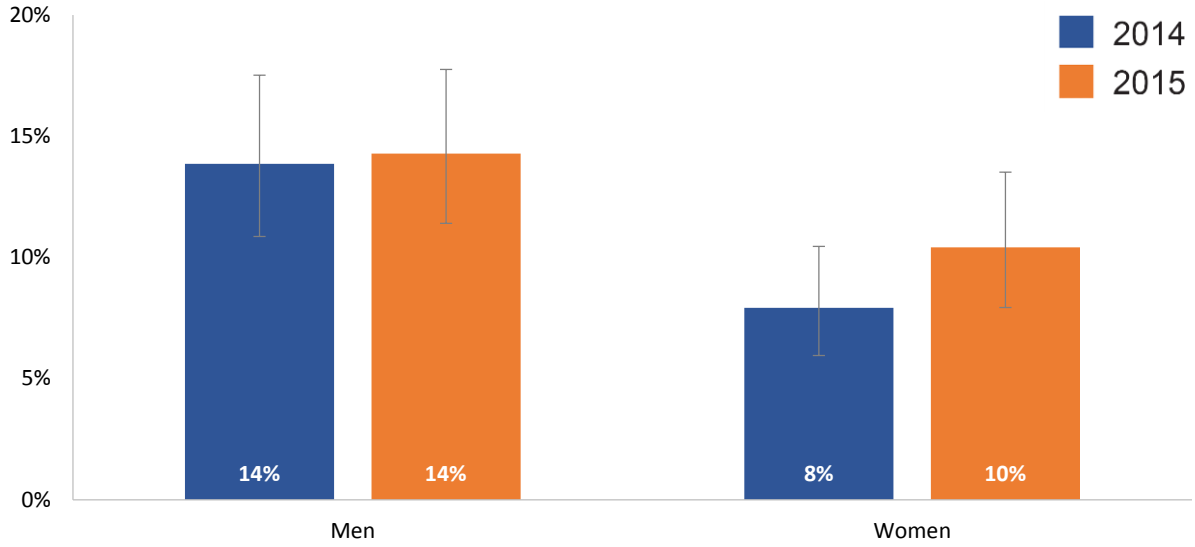
Notes: Oregon adults were asked, "How old were you the first time you used marijuana in any form, if ever?" and, "During the past 30 days, on how many days did you use marijuana or hashish (grass, hash or pot)?" "Ever" use is defined as ever using marijuana in a lifetime. "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 9:

- Approximately half (51%) of Oregon adults reported ever using marijuana in 2015, and approximately one in 10 (12%) reported current use of marijuana.
- Ever and current use did not change significantly between 2014 and 2015.

Figure 10. Current marijuana use among Oregon adults by gender, 2014 and 2015



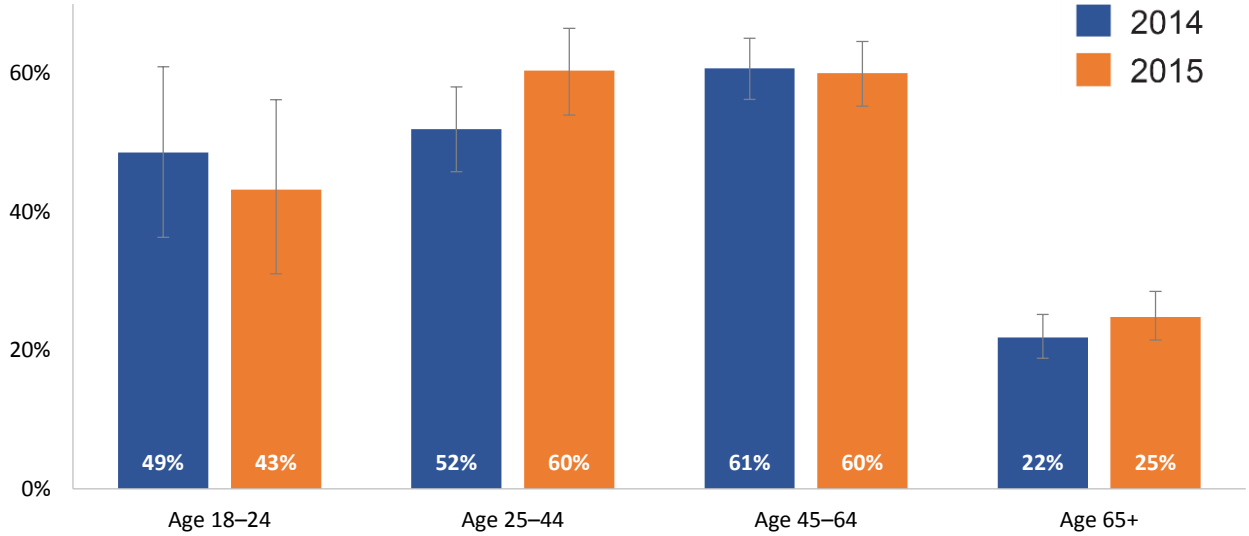
Note: "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 10:

- Current marijuana use was not significantly different between men (14%) and women (10%) in 2015.
- Current use did not change significantly between 2014 and 2015 for either women or men.

Figure 11. Ever marijuana use among Oregon adults by age, 2014 and 2015



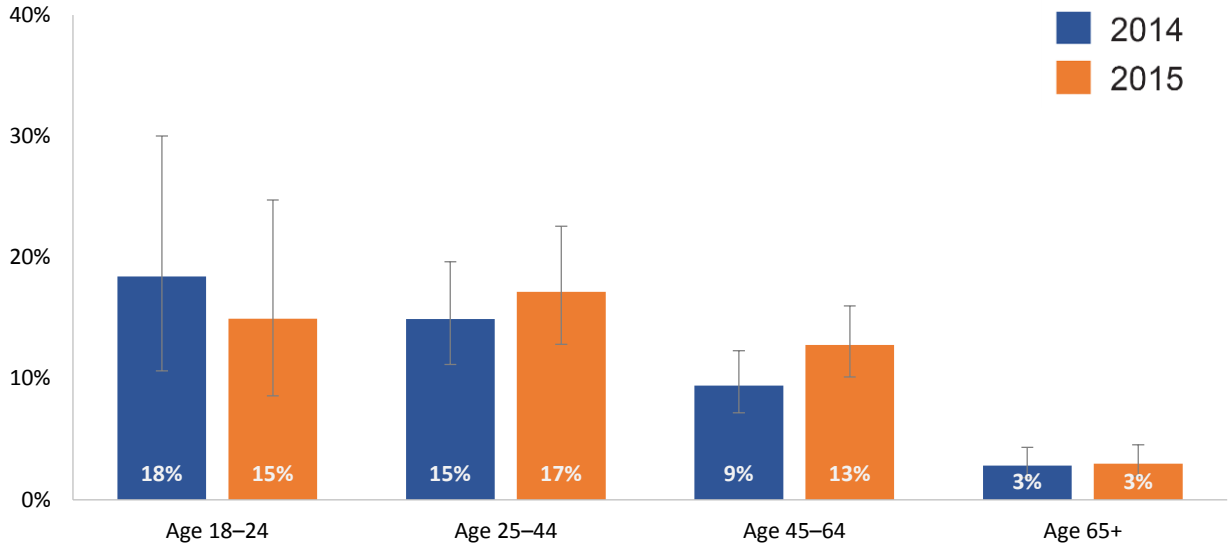
Notes: Oregon adults were asked, "How old were you the first time you used marijuana in any form, if ever?" "Ever" use is defined as ever using marijuana in a lifetime.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 11:

- Adults aged 25–64 years (combined) were more likely than both younger (age 18–24) and older (ages 65+) age groups to have ever tried marijuana.
- Among adults who had ever tried marijuana, the 2015 median age of first use was 17 years (data not shown).
- The percentage of people who have ever tried marijuana did not change significantly for any age group between 2014 and 2015.
- Lifetime marijuana use among adults aged 18–20 years (not legally able to purchase retail marijuana) did not change significantly between 2014 and 2015 (data not shown).

Figure 12. Current marijuana use among Oregon adults by age, 2014 and 2015



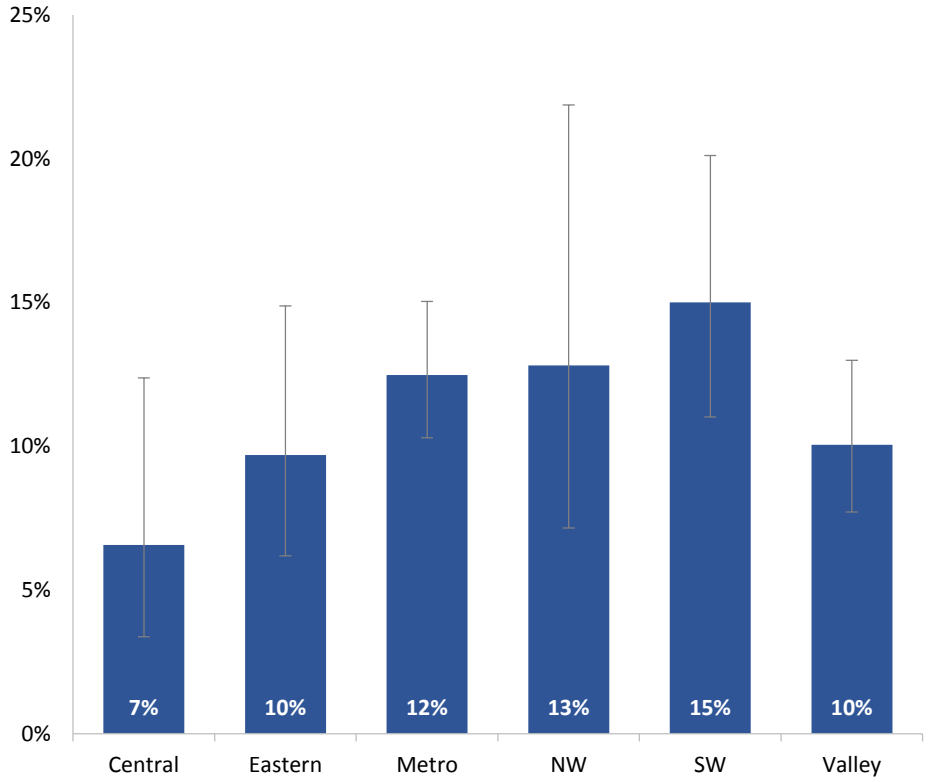
Note: "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 12:

- Current marijuana use was lowest among people ages 65 and older, but similar among other age groups in both 2014 and 2015.
- One in seven (15%) adult women of typical childbearing age (18–39 years old) currently uses marijuana (data not shown).
- The percentage of people who currently use marijuana increased among the 24–64 age groups (combined) between 2014 and 2015.

Figure 13. Current marijuana use among Oregon adults by geographic region, 2014–2015 combined



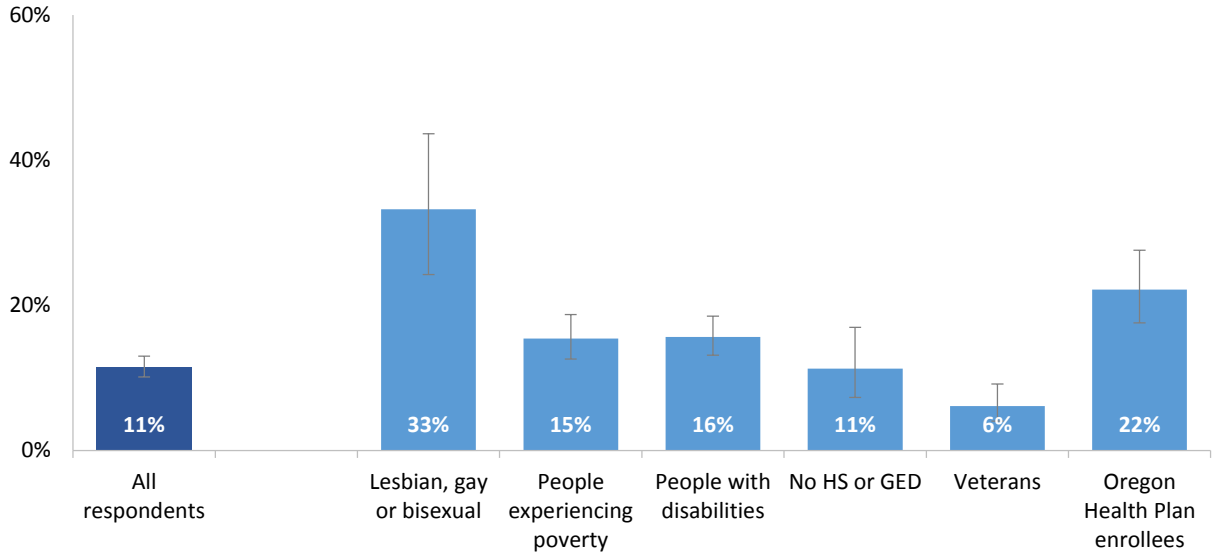
Notes: Regions are defined by county of residence; a map of regions is included in Appendix B. "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015 combined).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 13:

- Although current marijuana use estimates varied somewhat by region, usage prevalence was not significantly different among the regions or between any one region and the rest of the state.

Figure 14. Current marijuana use among Oregon adults by select demographic characteristics, 2014–2015 combined



GED = General Education Development, a high school equivalency certification

HS = high school graduation

Notes: People experiencing poverty are defined as having a household income less than 185% of 2015 Federal Poverty Guidelines; more information is available at https://aspe.hhs.gov/2015-poverty-guidelines. "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014–2015 combined).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

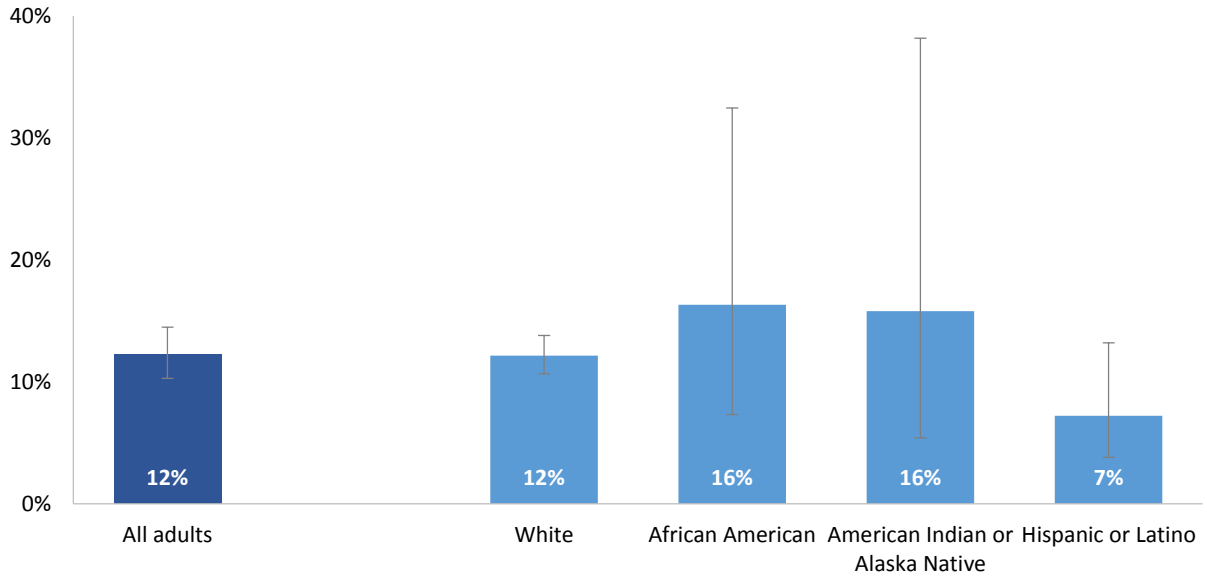
Figure 14 shows current marijuana use among specific priority population groups. These are self-reported characteristics, and a person may be a member of more than one group.

Marijuana use prevalence was examined for priority groups and relevant comparison groups (data not shown). Findings from those comparisons are summarized below:

- Marijuana use was higher among:
    - Lesbian, gay and bisexual people compared to straight people for men and women combined;
    - People with disabilities compared to people without disabilities; and
    - People enrolled in the Oregon Health Plan compared to non-enrollees.
- Marijuana use was lower among military veterans compared to non-veterans.
- There was no significant difference for marijuana use between people experiencing poverty and those not in poverty. There was also no significant difference between people

who did not graduate high school (HS) or receive a GED compared to those with higher levels of education.

Figure 15. Current marijuana use among Oregon adults by race and ethnicity, 2014–2015 combined



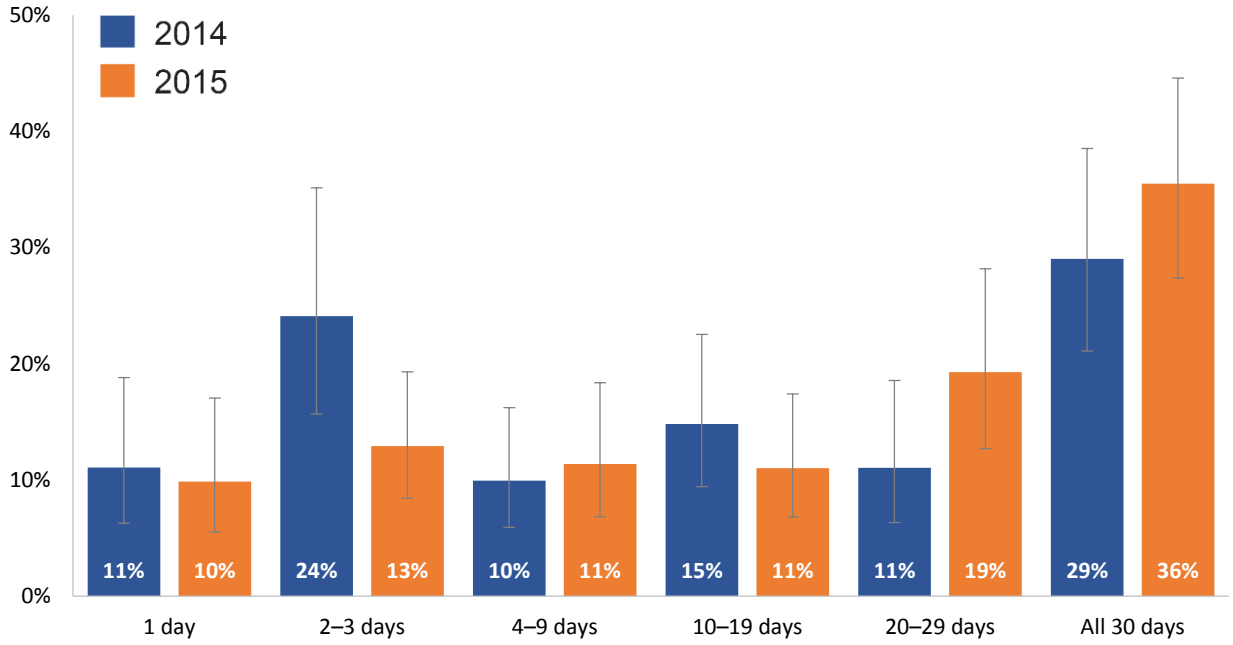
Notes: All racial groups exclude Hispanic or Latino ethnicity. Racial groups are defined as respondents who identified with a single race or "preferred race" among multiple races. "Current" marijuana use is defined as any marijuana use in the past 30 days. The Asian or Pacific Islander racial group is not shown because it has fewer than 100 respondents.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014–2015 combined).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 15:

- Current marijuana use was not significantly different among different race and ethnic groups.

Figure 16. Frequency of marijuana use among Oregon adults who currently use marijuana, 2014 and 2015



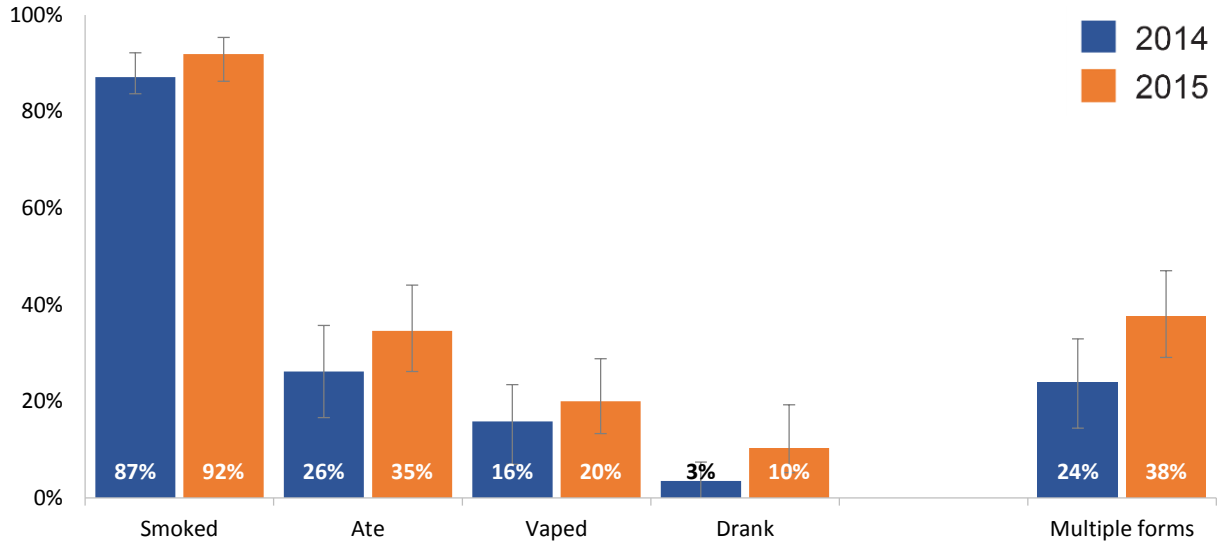
Notes: Adults were asked, "During the past 30 days, on how many days did you use marijuana or hashish?" "Current" marijuana use is defined as any marijuana use in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 16:

- More than one in three (36%) current marijuana users reported using marijuana all 30 days in the past month in 2015.
- The percentage of current users using on 20 or more days (20–29 and all 30 days combined) in the past 30 days increased significantly between 2014 (40%) and 2015 (55%).
- On average, current users in 2015 reported using marijuana on 17.4 days of the past 30 days (data not shown).

Figure 17. Modes of marijuana use among adult current marijuana users, 2014 and 2015



Notes: In the 2014 and 2015 BRFSS, adults who reported using marijuana in the past 30 days were asked, "During the past 30 days, how did you use marijuana?" Multiple choices were allowed.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 17:

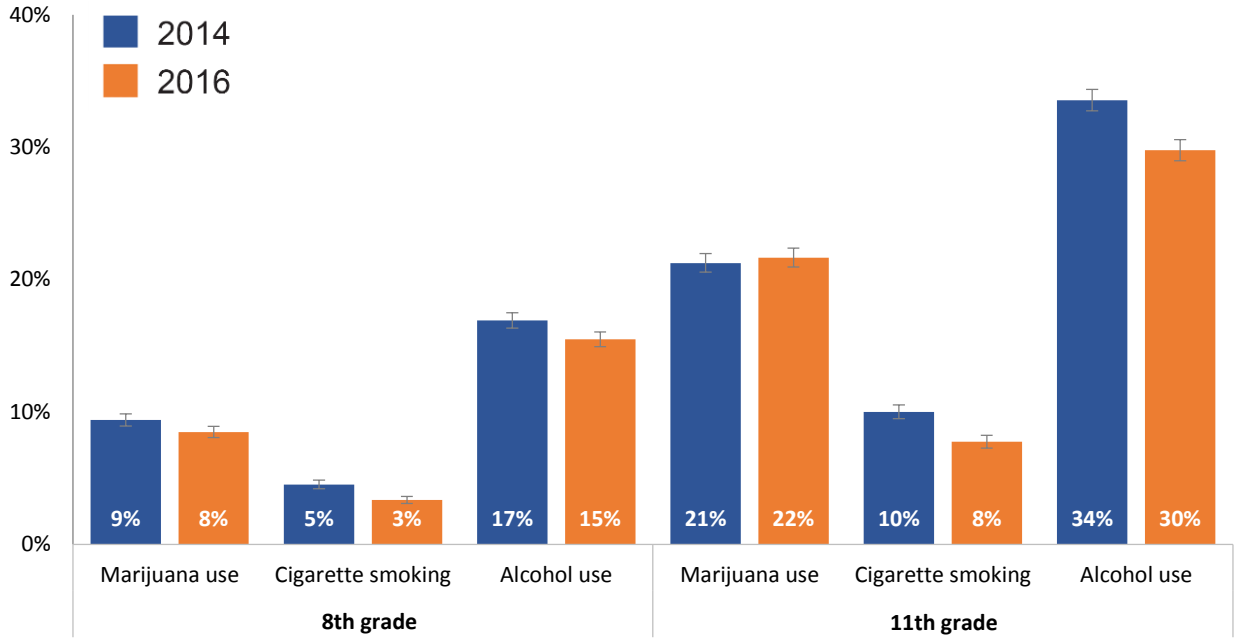
- In 2015, the vast majority (92%) of current marijuana users reported smoking it; one in three (35%) ate it (edibles); one in five (20%) vaped it; and one in ten (10%) drank it.
- There was a statistically significant increase in drinking marijuana-infused products from 2014 (3%) to 2015 (10%).
- Approximately two in five (38%) current users in 2015 reported using multiple forms of marijuana in the past month, a significant increase from 2014 (24%).

Marijuana, alcohol and tobacco

Alcohol and tobacco use patterns are important to consider in monitoring marijuana-related public health data. Changing patterns of marijuana use may lead to substitution of marijuana for other substances (e.g., using marijuana rather than binge-drinking alcohol), or to combining marijuana with other substances to increase their use (e.g., smoking marijuana with tobacco).

Youth substance use and access

Figure 18. Current use of marijuana, cigarettes and alcohol among Oregon youth, 2014 and 2016



Note: As with marijuana, "current" use of cigarettes and alcohol is defined as using one or more times in the past 30 days.

Data source: Oregon Student Wellness Survey (2014 and 2016).

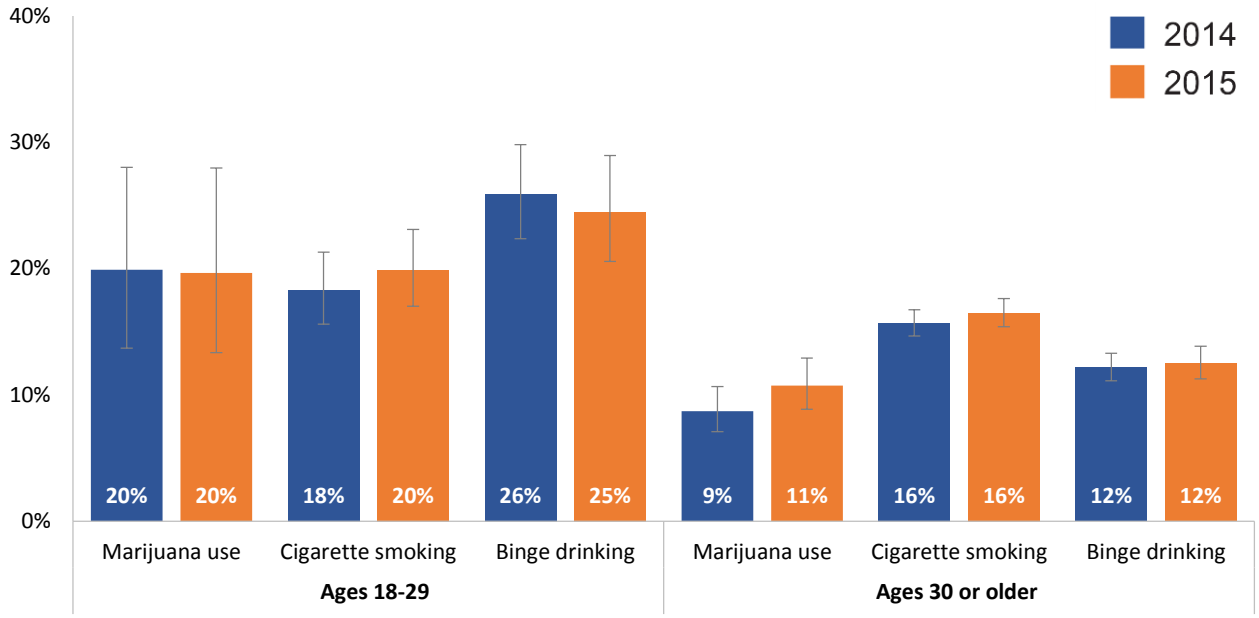
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 18:

- Current marijuana use is lower than alcohol use and higher than cigarette use among both eighth- and 11th-graders.
- While marijuana use has remained fairly stable from 2014 to 2016, current smoking and alcohol use decreased among eighth- and 11th-graders.

Adult substance use

Figure 19. Current marijuana use, cigarette smoking and binge drinking among Oregon adults by age, 2014 and 2015



Notes: "Current" cigarette smokers are defined as those who have smoked at least 100 cigarettes in their lifetime and now smoke cigarettes "every day" or "some days". "Binge drinking" is defined as having five or more drinks on one occasion for men and four or more drinks on one occasion for women in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014 and 2015).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 19:

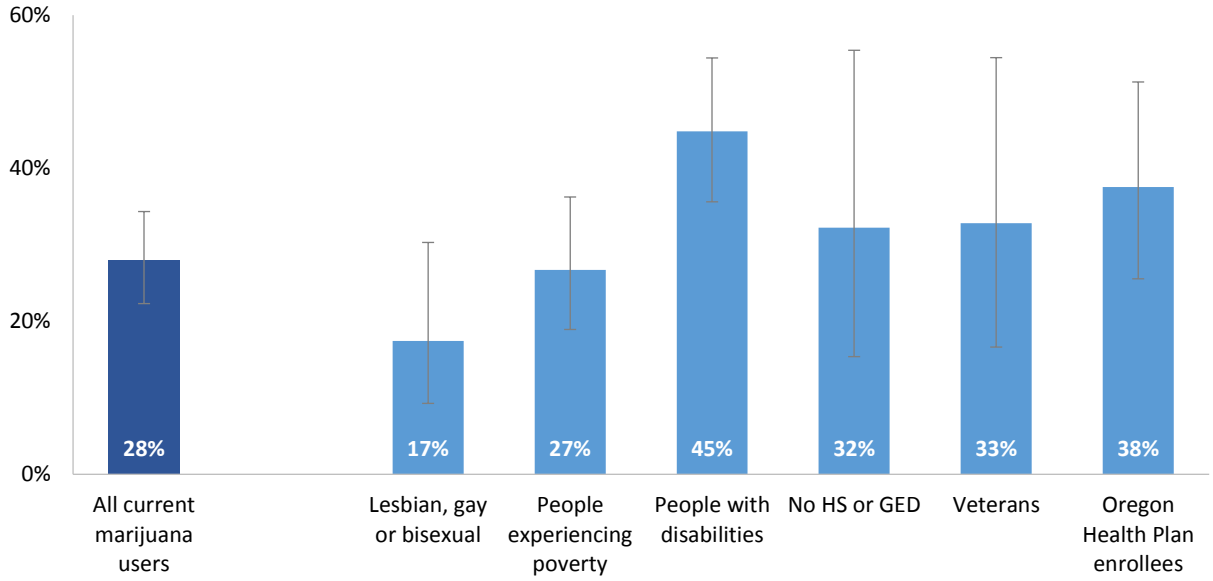
- While current marijuana use (20%) was comparable to current tobacco smoking (20%) among respondents aged 18–29, current marijuana use (11%) was less prevalent than cigarette smoking (16%) among adults ages 30 years and older.
- Current marijuana use was not significantly different from binge drinking prevalence in either age group.
- In 2015, 46% of current marijuana users also reported current cigarette smoking and 40% reported current binge drinking (data not shown).
- Among all adults in 2015, 12% currently used marijuana, 17% smoked cigarettes and 15% reported binge drinking (data not shown).

Medical marijuana

Medical marijuana use has been legal in Oregon since 1998, when the state's voters passed the Oregon Medical Marijuana Act.

Figure 20. Current medical marijuana use among Oregon adult current marijuana users by select demographic characteristics, 2014–2015 combined

(Reported on the Oregon Behavioral Risk Factor Surveillance System)



GED = General Education Development, a high school equivalency certification

HS = high school graduation

Notes: People experiencing poverty are defined as household income below 185% of the 2014/2015 Federal Poverty Guidelines; further information is available at https://aspe.hhs.gov/2015-poverty-guidelines. In 2015, BRFSS respondents were asked, "During the past 30 days, on how many days did you use medical marijuana as recommended by a doctor or other health care provider for treatment of a medical condition?" Current medical marijuana use is defined as use of medical marijuana in the past 30 days.

Data source: Oregon Behavioral Risk Factor Surveillance System (2014–2015 combined).

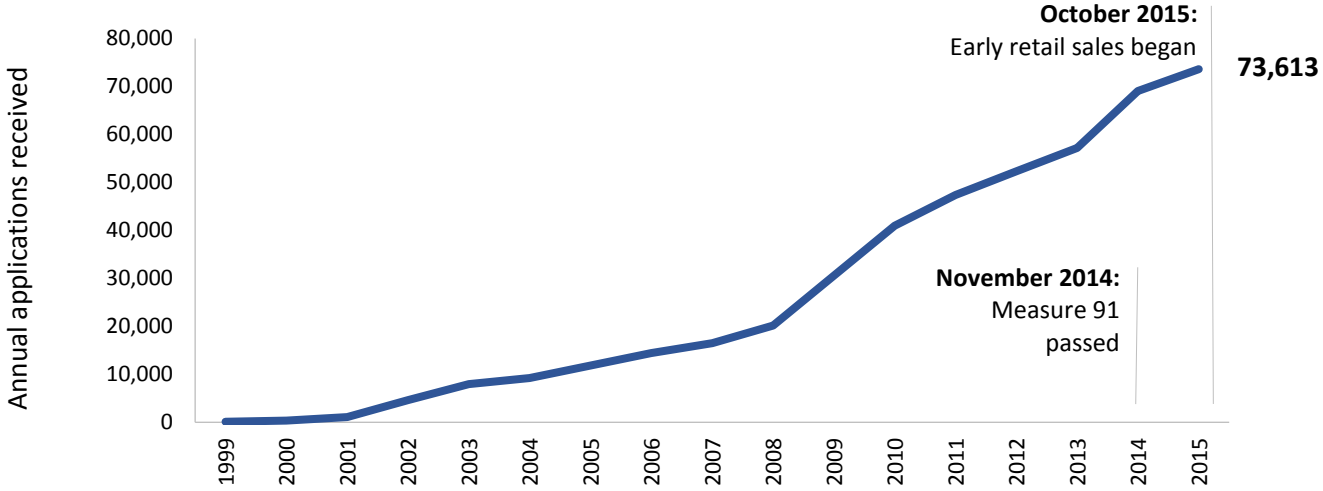
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 20:

- Approximately one in four (28%) adult marijuana users reported they were using marijuana for medical purposes.
- The percentages of adults who reported using marijuana for medical purposes were not significantly different among selected population groups.
- Current medical marijuana use was 3% in the total Oregon population (data not shown).

The Oregon Medical Marijuana Program (OMMP) is a state registry program within the Oregon Health Authority Public Health Division. OMMP's role is to administer the Oregon Medical Marijuana Act (passed in 1998), including registering patients to use marijuana for medical treatment for specific conditions as confirmed by a physician. Patients must have their condition and medical marijuana treatment recommendation reaffirmed by a physician once per year. The OMMP also registers medical marijuana caregivers (individuals 18 years and older who have significant responsibility for the wellbeing of a patient, including assisting with supply, transportation and administration), growers and grow sites. The OMMP routinely analyzes its registry data.

Figure 21. Annual numbers of Oregon medical marijuana card patient applications, 1999–2015



Data source: Oregon Medical Marijuana Program (OMMP) (1999–2015).

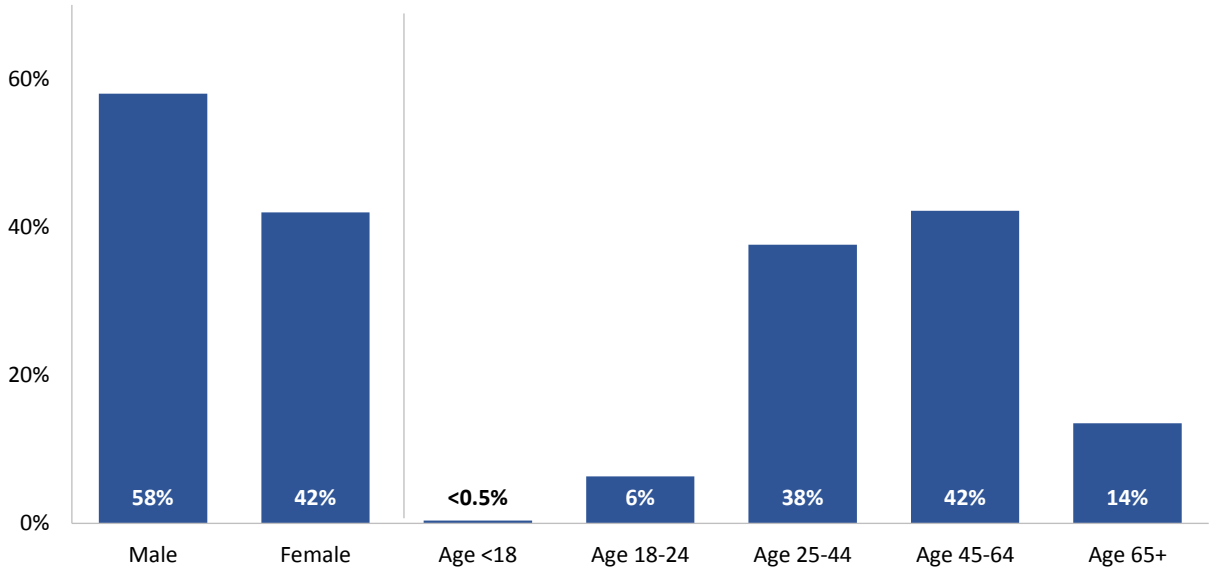
As shown in Figure 21:

- The OMMP has experienced a steady growth in medical marijuana card applications for patients, from 118 in 1999 to 73,613 in 2015.
- Most applications received are approved; since 2001, an average of 4% of applications has not been approved due to lack of documentation or compliance with OMMP (data not shown).

According to OMMP, as of October 30, 2016 there were:

- 68,032 medical marijuana patients registered;
- 29,770 caregivers registered;
- 37,847 medical marijuana growers registered;
- 27,200 medical marijuana grow sites registered; and
- 1,723 physicians provided treatment recommendations for medical marijuana patients.

Figure 22. Demographic characteristics of Oregon medical marijuana patients, 2015



Data source: Oregon Medical Marijuana Program (OMMP) (2015).

As shown in Figure 22:

- Men (58%) are a larger proportion of medical marijuana patients than women (42%).
- Most medical marijuana patients are between the ages of 25 and 64 years old.
- Relatively few minors (less than 18 years old) are medical marijuana patients; 289 minors are currently registered patients, which is less than 0.5% of total registrants.

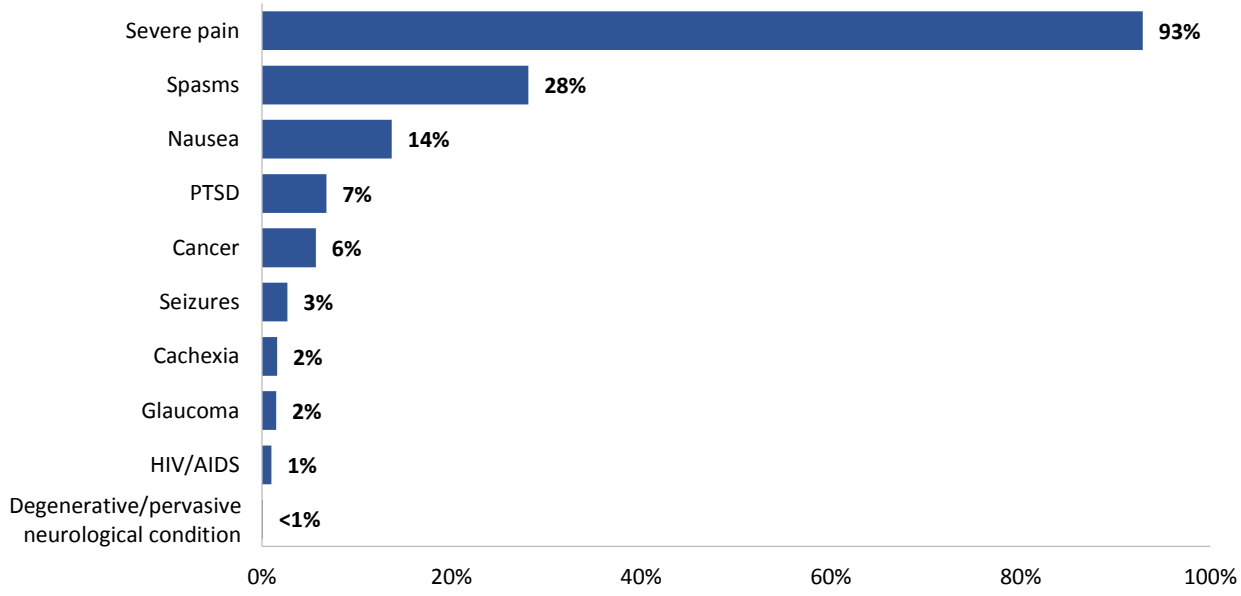
Medical conditions that qualify a patient for the OMMP are:

- Cancer;
- Glaucoma;
- Agitation due to Alzheimer's disease;

- Positive status for human immunodeficiency virus (HIV) or acquired immune deficiency syndrome (AIDS);
- Post-traumatic stress disorder (PTSD); or
- A medical treatment or condition that produces cachexia, severe pain, severe nausea, seizures (including, but not limited to, seizures caused by epilepsy) or persistent muscle spasms (including, but not limited to, spasms caused by multiple sclerosis).

These conditions are not mutually exclusive. A patient may have one or more conditions.

Figure 23. Oregon medical marijuana patient conditions, 2015



Data source: Oregon Medical Marijuana Program (OMMP) (October 2015 Statistical Snapshot).

As shown in Figure 23:

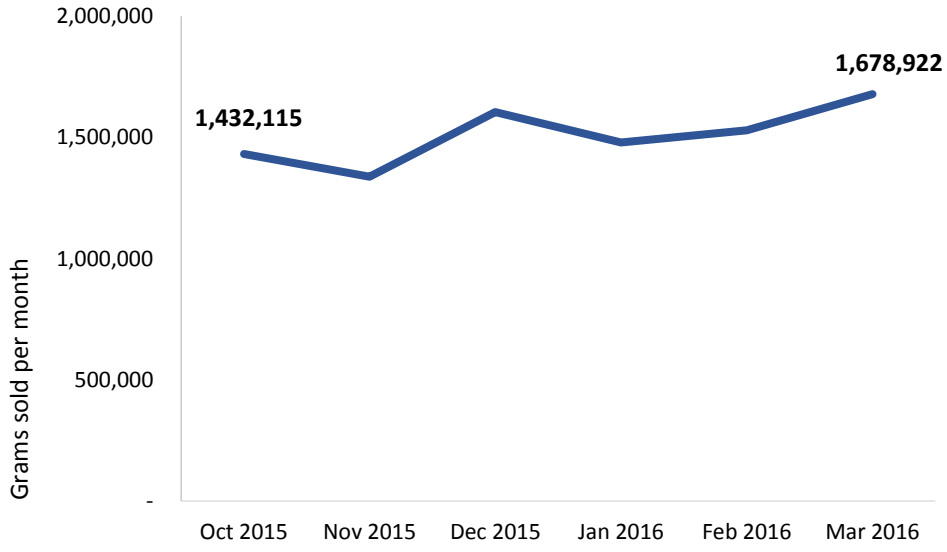
- Severe pain is the most common condition for which patients apply to receive medical marijuana. Nearly all applicants (93%) report severe pain.
- Approximately one in four (28%) medical marijuana patient applications indicated treatment of spasms as a qualifying condition, and approximately one in 10 (14%) indicated nausea.
- Fewer than 10% of patient applications mentioned any of the other qualifying conditions besides severe pain, spasms and nausea.

Retail marijuana sales

Beginning in October 2015, early retail sales of "usable marijuana" (bud or flower and leaf only – not including edibles or concentrates) were allowed in Oregon's licensed medical marijuana dispensaries. Sales were tax-free from October through December 2015 with taxes applied beginning Jan. 1, 2016. Early retail sales of low-dose edible and concentrate marijuana products through licensed medical marijuana dispensaries began in June 2016.

Total sales of retail marijuana is a valuable proxy measure for consumption, assuming that people use the marijuana products they buy within a relatively short period.

Figure 24. Retail marijuana sales in Oregon, total grams usable marijuana sold per month, October 2015–March 2016



Data source: Oregon Medical Marijuana Program (OMMP), early retail sales through medical marijuana dispensaries.

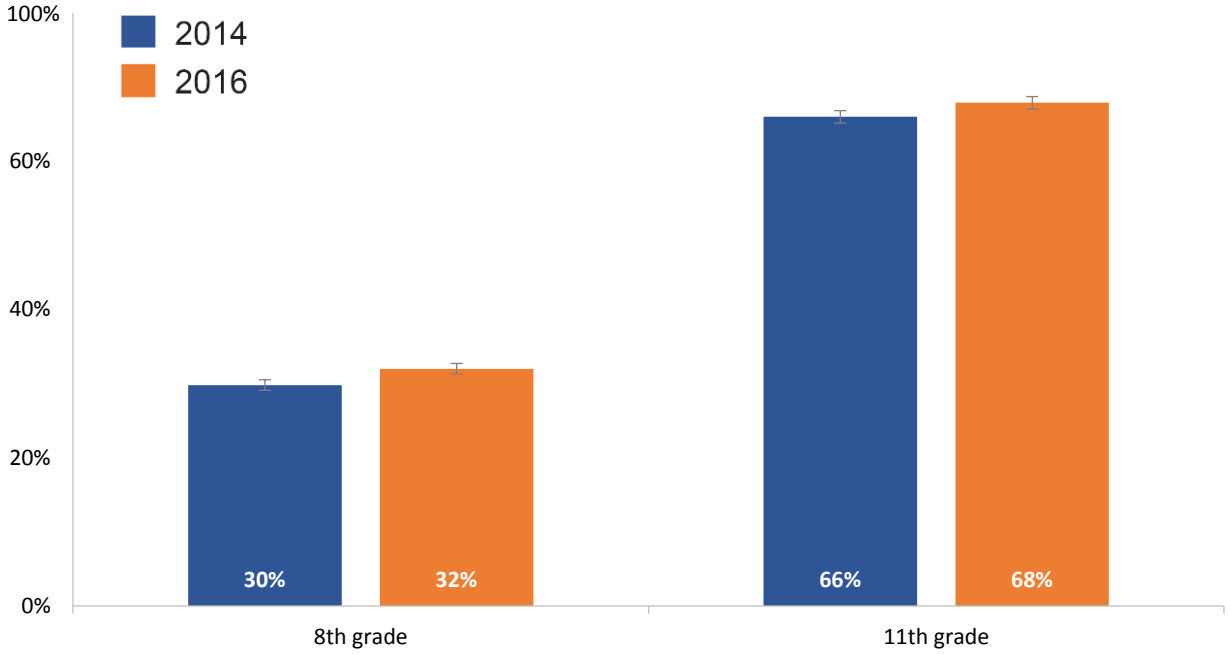
As shown in Figure 24:

- Monthly sales of recreational marijuana have grown since the start of recreational sales through existing medical dispensaries.
- During March 2016, Oregon dispensaries sold approximately 1.7 million grams (or approximately 1.9 tons) of retail marijuana. This translates to approximately 0.56 grams per Oregon adult age 21 and older.

Knowledge and attitudes

Youth

Figure 25. Oregon youth who think marijuana is easy to get, 2014 and 2016



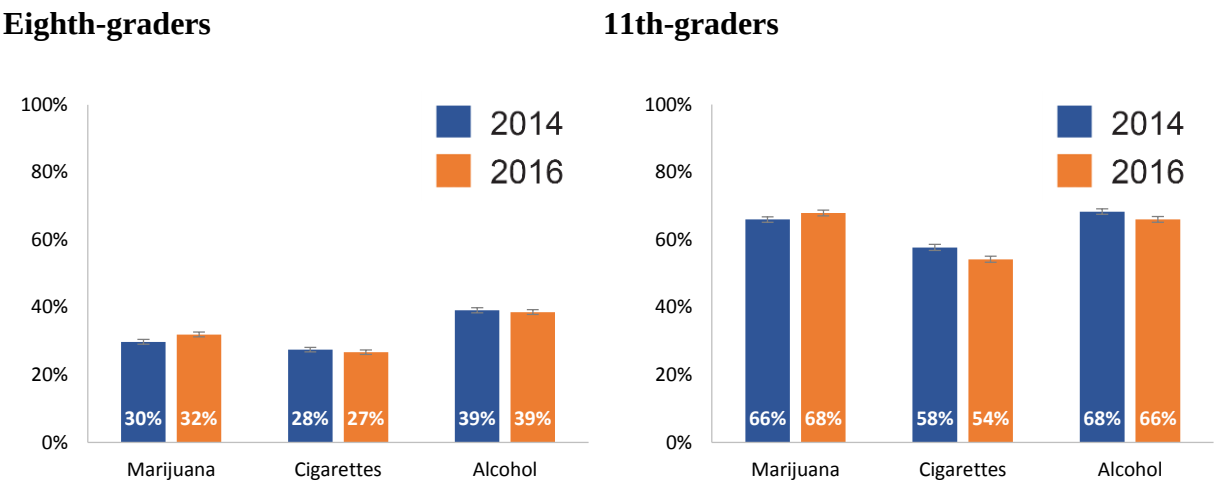
Notes: Oregon youth were asked, "If you wanted to get … some marijuana, how easy would it be for you to get some?" Responses of "sort of easy" and "very easy" were combined and reported as "easy."

Data source: Oregon Student Wellness Survey (2014 and 2016).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 25:

- In 2016, approximately three in 10 eighth-graders (32%) and seven in ten 11th-graders (68%) reported it would be easy to get marijuana.
- The percent of Oregon eighth- and 11th-graders who think it is easy to get marijuana increased modestly between 2014 and 2016.

Figure 26. Oregon eighth- and 11th-grade youth who think selected substances are easy to get, 2014 and 2016



Notes: Oregon youth were asked, "If you wanted to get [some marijuana/some cigarettes/some beer, wine or hard liquor], how easy would it be for you to get some?" Responses of "sort of easy" and "very easy" were combined and reported as "easy."

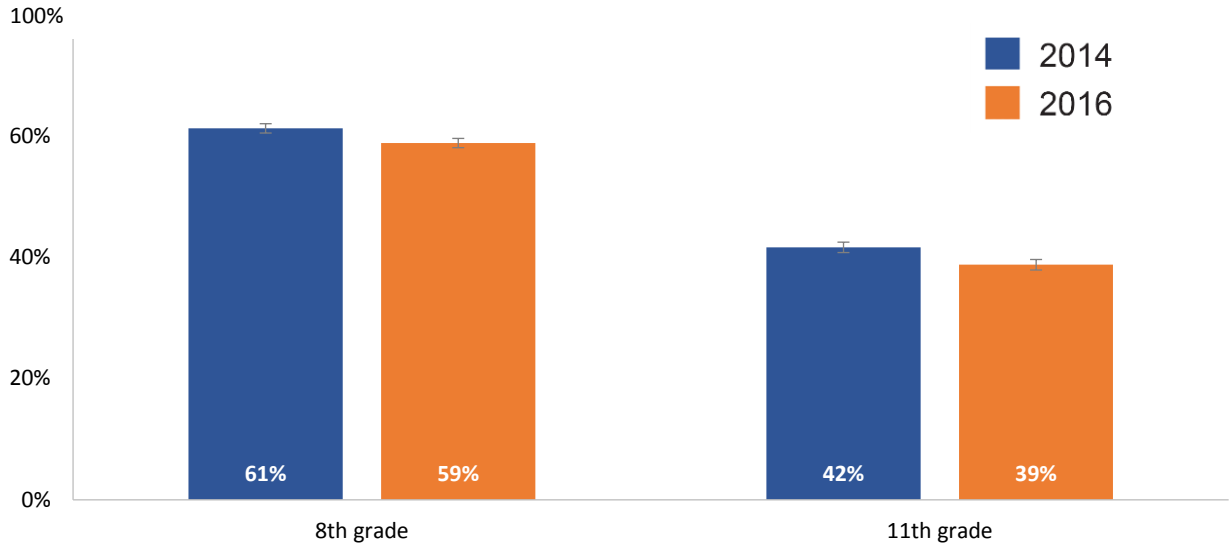
Data source: Oregon Student Wellness Survey (2014 and 2016).

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 26:

- Among eighth-graders, perceived easy access to marijuana was comparable to that of cigarettes, while alcohol is reported as easier to get.
- Among 11th-graders, access to marijuana was reported as being easier than cigarettes and about the same as alcohol.
- The percent of Oregon eighth- and 11th-graders who think it is easy to get marijuana increased modestly between 2014 and 2016; reported access to cigarettes and alcohol decreased between 2014 and 2016 among 11th-graders.

Figure 27. Oregon youth who think weekly marijuana smoking is harmful, 2014 and 2016



Notes: Oregon youth were asked, "How much do you think people risk harming themselves (physically or in other ways) if they smoke marijuana once or twice a week?" Responses of "moderate risk" and "great risk" were combined and reported as a perception of "harmful."

Data source: Oregon Student Wellness Survey (2014 and 2016).

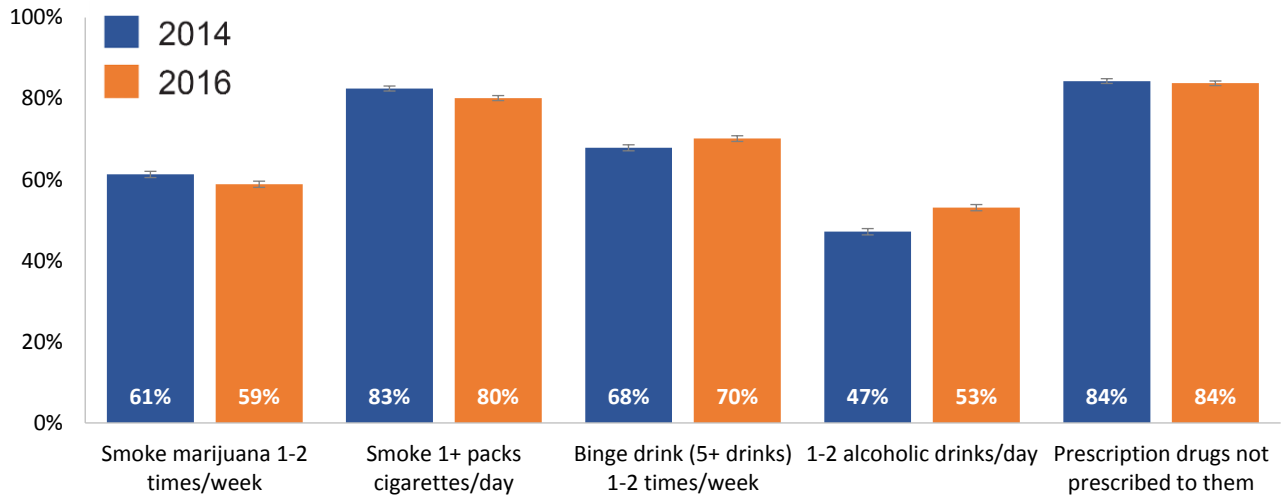
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 27:

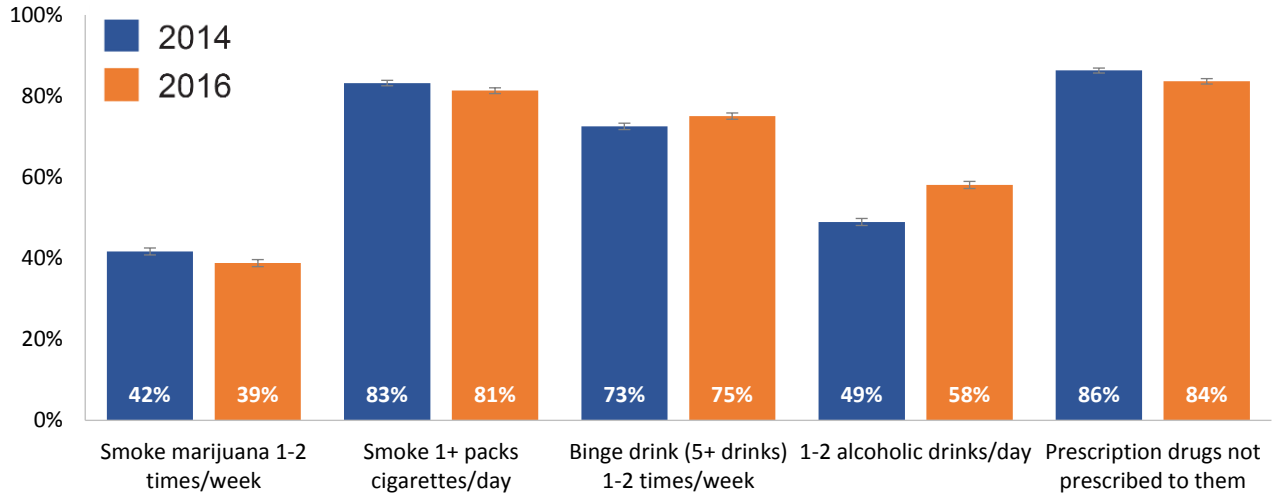
- In 2016, nearly six in ten (59%) eighth-graders and four in ten (39%) 11th-graders thought people were at moderate-to-great risk of harming themselves from smoking marijuana once or twice a week.
- Risk perception of weekly marijuana use declined between 2014 and 2016 for both grades.

Figure 28. Oregon eighth- and 11th-grade youth who think select substance use is harmful, 2014 and 2016

Eighth-graders



11th-graders



Notes: Oregon youth were asked, "How much do you think people risk harming themselves (physically or in other ways) if they…" [see response options below each set of bars in figures]. The percent of youth who said "great risk" and "moderate risk" were combined and reported as a perception of "harmful."

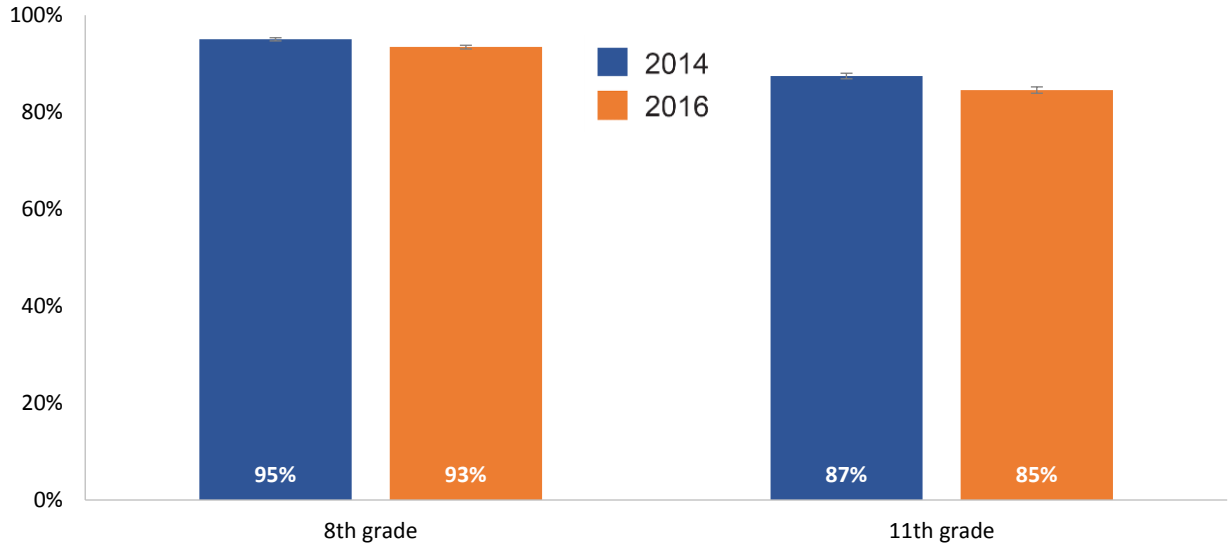
Data source: Oregon Student Wellness Survey (2014 and 2016).

Error bars (I) indicate 95% confidence intervals (see Appendix A for definition).

As shown in Figure 28:

- Oregon eighth-graders think weekly marijuana use is less harmful than smoking a pack of cigarettes a day, binge drinking or using prescription drugs that do not belong to them.
- Oregon 11th-graders think marijuana use is the least harmful of these substances in the scenarios described.

Figure 29. Oregon eighth- and 11th-grade youths' perception that parents feel it would be wrong to smoke marijuana, 2014 and 2016



Notes: Oregon youth were asked, "How wrong do your parents feel it would be for you to…smoke marijuana?" Responses of "wrong" and "very wrong" were combined and reported as "wrong."

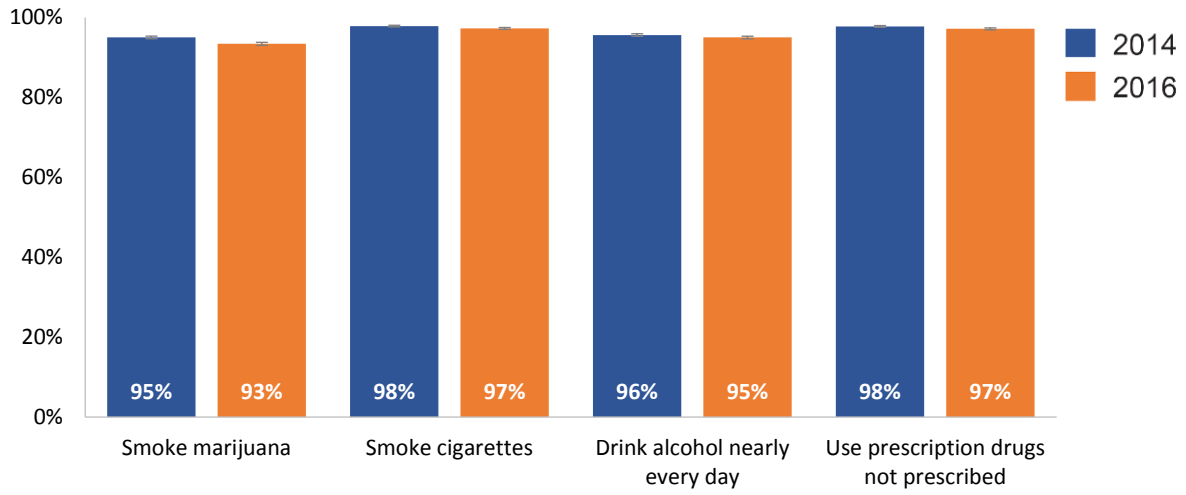
Data source: Oregon Student Wellness Survey (2014 and 2016).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 29:

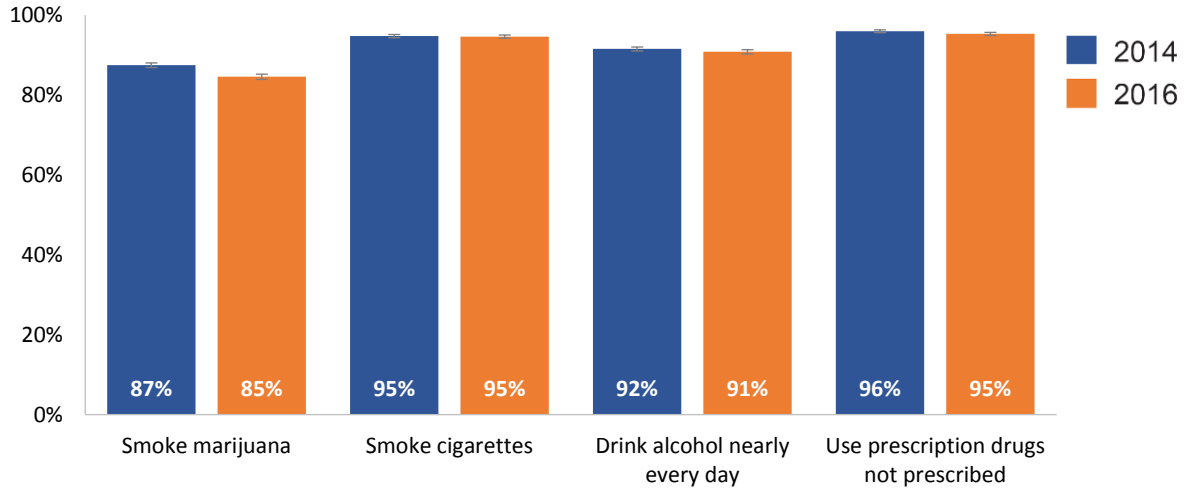
- Eighth-graders are more likely than 11th-graders to report their parents feel it would be "wrong" or "very wrong" for them to use marijuana.
- From 2014 to 2016, perceptions that parents feel it is wrong to smoke marijuana declined modestly for both age groups.

Figure 30. Oregon eighth- and 11th-grade youths' perception that parents feel it would be wrong to use select substances, 2014 and 2016

Eighth-graders



11th-graders



Notes: Oregon youth were asked, "How wrong do your parents feel it would be for you to…[see response options below figures]?" Responses of "wrong" and "very wrong" were combined and reported as "wrong."

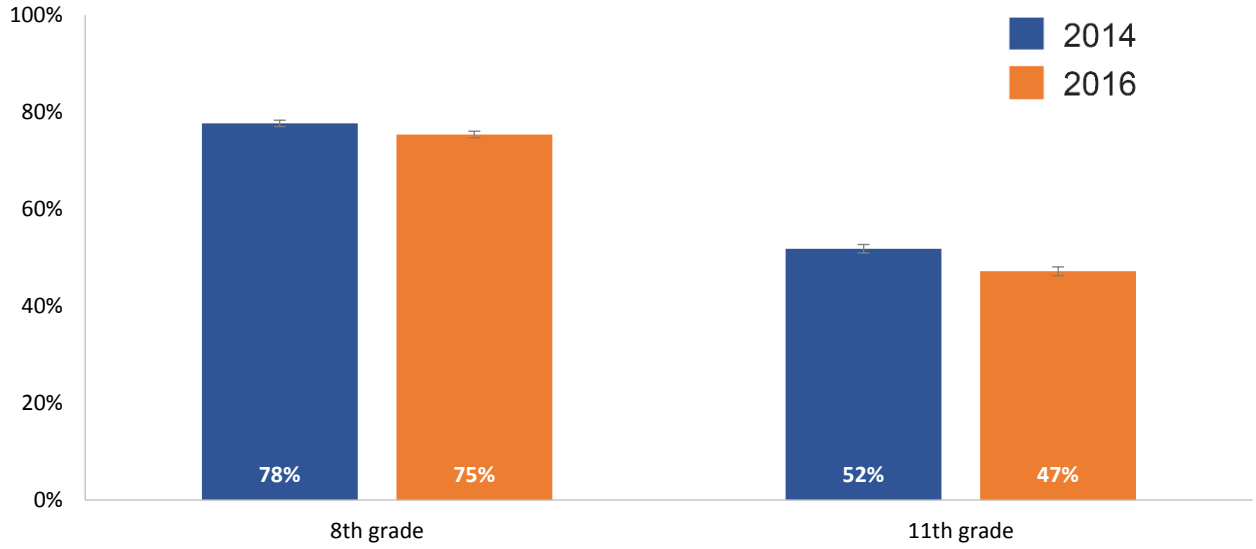
Data source: Oregon Student Wellness Survey (2014 and 2016).

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 30:

- In 2016, the vast majority (93% or more) of eighth-graders thought their parents think it is wrong to use any of these substances.
- Among 11th-graders in 2016, a somewhat smaller percentage (85%) thought their parents think it is wrong to smoke marijuana, compared to smoking cigarettes, drinking alcohol, and using prescription drugs (91% or more).
- From 2014 to 2016, no meaningful changes were observed for other substances among both eighth- and 11th-graders.

Figure 31. Oregon youths' perception that friends feel it would be wrong to smoke marijuana, 2014 and 2016



Notes: Oregon youth were asked, "How wrong do your friends feel it would be for you to…smoke marijuana?" Responses of "wrong" and "very wrong" were combined and reported as "wrong."

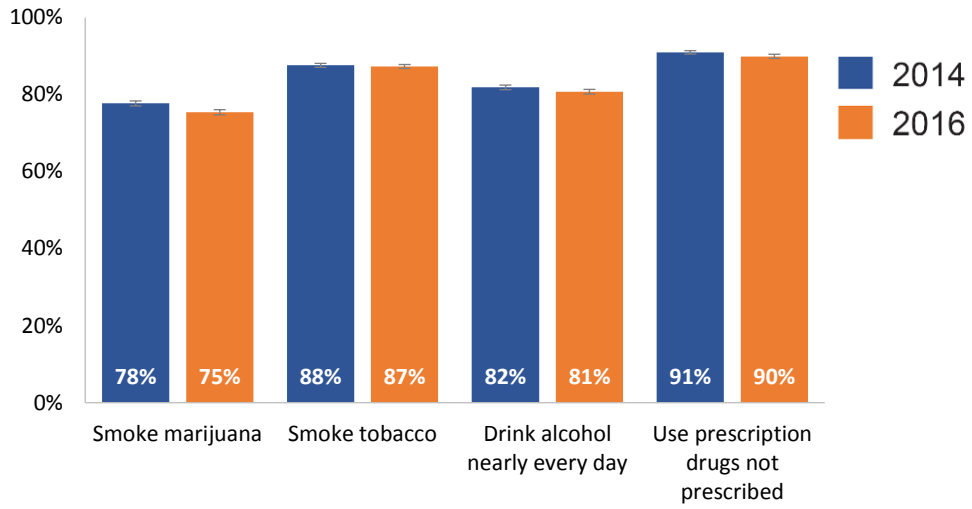
Data source: Oregon Student Wellness Survey (2014 and 2016).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 31:

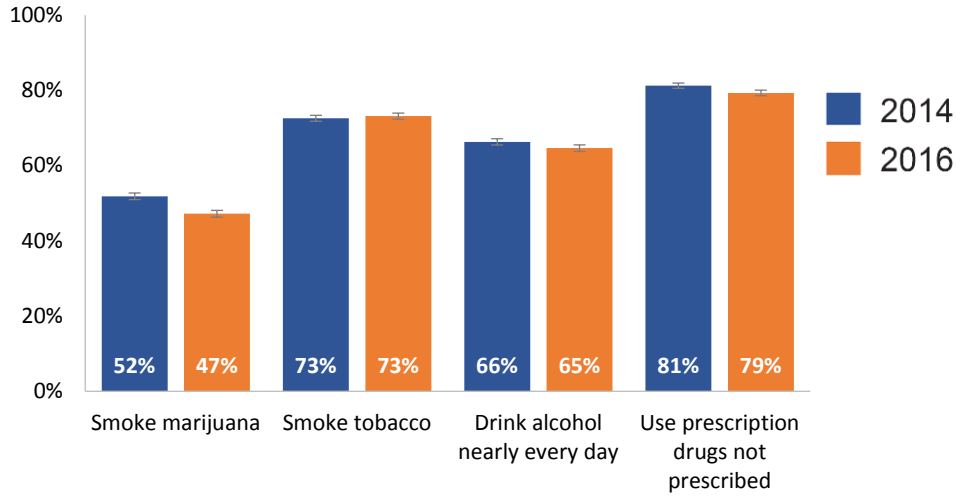
- A higher proportion of eighth-graders (75%) think their friends feel it is "wrong" or "very wrong" for them to use marijuana compared to 11th-graders (47%).
- From 2014 to 2016, perceptions that friends feel it is wrong to smoke marijuana decreased slightly for both eighth- and 11th-graders.

Figure 32. Oregon eighth- and 11th-grade youths' perception that friends feel it would be wrong to use select substances, 2014 and 2016

Eighth-graders



11th-graders



Notes: Oregon youth were asked, "How wrong do your friends feel it would be for you to…[see response options below figures]?" Responses of "wrong" and "very wrong" were combined and reported as "wrong."

Data source: Oregon Student Wellness Survey (2014 and 2016).

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 32:

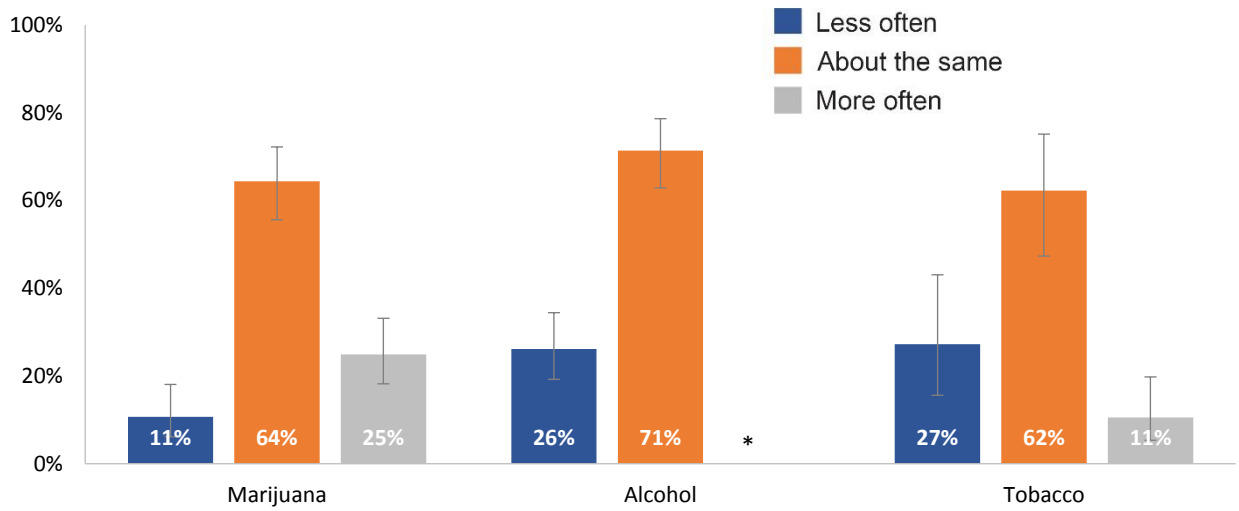
- A higher proportion of eighth-graders think their friends feel it is wrong to use these substances compared to 11th-graders.
- A higher proportion of both eighth- and 11th-graders think their friends feel it is wrong to use tobacco, alcohol and prescription drugs compared to smoking marijuana.
- From 2014 to 2016, perception that friends feel it would be wrong to use other substances did not change meaningfully in either grade.

Adults

The Oregon Public Health Division conducted an online survey of approximately 2,000 Oregon adults each in November 2015, May 2016 and October 2016. This survey included multiple measures of marijuana-related attitudes, beliefs and behaviors.

Respondents noted how retail marijuana legalization would affect their own use of marijuana, alcohol and tobacco. Respondents could indicate use of these products less often than before marijuana legalization, about the same, more often or don't know.

Figure 33. Oregon adults' self-reported use of marijuana, alcohol and tobacco after marijuana legalization, 2016



* Estimate is suppressed due to concerns with reliability from very few respondents giving this answer.

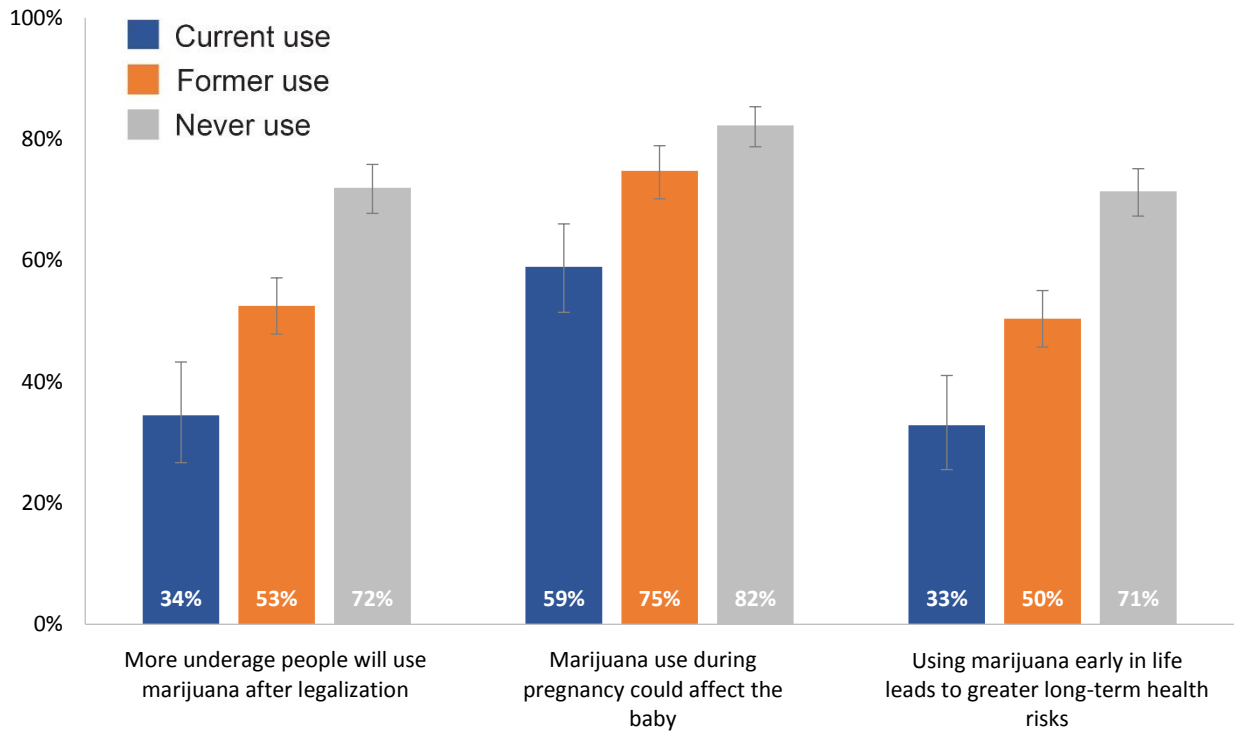
Data source: Prevention Panel Survey, Health Promotion & Chronic Disease Prevention Section, Oregon Public Health Division (fall 2016) (unpublished).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 33:

- Approximately one quarter (25%) of adults who use marijuana reported they use marijuana *more* often after retail marijuana legalization in Oregon; 11% said they used it less often.

- Approximately one quarter (26%) of adults who use both marijuana and drink alcohol reported drinking alcohol *less* often after retail marijuana legalization, and very few reported that they would drink alcohol *more* often.
- Approximately one quarter (27%) of adults who use both marijuana and tobacco reported using tobacco *less* often after retail marijuana legalization. Eleven percent reported using it more often.

Figure 34. Oregon adults' beliefs about harms from marijuana use, 2015



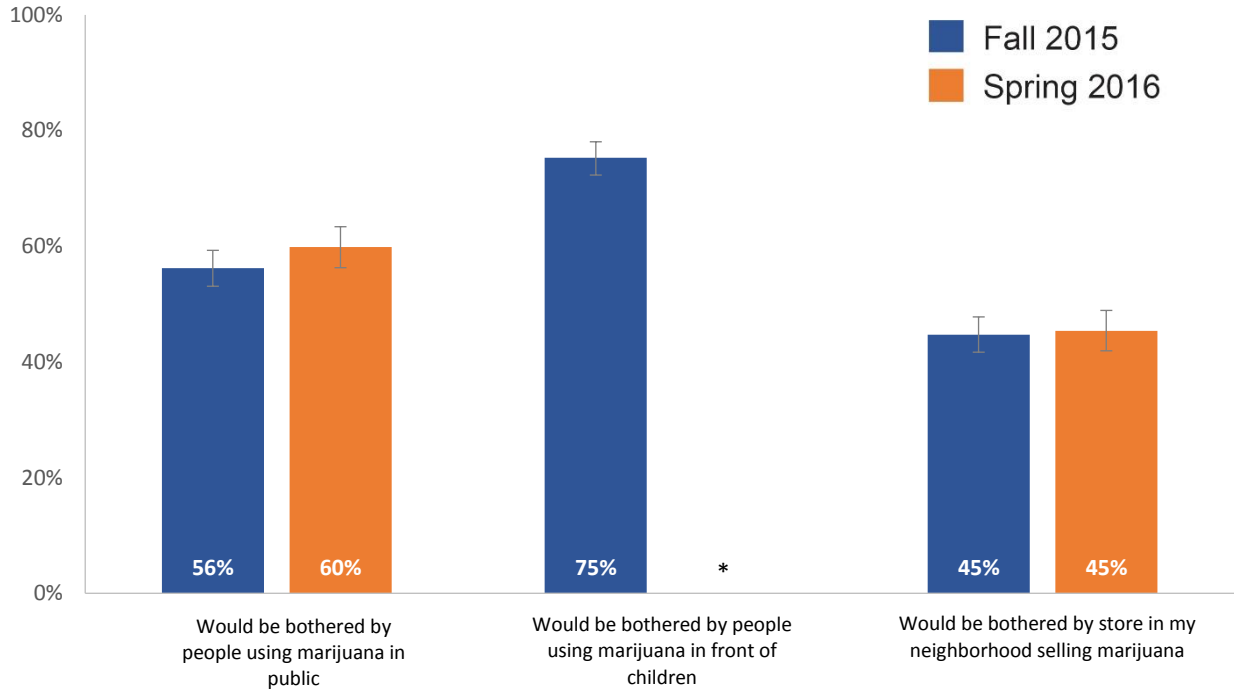
Notes: Respondents were asked, "How much do you agree with the following statements?" Paraphrased statements are listed within this figure. The percent of adults who said they "strongly agree" or "somewhat agree" were combined and reported as "agree." Current users have used marijuana in the past 30 days; former users have used in the past, but not within the past month; and never users have never tried using marijuana.

Data source: Prevention *Panel Survey, Health Promotion & Chronic Disease Prevention Section, Oregon Public Health Division (fall 2015) (unpublished).*
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 34:

- Agreement varied by marijuana use status across the three beliefs. The greatest differences were between current users and never users related to believing underage use will increase after legalization (34% of current users vs. 72% of never users) and early marijuana use leading to long-term risks (33% of current users vs. 71% of never users).
- Overall, 55% of adults agreed that more underage people will use marijuana after retail marijuana legalization; 74% agreed that marijuana use during pregnancy could affect the baby; and 54% agreed that using marijuana early in life leads to greater long-term health and addiction risks (data not shown).

Figure 35. Oregon adults' attitudes about marijuana use, 2015 and 2016



* Not asked on spring 2016 survey

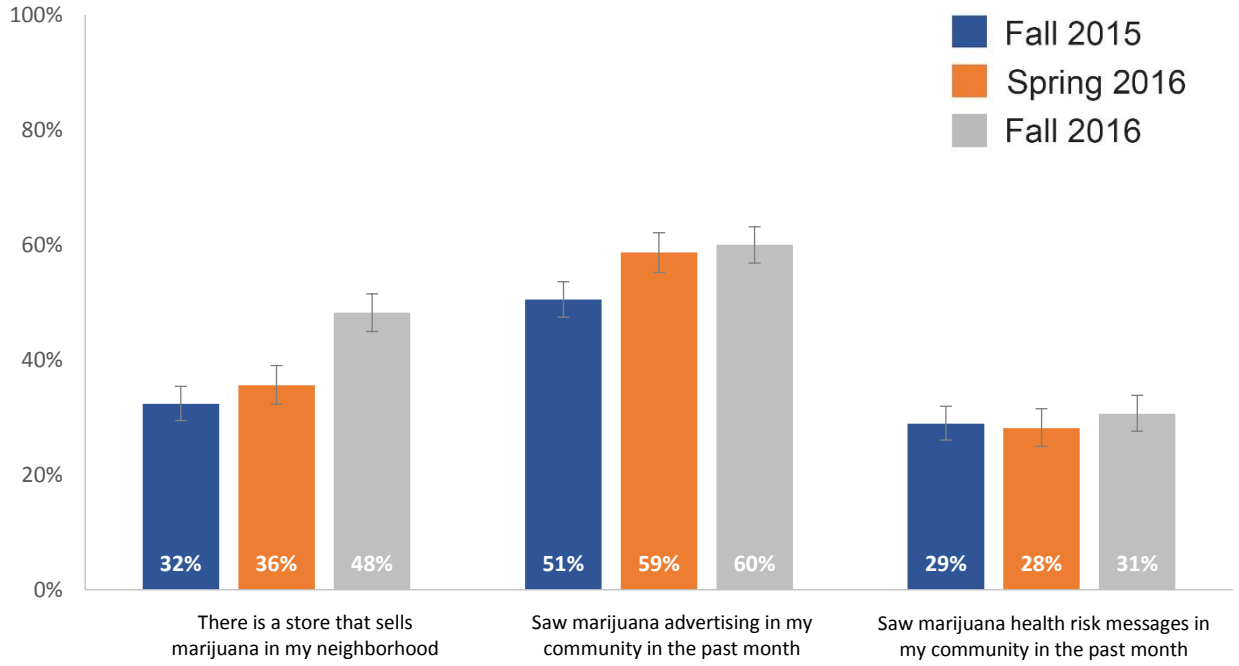
Notes: Respondents were asked, "How much do you agree with the following statements?" Paraphrased statements are listed within this figure. The percent of adults who said they "strongly agree" or "somewhat agree" were combined and reported as "agree."

Data source: Prevention Panel Survey, Health Promotion & Chronic Disease Prevention Section, Oregon Public Health Division (fall 2015 and spring 2016) (unpublished).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 35:

- In spring 2016, three in five (60%) adults agreed they would be bothered by people using marijuana in public, and nearly half (45%) agreed they would be bothered by a store in their neighborhood selling marijuana.
- These attitudes about marijuana use did not change significantly between fall 2015 and spring 2016.
- Three in four (75%) adults agreed in fall 2015 that they would be bothered by people using marijuana in front of children.
- Attitudes varied by marijuana use status. The largest differences were between current users and never users who said they would be bothered by people using marijuana in public (17% of current users vs. 77% of never users in spring 2016) and bothered by having a store in their neighborhood (9% of current users vs. 68% of never users in spring 2016) (data not shown).

Figure 36. Oregon adults' awareness of marijuana advertising and health risk messages in communities, 2015 and 2016



Note: Respondents were asked if they had seen marijuana-related business activity or messages in their community during the past 30 days.

Data source: Prevention Panel Survey, Health Promotion & Chronic Disease Prevention Section, Oregon Public Health Division (fall 2015, spring 2016 and fall 2016) (unpublished).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 36:

- In fall 2016, nearly half (48%) of adults reported having a store that sells marijuana in their neighborhood; this was a significant increase between fall 2015 and spring 2016.
- In fall 2016, three in five adults (60%) reported seeing or hearing marijuana advertising in their communities in the past month. Marijuana advertising exposure increased between fall 2015 and spring 2016 but was similar between spring and fall 2016.
- Among adults reporting exposure to marijuana advertising, the majority reported exposure to advertising on storefronts (75%) and street-side marketing such as sandwich board-style ads (71%) and billboards (66%) (data not shown).

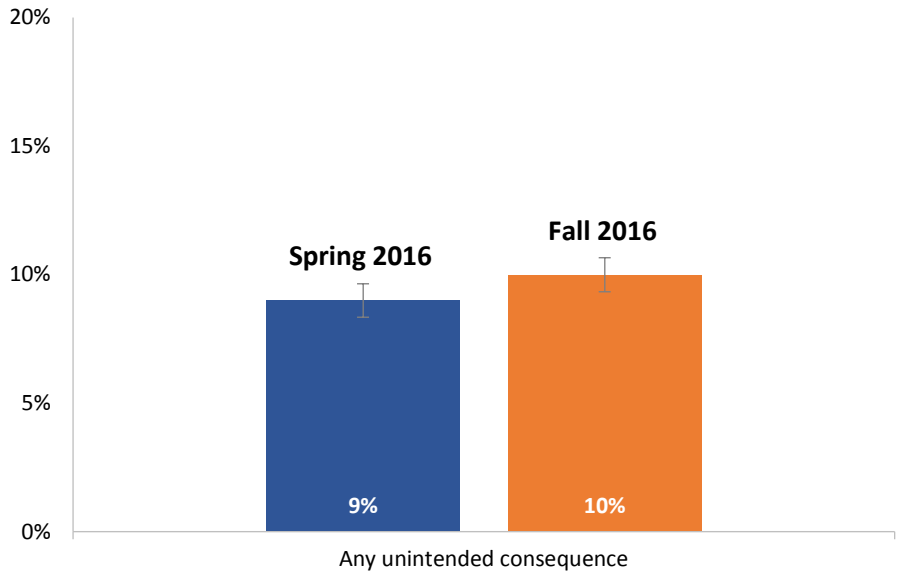
- In fall 2016, approximately three in ten adults (31%) reported seeing or hearing marijuana-related health risk messages in the past month. This was similar to previous surveys.
- Although exposure to marijuana advertising was similar for people who use marijuana and people who do not, current marijuana users were more likely than non-users to report seeing health risk messages about marijuana. More than half of both currents users (57%) and never users (56%) had seen marijuana advertising in the past month. In contrast, four out of 10 (41%) current marijuana users reported seeing health risk messages about marijuana, in comparison to 25% of never users (data not shown).

Public health and social consequences

Unintended consequences

Some people may experience unintended negative consequences as a result of using marijuana. These might include acute reactions to marijuana products (including from using too much), or things that happen as a result of physical or cognitive impairment while using.

Figure 37. Unintended consequences of marijuana use during the past year among Oregon adults who use marijuana, 2016



Notes: Respondents who had used marijuana in the past year were asked if they had experienced any of the following unintended consequences when using marijuana during the past 12 months: missing work or school; having a "bad trip" (an unexpected, negative physical or other reaction) or panic attack; injuring oneself or another person; needing to visit a doctor or hospital for care; or something else.

Data source: Prevention Panel Survey, Health Promotion & Chronic Disease Prevention Section, Oregon Public Health Division (spring 2016 and fall 2016) (unpublished).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 37:

- The percentage of marijuana users who reported experiencing an unintended consequence did not change significantly between spring and fall 2016. In the spring 2016 survey, 36

out of 513 adult respondents (9%) reported experiencing at least one unintended consequence from marijuana use in the past year; 46 out of 513 respondents (10%) reported experiencing unintended consequences in the fall 2016 survey.

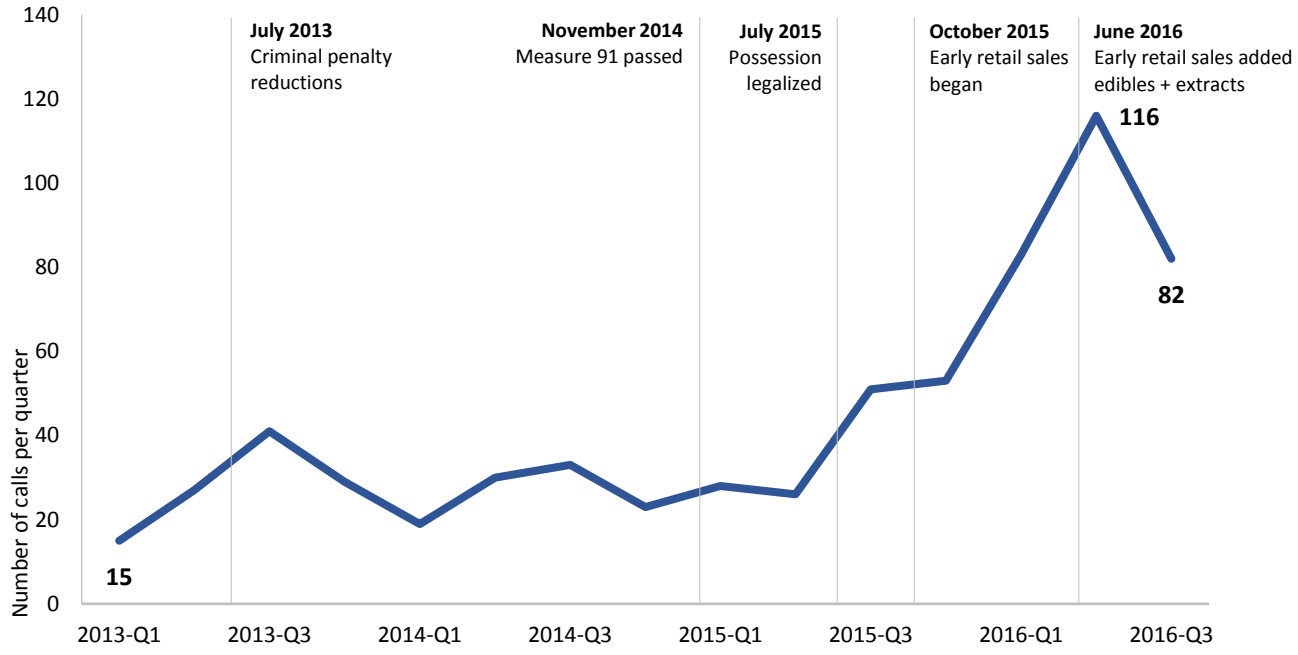
- Among the 1,026 combined adult marijuana users surveyed in spring 2016 and fall 2016, specific unintended consequences reported included having a “bad trip” (negative physical reaction) or panic attack (n=50); missing work or school (n=20); needing to visit a doctor or hospital for care (n=7); and injuring oneself or injuring another person (n=7). Thirteen adults described other negative unintended consequences including trouble sleeping, passing out and burning their fingers.

Poison Center calls

The Oregon Poison Center is a 24-hour health care information and treatment resource staffed by doctors and nurses trained in toxicology. For more then 30 years, the Poison Center has provided emergency treatment information for patients experiencing a poisoning or toxic exposure.

Marijuana exposure calls to the Oregon Poison Center are an important measure of acute adverse reactions and accidental poisonings from marijuana. People may call the Poison Center when someone (especially a child) accidentally ingests marijuana, or if they are concerned about having overdosed. Medical professionals also call the Poison Center to ask for medical advice and treatment recommendations.

Figure 38. Quarterly marijuana-related calls to the Oregon Poison Center, 2013 through September 2016

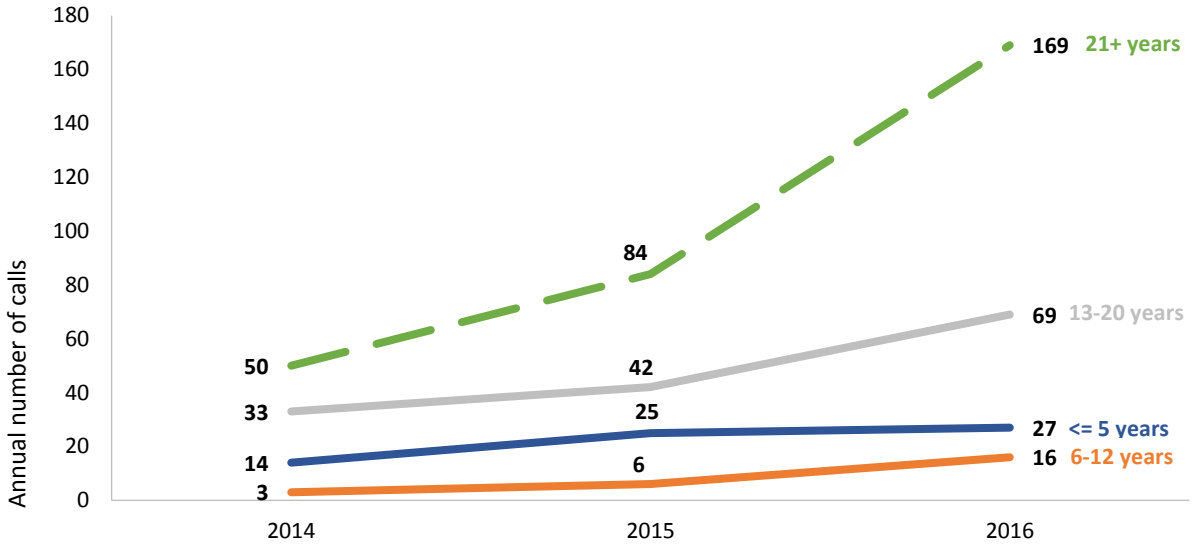


Data source: Toxic Exposure Surveillance System (2013 through Q3 2016). Oregon Poison Center, Oregon Health & Science University

As shown in Figure 38:

- Marijuana-related calls to the Poison Center were fairly stable from Q1 2013 through Q1 2015, and began a steady increase starting in Q2 2015. They peaked in Q2 2016 (April through June 2016), which corresponds to the opening of early retail sales of low-dose edibles and extracts in June 2016.
- However, there was a decrease in calls in Q3 2016 (July 2016 through September 2016). Longer-term monitoring will be necessary to determine whether there has been a sustained increase in call frequencies following changes in Oregon's marijuana laws.

Figures 39. Annual marijuana-related calls to the Oregon Poison Center by age group, 2014 through September 2016

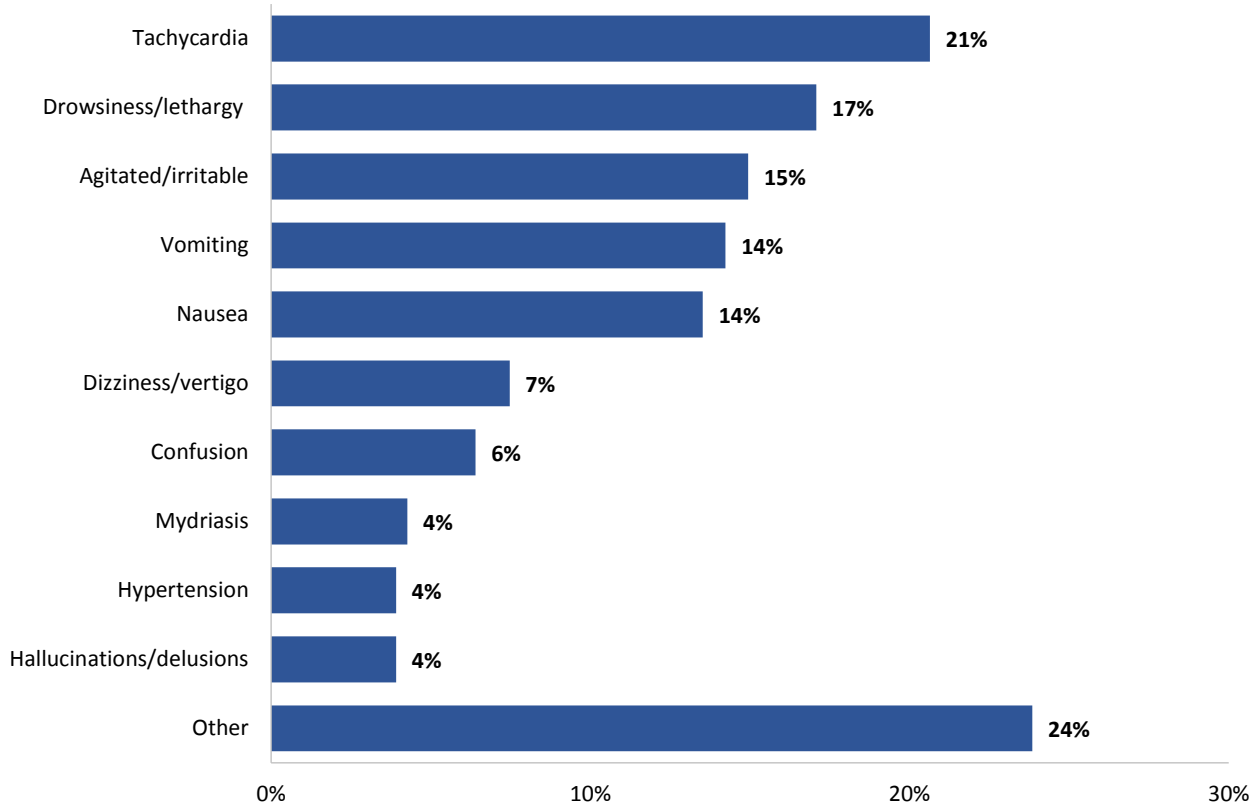


Data source: Toxic Exposure Surveillance System (2014 through Q3 2016).
Oregon Poison Center, Oregon Health & Science University

As shown in Figure 39:

- Although counts of marijuana-related calls to the Oregon Poison Center increased across all age groups, the largest increase was seen related to the 21 years and older age group.
- There were 158 total marijuana-related calls to the Oregon Poison Center in 2015, and there have been 281 calls so far in 2016 (through September).

Figure 40. Clinical effects reported in marijuana-related calls to Oregon Poison Center, 2016



Data source: Toxic Exposure Surveillance System (Q1–Q3 2016).
Oregon Poison Center, Oregon Health & Science University

As shown in Figure 40:

- The most common marijuana-related calls to the Oregon Poison Center were for tachycardia (racing heartbeat, 21%) and drowsiness or lethargy (17%).
- Additional frequent clinical effects reported by marijuana-related calls to the Oregon Poison Center included being agitated or irritable (15%), vomiting (14%) and nausea (14%).
- Other clinical effects reported by marijuana-related callers to the Oregon Poison Center included dizziness or vertigo, confusion, myradriasis (dilation of eye pupil), hypertension, and hallucinations or delusions.

Emergency department visits

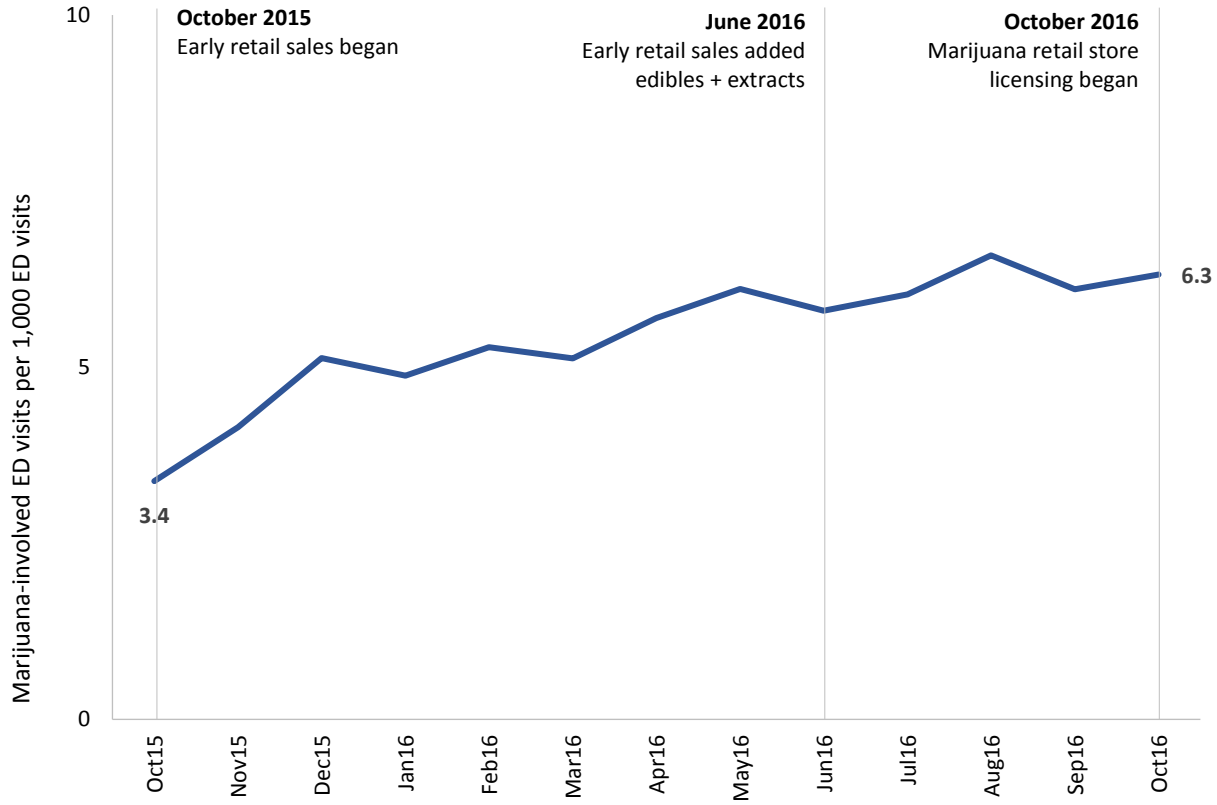
Marijuana-involved emergency department visits are collected through Oregon's Electronic Surveillance System for the Early Notification of Community-Based Epidemics (or ESSENCE). ESSENCE collects information about emergency department visits for identifying emerging public health threats (such as infectious disease outbreaks). Emergency Department (ED) visit information is collected from all 60 non-federal hospital emergency departments and 14 urgent care centers across Oregon.

Marijuana-involved ED visits are identified as visits that have a discharge diagnosis (ICD-10 numeric codes that specify the diagnoses associated with treatment) or chief complaint (short description of the reason for a patient's visit) that indicates marijuana or cannabis involvement. Up to eight discharge diagnosis codes may be entered per patient. Marijuana use is rarely listed as the primary reason for a visit. Primary reasons for visits often include diverse physical or other conditions that may or may not be directly caused by marijuana use.

In October 2015, health care systems – including ESSENCE – changed their discharge diagnosis coding system (from ICD-9 to ICD-10). Data in this report are shown beginning with October 2015 (ICD-10) due to concerns about comparability between the two coding systems.

Note: Increased reporting of marijuana-involved cases may be due to: (1) a true increase in events; (2) patients' increased comfort with disclosing their use after marijuana legalization; or (3) increased screening or documentation of marijuana use by health care facilities after marijuana legalization.

Figure 41. Monthly marijuana-involved emergency department visits per 1,000 emergency department visits, October 2015–October 2016



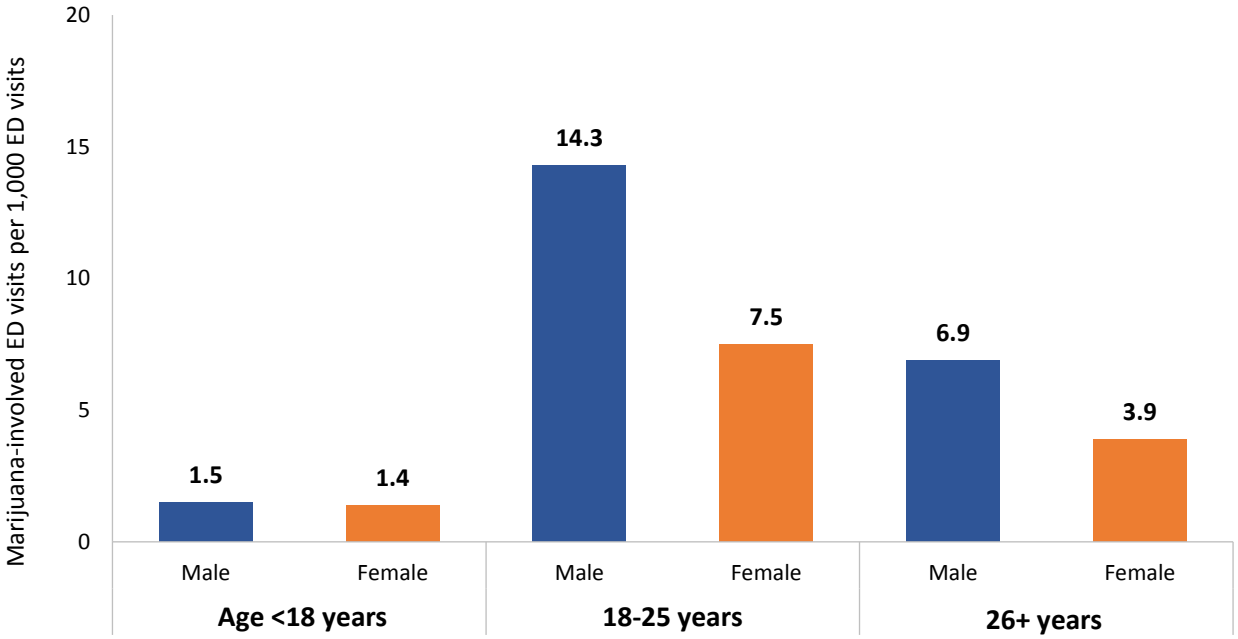
Notes: Marijuana-involved emergency department visits include those with a discharge diagnosis of F12.1, F12.2, F12.9 or T40.7, or any of the following chief complaint terms: marij, maraju, thc, cbd, cannab, canab, mj, smok & pot, smok & weed, hash, hemp.

Data source: Oregon Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE) (October 2015–October 2016).

As shown in Figure 41:

- From October 2015 through October 2016, the rate of emergency department visits with marijuana-involved codes or text descriptions increased from 3.4 per 1,000 ED visits to 6.3 per 1,000 ED visits.
- During this time period, there have been a total of 11,488 marijuana-involved ED visits.

Figure 42. Marijuana-involved emergency department visits per 1,000 emergency department visits by age and sex, October 2015–October 2016



Notes: Age was missing for 425 or 4% of the marijuana-involved emergency department visits. Marijuana-involved emergency department visits include those with a discharge diagnosis of F12.1, F12.2, F12.9 or T40.7, or any of the following chief complaint terms: marij, maraju, thc, cbd, cannab, canab, mj, smok & pot, smok & weed, hash, hemp.

Data source: Oregon Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE) (October 2015–October 2016).

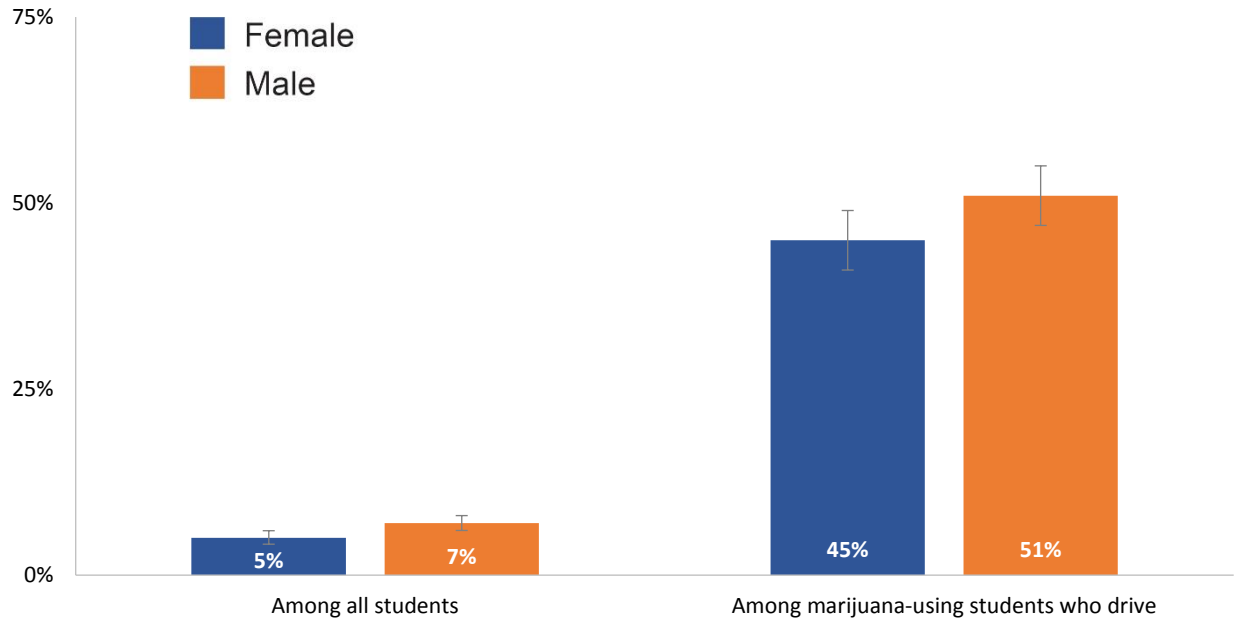
As shown in Figure 42:

- From October 2015 to October 2016, the rate of emergency department (ED) visits with marijuana-involved codes was highest among males in the 18–25 age group (14.3 marijuana-related visits per 1,000 ED visits), followed by females 18–25 years old (7.5 per 1,000 ED visits), males 26 years old or older (6.9 per 1,000 ED visits), and females 26 years old and older (3.9 per 1,000 ED visits).
- Marijuana-involved ED visit rates are lowest among youth (people younger than 18).

Impaired driving

Marijuana use impairs judgement, reaction time and motor coordination. Its effects are amplified when used in combination with alcohol. These conditions impair driving ability.

Figure 43. Driving within three hours of marijuana use in past 30 days among Oregon 11th-graders by gender, 2015



Notes: Oregon students were asked, "During the past 30 days, how many times did you drive a car or other vehicle within three hours after using marijuana?" One response option was, "I did not drive in the past 30 days." Youth who gave any other response besides this one were classified as "students who drive." "All students" includes all 11th-graders, regardless of whether or not they use marijuana.

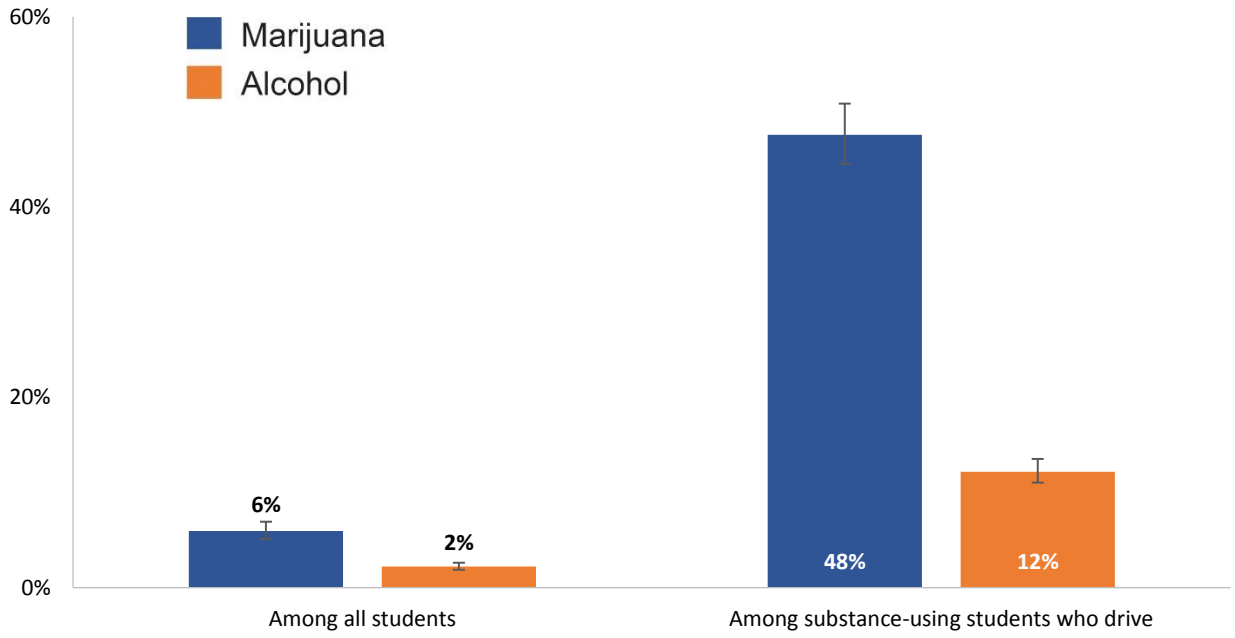
Source: Oregon Healthy Teens Survey (2015)

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 43:

- Of all 11th-grade students, approximately one in 20 girls (5%) and one in 15 boys (7%) had driven within three hours of marijuana use in the past 30 days.
- Approximately one-third of all 11th-graders said they had driven in the past month (data not shown). Among the subgroup of 11th-graders who had both driven a vehicle and used marijuana in the past month (not necessarily at the same time), half of boys (51%) and nearly half of girls (45%) had driven within three hours of marijuana use.

Figure 44. Driving after using marijuana or alcohol among Oregon 11th-grade students, 2015



Note: Oregon youth were asked, "During the past 30 days, how many times did you drive a car or other vehicle within three hours after using marijuana?" and "During the past 30 days, how many times did you drive a car or other vehicle when you had been drinking alcohol?" "Students who drive" was defined as students who gave any response to question other than "I did not drive in the past 30 days."

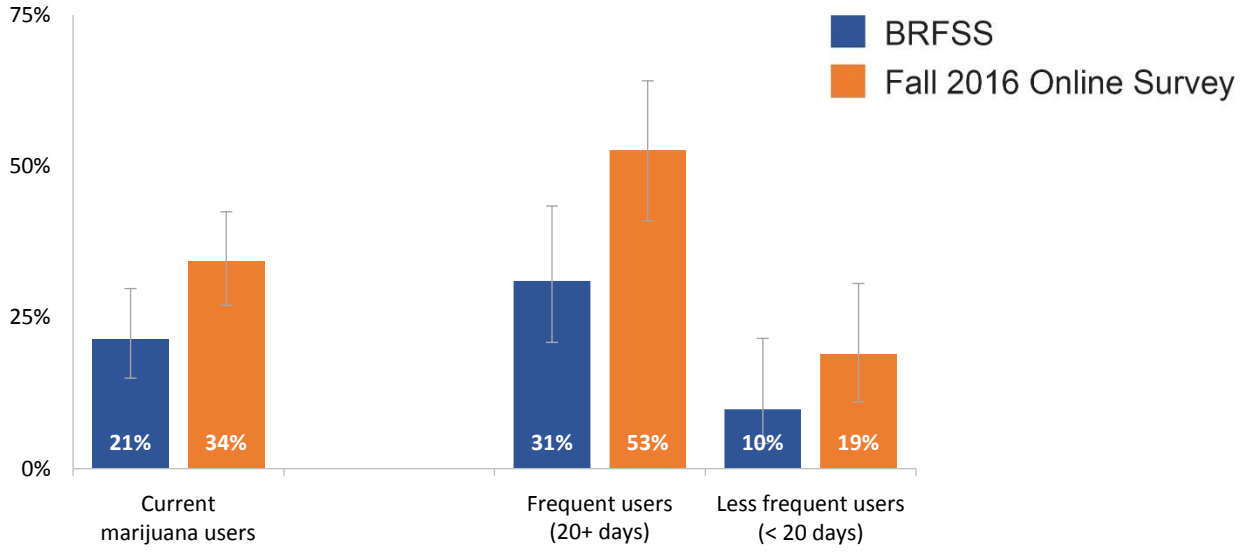
Data source: Oregon Healthy Teens Survey (2015)

Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 44:

- In the overall student population, more 11th-grade students drove within three hours of marijuana use than did after drinking alcohol in the past month.
- Approximately one-third of all 11th-graders said they had driven in the past month (data not shown). Among the subgroup of 11th-grade students who drove and used substances in the past month, nearly half (48%) of marijuana users had driven after using marijuana in the past month. This is four times higher than the one in 10 (12%) alcohol-using students who drove after using alcohol in the past month.

Figure 45. Driving within three hours of using marijuana among Oregon adults who currently use marijuana, 2015 and 2016



Notes: Adults who reported using marijuana in the past 30 days (BRFSS) or past year (online survey) were asked, "Thinking about the last 12 months, did you ever drive within approximately three hours after using marijuana or hashish?" Current marijuana users are adults who have used marijuana in the past 30 days; "frequent users" are adults who used marijuana on 20 or more days in the past 30 days; and "less frequent users" used marijuana on at least one day but less than 20 days in the past 30 days.

Data sources: Oregon Behavioral Risk Factor Surveillance System (2015) and Prevention Panel Survey, Health Promotion & Chronic Disease Prevention Section, Oregon Public Health Division (fall 2016) (unpublished).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 45:

- Approximately one in five (21%) current marijuana users reported driving within three hours of use in the past year on the 2015 Oregon BRFSS, and approximately one in three (34%) reported driving within three hours of use on the fall 2016 online survey.
- Frequent marijuana users (20+ days of last 30) were significantly more likely (31% on BRFSS and 53% of panel survey) than less frequent users (10% on BRFSS and 19% on panel survey) to have driven within three hours of using marijuana.
- Among all adult drivers who have used marijuana any time in the past year, 28% reported driving within three hours of marijuana use; in contrast, 9% of adult drivers who had used alcohol anytime in the past year reported driving after "having perhaps too much to drink" (fall 2016 survey, data not shown).

Figure 46. Perceptions of driving under the influence among Oregon adults, 2015 and 2016

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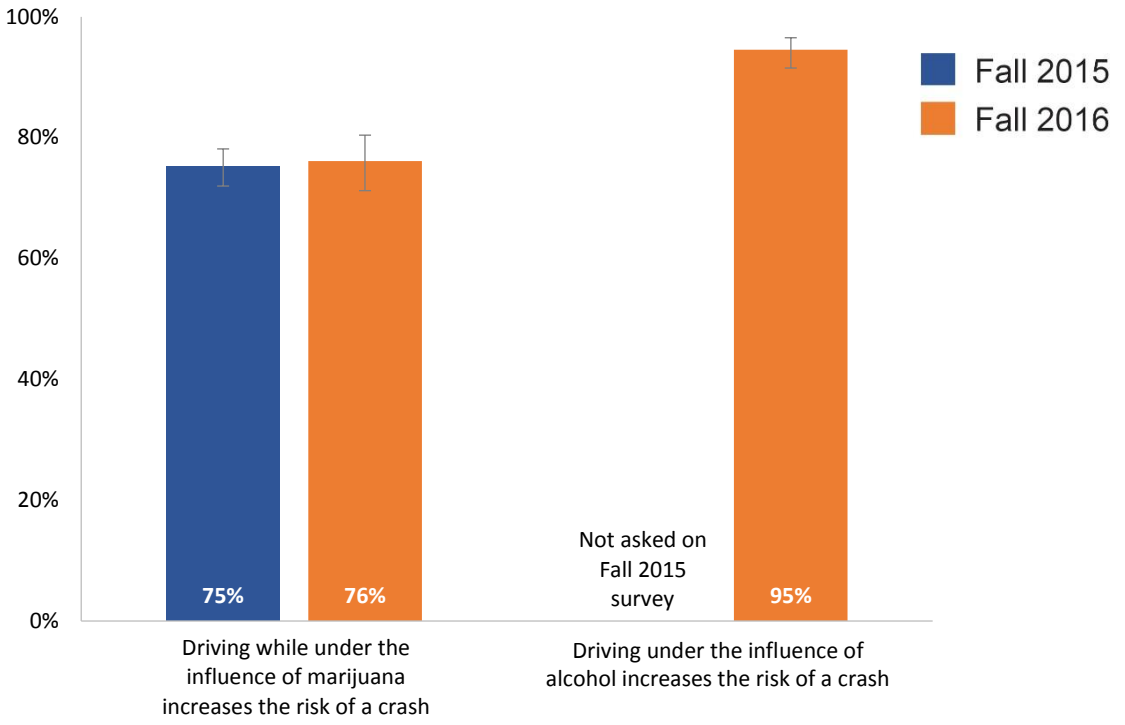


Notes: Respondents were asked if they thought driving under the influence of marijuana increased the risk for a traffic crash and if driving under the influence of alcohol increased the risk for a traffic crash. Responses of "strongly agree" or "somewhat agree" were combined and reported as agreement.

Data source: Prevention Panel Survey, Health Promotion & Chronic Disease Prevention Section, Oregon Public Health Division (fall 2015 and fall 2016) (unpublished).
Error bars (I) *indicate 95% confidence intervals (see Appendix A for definition).*

As shown in Figure 46:

- In both fall 2015 and fall 2016, approximately three out of four adults agreed that driving under the influence of marijuana increases the risk of a crash.
- For comparison, nearly all adults (95%) in fall 2016 agreed that driving under the influence of *alcohol* increases the risk of a crash.
- Among current marijuana users, people who said they knew that driving after using marijuana increased crash risk were less likely to drive after using marijuana. Eighteen percent of those who believe that marijuana use can increase crash risk reported driving within three hours of marijuana use, in comparison to 47% of those who did not know

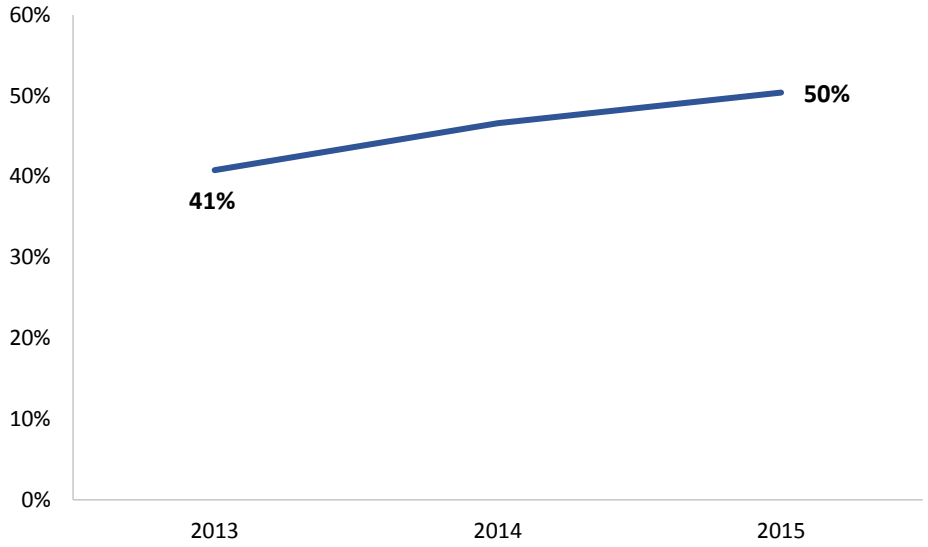
and 61% of those who had no opinion about the crash risk associated with driving under the influence of marijuana (data not shown).

A person commits the offense of driving under the influence of intoxicants (DUII) if the person drives a vehicle with 0.08 percent or more by weight of alcohol in their blood, or under the influence of any intoxicating liquor, controlled substance or inhalant. Unlike alcohol, in Oregon there is no specific threshold for determining marijuana-related driving impairment based on physical measures (such as concentrations of specific marijuana chemicals in blood or urine).

DUII for marijuana is determined based on an evaluation by officers certified as drug recognition experts (DREs). Impairment assessment includes both questioning and physical tests. Based on their assessment, the DRE delivers a formal opinion on whether the driver is impaired, and by what type of drug. If a person is investigated for impaired driving and breathalyzer test results indicate an alcohol DUII (e.g., blood alcohol concentration [BAC] is 0.08 or greater), further investigation of drug impairment is rarely conducted. If the BAC is less than 0.08, and the officer believes that the level of driver impairment is greater than expected based on whatever BAC level is measured, then a DRE assessment is conducted. This procedure means that a person driving while impaired by both alcohol and marijuana is likely to be categorized as only an alcohol-impaired DUII case, resulting in an under-count of actual marijuana-impaired or other drug-impaired driving.

Oregon State Police's DRE Program provided data on DRE evaluation results. See "Data sources" at the end of this report for more discussion of DUII data, including DUII arrests.

Figure 47. Cannabis-positive impaired driving assessments among drivers evaluated by drug recognition experts (DREs) in Oregon, 2013–2015



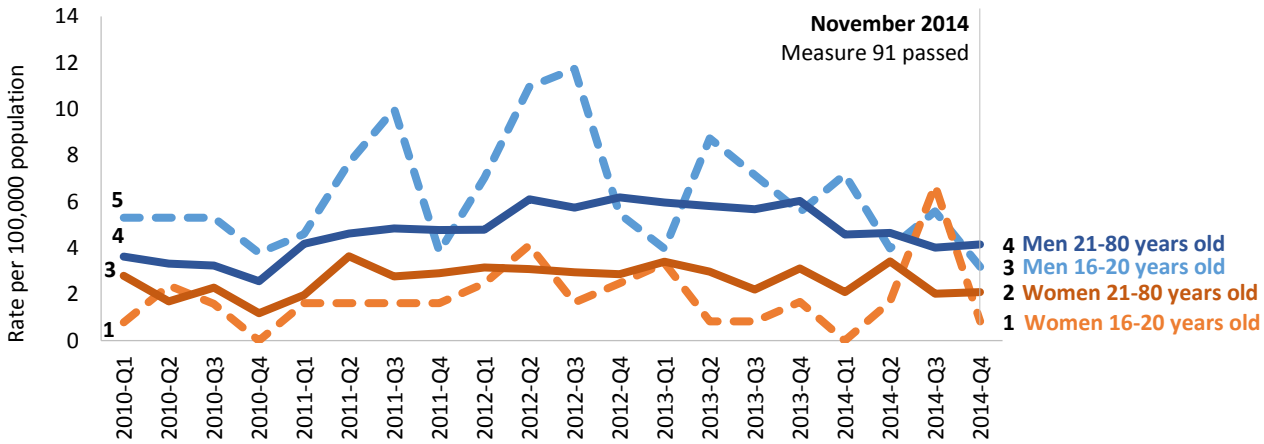
Data source: Oregon State Police DRE Program (2013–2015).

As shown in Figure 47:

- The percentage of DRE evaluations in which a formal opinion was issued of cannabis impairment did not significantly increase from 41% in 2013 to 50% in 2015.
- The total number of DRE evaluations also increased from 1,301 in 2013 to 1,510 in 2015 (data not shown).

Oregon Department of Transportation (ODOT) routinely collects information about traffic collisions involving injury or property damage of $1,500 or greater. Collision data include indication of participant non-specific drug use, as determined by a police officer through observation, field testing, toxicology testing or participant admission. Collision data presented in this report pertain only to "active" participants in collisions, which excludes motor vehicle passengers and all occupants of parked cars.

Figure 48. Quarterly drug-involved traffic collisions per 100,000 population by age and gender, 2010–2014



Notes: Drug-involved traffic collisions are defined as traffic collisions where an active participant was determined by an officer to have used drugs. Rates per 100,000 population is based on annual population estimates from the U.S. Census Bureau, available at https://www.census.gov/popest/data/state/asrh/2015/index.html.

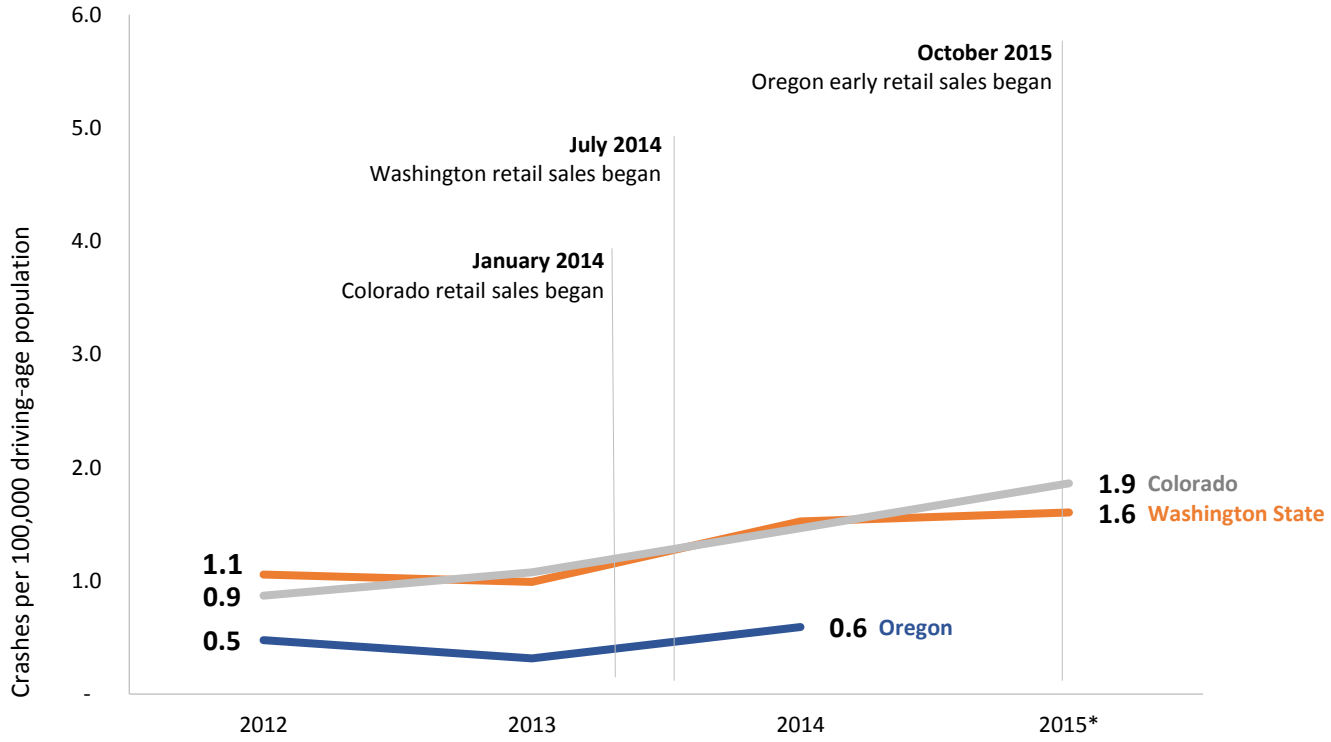
Data source: Oregon Department of Transportation (ODOT) (2010–2014).

As shown in Figure 48:

- There were no clear, consistent trends in drug-involved traffic collisions for any of the displayed gender/age groups between 2010 and 2014, aside from seasonal trends. Information is not available about what specific types of drugs were involved in crashes (e.g., marijuana).

Marijuana-involved fatal accidents are collected from the Fatal Accidents Reporting System (or FARS). FARS is a national database administered by the National Highway Traffic Safety Administration, and contains information on all fatal accidents involving a motor vehicle on a public roadway in all 50 states, the District of Columbia and Puerto Rico. Though accident data collection standards and procedures vary by municipality, all states submit standard elements describing the crash, all involved vehicles and all involved people. Marijuana-involved fatal traffic collisions are defined as fatal traffic collisions where an involved vehicle driver tested positively for THC/marijuana.

Figure 49. Annual marijuana-involved traffic fatalities per 100,000 driving-age population, 2012–2015



* Oregon 2015 data are not yet complete.

Data source: Fatal Accidents Reporting System (FARS) (2012–2015).

As shown in Figure 49:

- Marijuana-involved traffic fatalities appear to have increased in Colorado and Washington State since those states legalized retail marijuana in 2012 and began retail

sales in 2014. Fatalities remained relatively infrequent and stable in Oregon during the same period, prior to and leading up to the start of early retail marijuana sales in October 2015. The difference in rates prior to any state's legalization (i.e., 2012) between Oregon and other states may be partly explained by differences in testing: Oregon performs drug tests on fatally injured drivers at a much lower rate (18%) than Washington (86%) or Colorado (83%) (data not shown). It is too early to know whether Oregon traffic fatalities have been influenced by marijuana legalization.

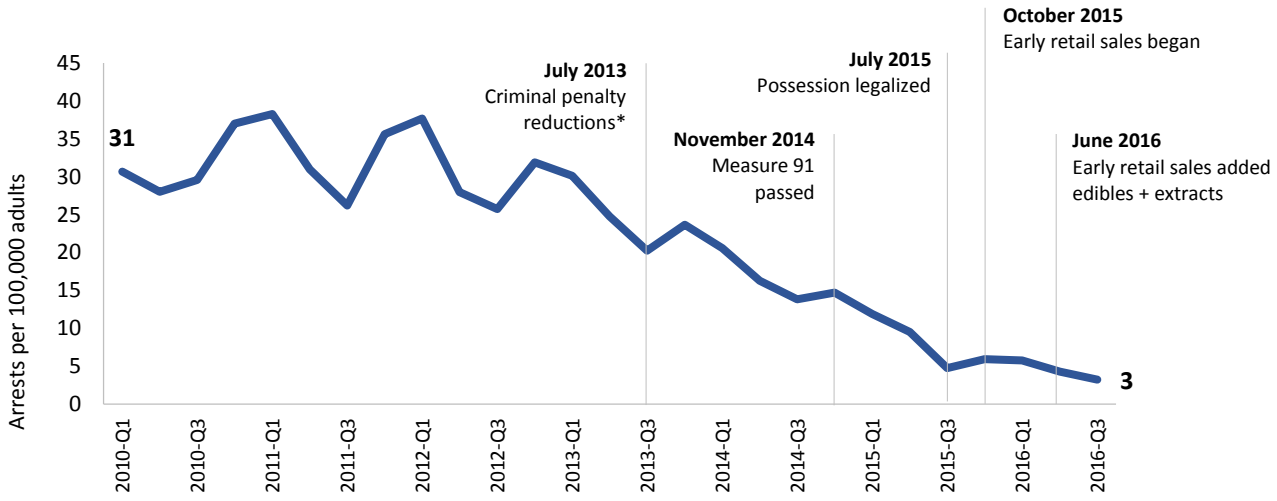
- Between 2012 and 2014 there were a total of 46 fatal crashes in Oregon with an involved driver that tested positive for marijuana.
- The majority (58%) of Oregon marijuana-involved traffic fatalities during this period also involved driver use of alcohol and/or other drugs (data not shown).

Crime

Arrests and convictions can have long-lasting consequences such as decreased employment opportunities. In addition, people with incarceration histories are more likely to have mental illness, chronic conditions and communicable diseases. Furthermore, children can be negatively affected; incarceration of a household member is considered an adverse childhood experience and can act as a risk factor for poor subsequent adult health.

Oregon State Police routinely collect information about drug-related adult arrests. Data in this section reflect marijuana-related arrests where the subject is taken into custody (booked and fingerprinted). Juveniles prosecuted as adults are also included in these arrest reports. Citations (such as for possessing less than an ounce of marijuana) are not included.

Figure 50. Quarterly marijuana arrest rate among adults in Oregon, 2010–August 2016



* Reduction in penalties for >1 ounce of marijuana posession and marijuana manufacturing.

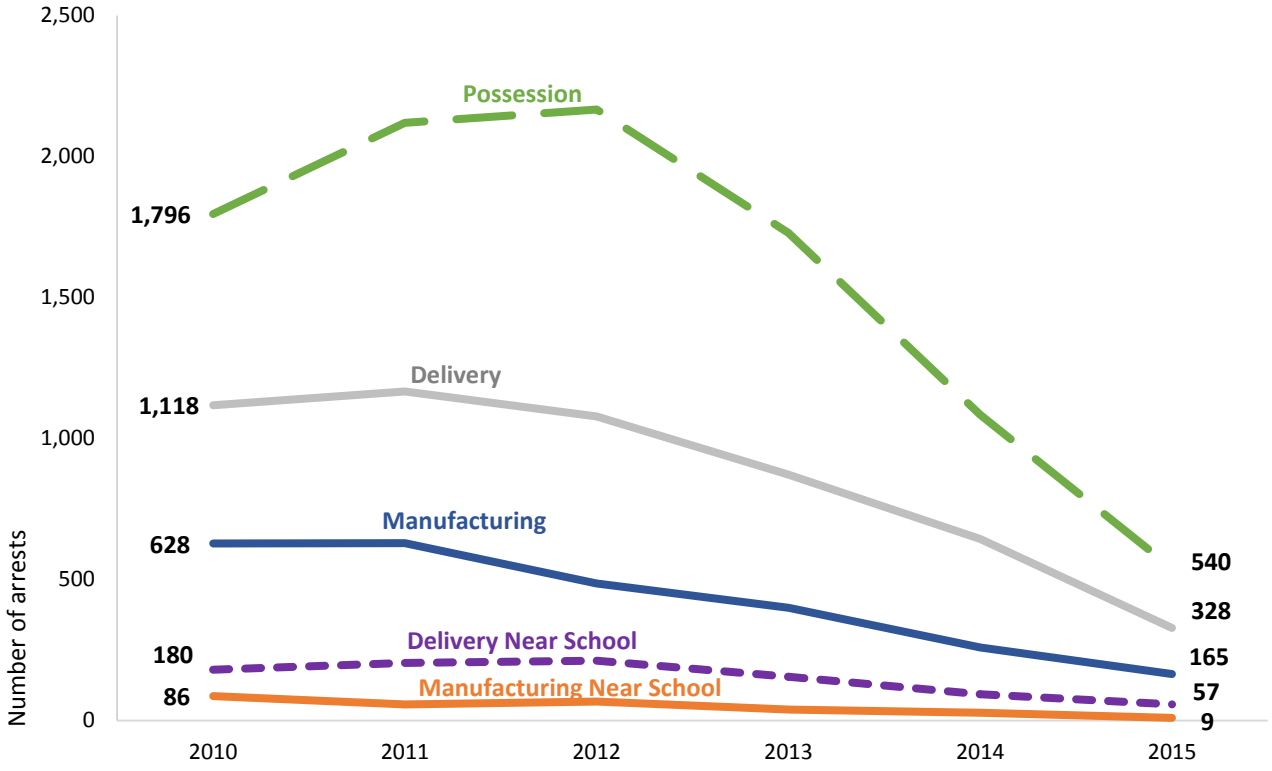
Note: See "Data Sources" section at the end of this report for more information on the Oregon State Police Law Enforcement Data Systems (LEDS) and a link to a report on the effects of incarceration on health.

Data source: Oregon State Police arrest data, Oregon Criminal Justice Commission (2010–August 2016).

As shown in Figure 50:

- The rate of marijuana arrests has decreased in the past five years, from a peak quarterly rate of 35 arrests per 100,000 adults during 2011 to three arrests per 100,000 adults during 2016 (post-legalization).
- During 2010–2014 (pre-legalization), marijuana arrests accounted for 15% of all drug-related arrests in Oregon; between January 2015 and August 2016 (post-legalization), marijuana arrests accounted for 4% of all drug-related arrests in Oregon (data not shown).

Figure 51. Annual number of arrests by marijuana charge in Oregon, 2010–2015



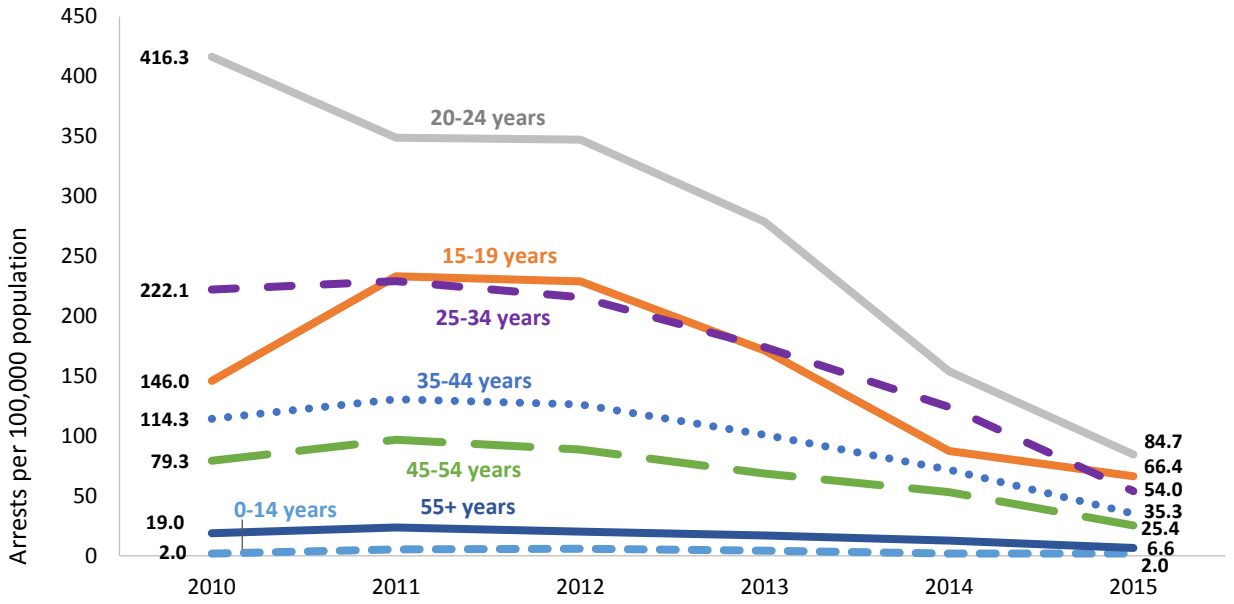
Data source: Oregon State Police arrest data, Oregon Criminal Justice Commission (2010–2015).

As shown in Figure 51:

- The number of marijuana arrests decreased for all charge types between 2010 and 2015; the largest decrease was for marijuana possession arrests.
- The total number of marijuana arrests decreased by nearly half from 2014 (pre-legalization) to 2015. There were 2,108 marijuana arrests in 2014 compared to 1,099 marijuana arrests in 2015.

- In 2015, half of marijuana arrests were for possession (49%), one-third (35%) for delivery of marijuana and 16% for manufacture of marijuana.

Figure 52. Average annual arrest rates for marijuana charge by age group in Oregon, 2010–2015

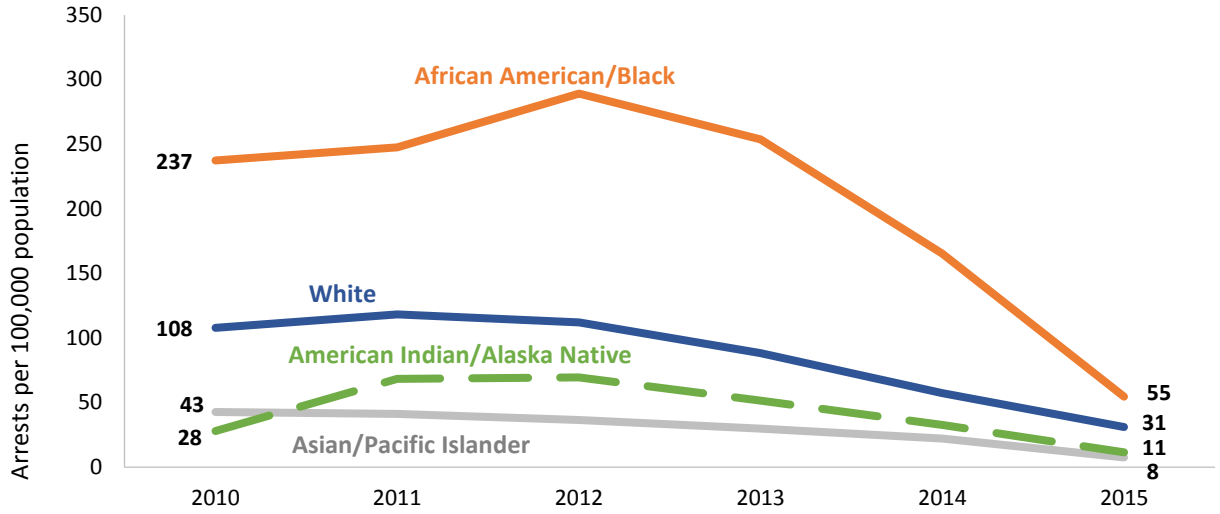


Data source: Oregon State Police arrest data, Oregon Criminal Justice Commission (2010–2015).

As shown in Figure 52:

- In 2015, the highest rate of marijuana arrests occurred among 20–24 year olds.
- From 2010 to 2015, the rate of marijuana arrests decreased for all age groups other than 0–14 year olds with particularly large reductions among 20–24 year olds.
- The vast majority of the people arrested for marijuana crimes were men (84%); 16% were women (data not shown).

Figure 53. Annual marijuana arrest rates by race in Oregon, age-adjusted, 2010–2015



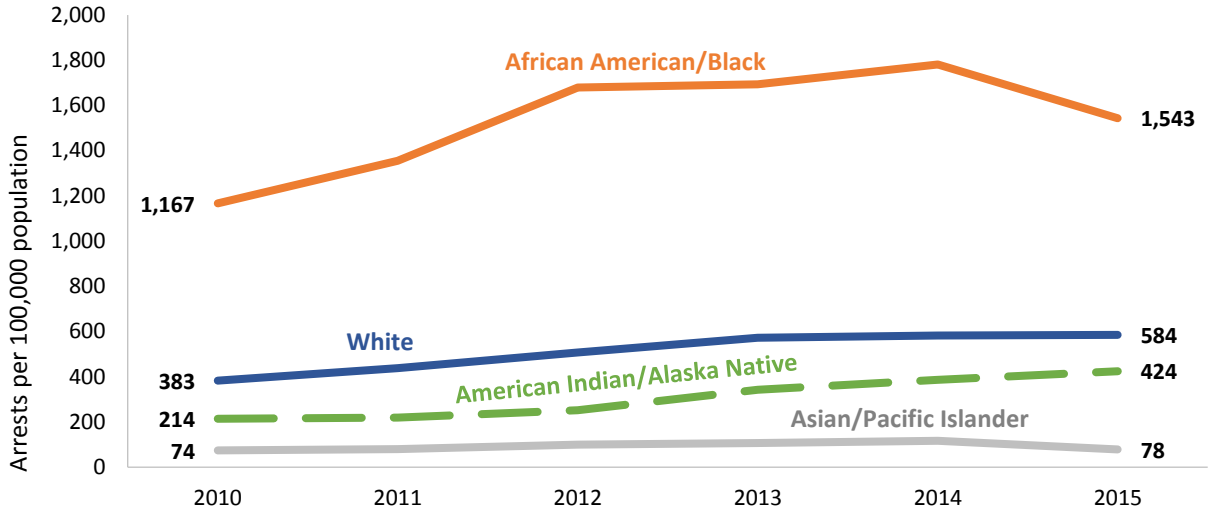
Notes: Rates are age-adjusted. Data are not available for Hispanic or Latino ethnicity.

Data source: Oregon State Police arrest data, Oregon Criminal Justice Commission (2010–2015).

As shown in Figure 53:

- Racial differences exist in the rate of marijuana arrests.
- From 2010 to 2014, the rate of marijuana arrests among African Americans/Blacks was between two and three times higher than the rate among Whites. In 2015, it was still more than 50% higher than among Whites.
- The rates of marijuana arrests among Asian/Pacific Islanders and American Indian/Alaska Natives were lower or similar to that of Whites from 2010 to 2015.

Figure 54. Annual other drug (non-marijuana) arrest rates by race in Oregon, age-adjusted, 2010–2015



Notes: Rates are age-adjusted. Data are not available for Hispanic or Latino ethnicity.

Data source: Oregon State Police arrest data, Oregon Criminal Justice Commission (2010–2015).

Most drug-related arrests are for non-marijuana substances, so for comparison we present arrests by race for these other substances.

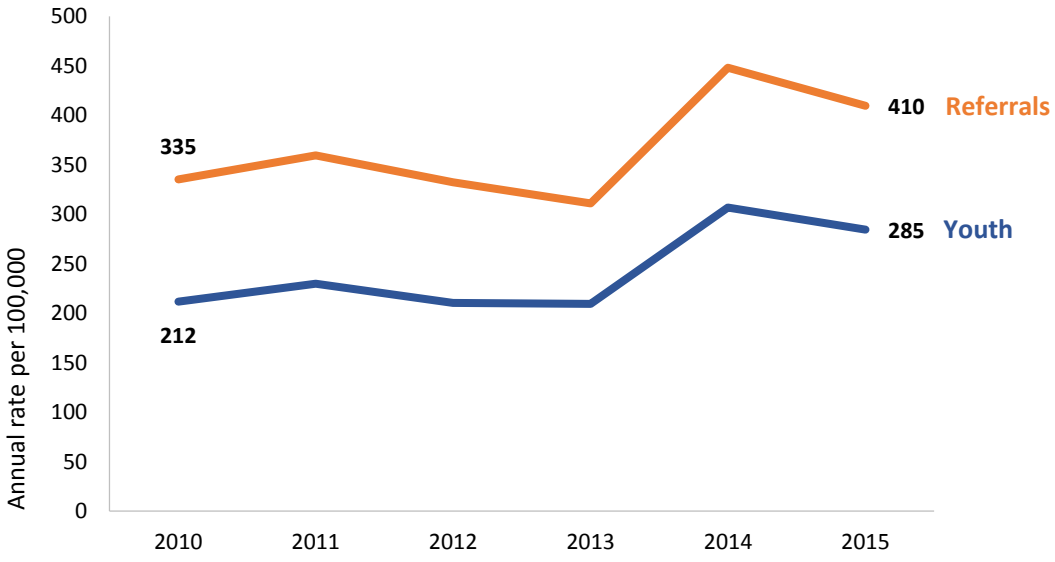
As shown in Figure 54:

- Similar to the racial disparities we see for marijuana arrests, the rate of other drug arrests was higher among African Americans/Blacks than Whites from 2010 to 2015.
- The rates of other drug arrests among Asian/Pacific Islanders and American Indian/Alaska Natives were lower or similar to that of Whites.

The Oregon Juvenile Justice Information System (JJIS) reports on youth who have been processed by the juvenile justice system in the previous year. Data are reported both for "youth" (meaining no matter how many crimes a youth commits, he or she is only counted once within the year), and for "referrals" (meaning all separate reports of incidents, which may include more than one report per youth).

Although marijuana has been legalized for adults ages 21 and older, marijuana possession and use remains illegal for people ages 20 and younger in Oregon (with the exception of youth who have a medical marijuana card). Oregon considers youth possession of less than one ounce of marijuana a violation, not a misdemeanor or felony.

Figure 55. Annual youth referral rates and rates of youth who are referred, for possession of <1 oz. marijuana, 2010–2015



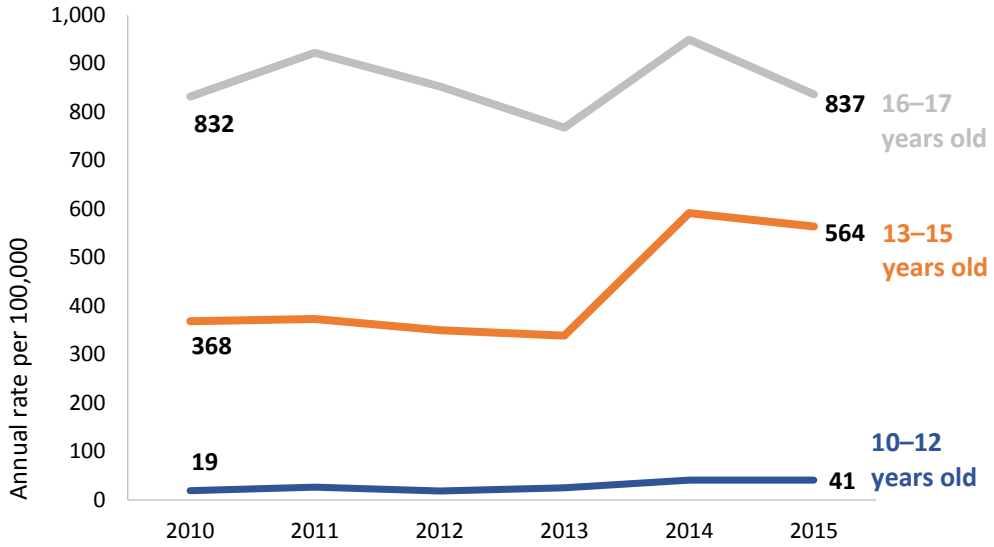
Data source: Oregon Juvenile Justice Information System Annual Youth and Referrals Reports (2010–2015).

As shown in Figure 55:

- Numbers of marijuana referrals and youth referred for marijuana possession increased during 2014–2015 in comparison to prior years. This pattern suggests that shortly prior to retail marijuana legalization in November 2014, either marijuana incidents increased or practices for identifying and referring marijuana incidents among youth were changing.

- The total number of marijuana referrals increased from 1,397 in 2010 to 1,709 in 2015; the total number of youth referred increased from 882 in 2010 to 1,187 in 2015 (data not shown).
- The rate of referrals has remained between two and three times higher among boys vs. girls over all years. In 2015, the rate of marijuana referrals per 100,000 among boys was 549.2 vs. 262.0 among girls (data not shown).

Figure 56. Annual referral rates for youth possession of <1 oz. marijuana by age group, 2010–2015

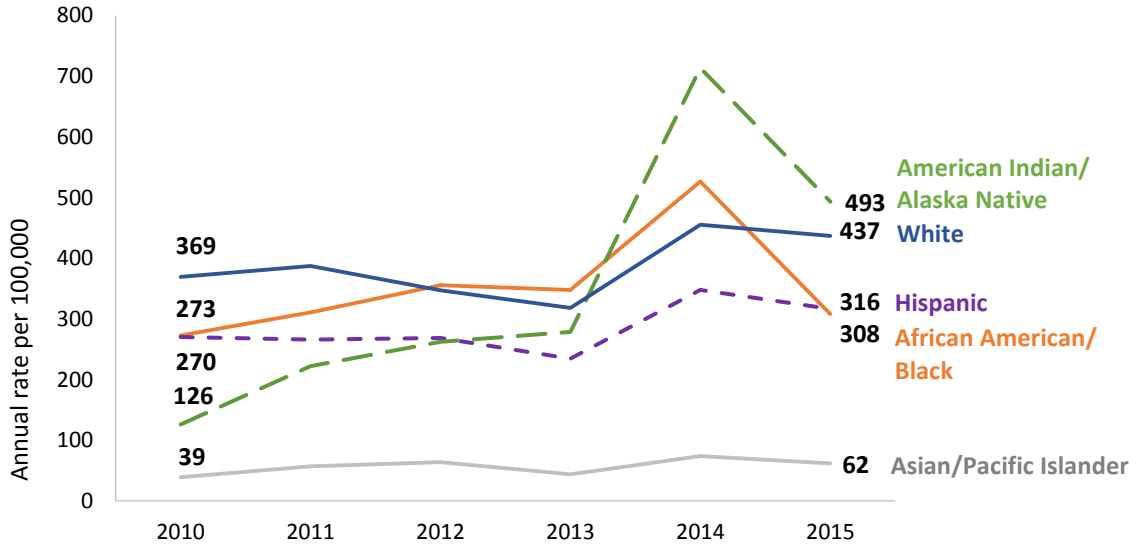


Data source: Oregon Juvenile Justice Information System Annual Youth & Referrals Reports (2010–2015).

As shown in Figure 56:

- During 2010–2013, rates of marijuana referrals were consistently highest among youth ages 16–17 and lowest among youth ages 12 and younger.
- In 2014–2015 the rates of marijuana referrals among youth ages 13–15 increased substantially compared to 2010–2013. Modest increases in the youngest youth group were seen during 2014–2015 as well. The rate of referrals among 16–17 year olds has varied over time.

Figure 57. Annual referrals for youth possession of <1 oz. marijuana by race and ethnicity, 2010–2015



Data source: Oregon Juvenile Justice Information System Annual Youth & Referrals Reports (2010–2015).

As shown in Figure 57:

- From 2010 to 2015, referral rates have been similar for youth who are African American/Black, Hispanic and White.
- Asian or Pacific Islander youth have consistently had lower referral rates than other groups of youth.
- In 2014–2015, referral rates appeared to increase among all groups of youth, but particularly among American Indian/Alaska Native youth relative to other groups of youth.

Future directions

This report provided a summary of information from readily available data sources that describe metrics related to marijuana and public health. Other data sources will also provide important information moving forward. Key emerging data sources include:

- **Expanded Behavioral Risk Factor Surveillance System (BRFSS) measures.** Beginning in 2016, an expanded set of marijuana indicators was added to the survey, including assessing combined use of marijuana with alcohol or tobacco, whether users have experienced adverse effects associated with marijuana use, and whether parents are storing marijuana so that it is inaccessible to children. Reports from the 2016 data will be available in fall 2017.
- **Oregon's Pregnancy Risk Assessment Monitoring System (PRAMS).** PRAMS is a well-established and ongoing survey to assess maternity-related health. It is conducted among women who recently had a baby in Oregon. Questions about marijuana use prior to pregnancy, during pregnancy and after delivery will be collected beginning in 2016. This will be the first population-based information available in Oregon to describe maternal marijuana use during pregnancy and post-partum (including among breastfeeding mothers). Data from calendar year 2016 will be available in fall 2017.
- **Oregon Measures and Outcomes Tracking System (MOTS).** MOTS is a comprehensive electronic data system used by behavioral health service providers to improve care, control costs and share information. MOTS collects information about publicly funded addictions treatment, including which substances are being addressed through treatment. A plan to extract appropriate MOTS data for monitoring trends in publicly funded marijuana-related addictions treatment is in development.

Other data sources under investigation include hospitalization data and marijuana-related student discipline data. Information will be reported as it becomes available from these or other potential sources that provide greater understanding about marijuana and public health.

Data sources

Youth use and attitudes: Oregon Healthy Teens, Student Wellness Survey and Monitoring the Future

Oregon Healthy Teens (OHT) and Student Wellness Survey (SWS) are anonymous, school-based surveys conducted by the Oregon Health Authority. Both surveys collect health behavior information from eighth- and 11th-graders in most counties across Oregon. Data are weighted to represent students proportionally across Oregon. Unweighted data are used for race-specific estimates. The trend of current marijuana use among Oregon eighth- and 11th-graders used both SWS (2012, 2014 and 2016 school years) and OHT (2013 and 2015 school years). Other charts include data from either the SWS or OHT alone.

For more information about OHT, go to https://public.health.oregon.gov/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx.

For more information about SWS, go to https://oregon.pridesurveys.com/.

Note that some SWS estimates included in this report may vary from those in the Student Wellness Survey online reports. While conceptually similar, current marijuana use in the other reports was based on the survey question, "Which of the following illicit drugs did you use during the past 30 days?" The current report estimates were based on the survey question, "During the past 30 days, how many times did you use marijuana?" We used this question for our report analysis because it is consistent with the Oregon Healthy Teens survey and consistent with the questions used to assess current tobacco and alcohol use.

National youth data were obtained from Monitoring the Future (MTF), a similar school-based survey of U.S. secondary school students. MTF results for 10th-graders and 12th-graders were averaged to provide a national comparison for Oregon's 11th-graders. For more information about MTF, go to http://www.monitoringthefuture.org/.

Adult use and behaviors: Behavioral Risk Factor Surveillance System and National Survey on Drug Use and Health

The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing random-digit-dialed telephone survey of adults ages 18 or older concerning health-related behaviors. The Centers for Disease Control and Prevention (CDC) developed the BRFSS. It is conducted in all states in the United States. Each year, between 5,000 and 15,000 adult Oregonians are interviewed. The BRFSS includes questions on health behavior risk factors such as diet, weight control, tobacco and alcohol use, physical activity, preventive health screenings, and use of health care services. Marijuana questions were added to the Oregon BRFSS beginning in 2014. The data are weighted to represent all adults aged 18 and older.

For more information about the Oregon BRFSS, go to https://public.health.oregon.gov/BirthDeathCertificates/Surveys/AdultBehaviorRisk/Pages/index.aspx.

The National Survey on Drug Use and Health (NSDUH) is an annual nationwide survey involving interviews with approximately 70,000 randomly selected individuals aged 12 and older. The NSDUH provides national and state-level data on the use of tobacco, alcohol, illicit drugs (including non-medical use of prescription drugs) and mental health in the United States. NSDUH biennial state-level reports published online were used for this report. At the time of this report, 2014 data were the most currently available.

For more information about NSDUH and results, go to http://www.samhsa.gov/data/population-data-nsduh.

Medical marijuana patients: Oregon Medical Marijuana Program (OMMP)

The OMMP provides extensive data as part of quarterly "statistical snapshot" reports of current patients, caregivers, growers and grow sites, based on their applications. Reports are routinely updated and posted at https://public.health.oregon.gov/DiseasesConditions/ChronicDisease/MedicalMarijuanaProgram/Pages/data.aspx.

Adult knowledge, attitudes and unintended consequences: Health Promotion & Chronic Disease Prevention Panel Survey

The Oregon Public Health Division's Health Promotion & Chronic Disease Prevention Section conducted an online survey of Oregon adults in November 2015. The online survey consisted of 66 questions and was taken by 2,000 adults (ages 18 years and older) living in Oregon. Survey respondents participated through a professionally maintained panel. Panelists were provided an incentive by the panel vendor to participate in surveys, but were not given any additional incentive by the Oregon Public Health Division for participation. The survey asked questions about tobacco use, attitudes about community policies to regulate tobacco products, active transportation (walking, biking) and marijuana use and attitudes.

Statistical weights were applied to the data after collection so that respondents reflect the demographic characteristics of Oregon's adult population, a common practice for population-based survey analysis that ensures the survey results better represent all Oregon adults.

Poison center calls: Oregon Poison Center (OPC)

The Oregon Poison Center (OPC) uses Toxicall®, a data software program for documentation of each Poison Center case. Poison Center staff collect extensive demographic, clinical and substance information from each caller. Statistical data from the OPC is obtained through custom data queries of Toxicall. De-identified data elements from each poison center in the country are transmitted to the National Poison Data System (NPDS). The NPDS enables queries of national aggregate poison center data.

More information about the Oregon Poison Center is available at http://www.ohsu.edu/xd/outreach/oregon-poison-center/index.cfm.

Emergency department visits: ESSENCE

Marijuana-related emergency department visits are collected through Oregon's Electronic Surveillance System for the Early Notification of Community-Based Epidemics (or ESSENCE). ESSENCE is a syndromic monitoring system that collects information about emergency department visits to identify emerging public health threats (such as infectious disease outbreaks). Although syndromic surveillance systems were developed with detection of bioterrorism events in mind, current systems are being used beyond terrorism preparedness to monitor disease and behavioral trends. ED visit information is collected from hospitals and urgent care centers across Oregon. Currently, all 60 eligible hospitals and 14 urgent care centers are sending data every day for syndromic surveillance.

Marijuana-related ED visits were determined by searching the chief complaint and discharge diagnosis fields of ED records for specific marijuana text terms and ICD codes. Applicable ICD—10 discharge diagnosis codes included F12.1 (cannabis abuse), F12.2 (cannabis dependence), F12.9 (cannabis use, unspecified) and T40.7 (poisoning by adverse effect of and underdosing of cannabis), and chief complaint search terms included marij, maraju, thc, cbd, cannab, canab, mj, smok & pot, smok & weed, hash, and hemp. The chief complaint is the primary symptom(s) that a patient states as the reason for seeking medical care. Discharge diagnosis is the final diagnosis given a patient before release from the hospital and is used for billing purposes. Both chief complaint and discharge diagnosis are required fields of the electronic health record for hospitals to achieve the Centers of Medicare and Medicaid Services' Meaningful Use standards.

ED records from October 2015 through October 2016 are included in this report because this was after the transition from the ICD-9 to ICD-10 coding system.

There are notable concerns about the ED data and interpretation. Specifically, increased reporting of marijuana-related cases during the period of our report may be due to: (1) a true increase in events; (2) patients' increased comfort with disclosing their use after marijuana legalization; or (3) increased screening or documentation of marijuana use by health care facilities after marijuana legalization.

For more information about Oregon ESSENCE, go to https://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/PreparednessSurveillanceEpidemiology/essence/Pages/index.aspx.

Impaired driving measures: Oregon State Police

Oregon State Police have several data sources that describe driving under the influence of intoxicants (DUII) events. However, each of these data sources has limitations.

DUII arrests. DUII arrests reported by local police jurisdictions to the Oregon State Police were investigated as potential data source for monitoring marijuana-related traffic safety; however, due to concerns about the consistency of the data, we did not include them in the body of this report.

Oregon State Police provide annual online reports of total arrests per year, by police jurisdiction and statewide. These reports are available online at https://www.oregon.gov/osp/CJIS/Pages/annual_reports.aspx.

Numbers of DUII arrests per year are included in the Oregon State Police online reports in the category of Behavioral Crimes. They are reported separately by multiple types of involved substances, including alcohol (specifically with blood alcohol concentration [BAC] <.08, .08-.14, .15-.19, .20 or above, BAC refused, BAC not given), drugs, undetermined, and unclassified. Marijuana-related DUII events are not specifically identifiable within the "drug-related DUII."

During recent years, the format for crime reporting has been transitioning from the Oregon Uniform Crime Report (OUCR) to the Oregon National Incident-Based Reporting System (ONIBRS). Both systems include reports of impaired driving arrests that local police jurisdictions submit to the state, which in turn reports the data to the Federal Bureau of Investigations (FBI). This transition has resulted in some local police jurisdictions reporting

inconsistently, meaning that actual numbers of DUII arrests are greater than reported. For example, in 2015 several populous Oregon cities did not report data for the full year. In comparison to 2014, when nearly 90% of agencies provided a full year of data, fewer than 50% provided a full year of data in 2015. Therefore, actual DUII arrests in 2015 are greater than shown in online reports of the numbers of arrests per year in the state. In examining these reports, there was a modest increase in drug-related DUII arrests from 915 in 2010 to 1,128 in 2014 (2015 data were not considered due to lack of complete reporting). However, these numbers are less than the numbers of positive alcohol breathalyzer tested recorded by the Oregon State Police Crime Lab, confirming that not all police jurisdictions are reporting consistently and completely. Therefore, at this time, these data are not used for systematic tracking as a marijuana-related public health indicator.

DRE evaluations. When a driver being investigated for impaired driving shows a breathalyzer result with blood alcohol concentration (BAC) that is less than .08 (the legal limit for alcohol-impaired driving), and the officer believes that the driver is impaired to a degree that is inconsistent with their measured BAC, a trained drug recognition expert (DRE) will conduct a formal evaluation of impairment. Evaluations are based on both questioning and physical tests (such as pupil dilation in the presence of changing light), and the DRE delivers a formal opinion on whether the driver is impaired, and by what type of drug category.

If a person is investigated for impaired driving and breathalyzer test results indicate an alcohol DUII (e.g., blood alcohol concentration [BAC] is 0.08 or greater), further investigation of drug impairment is rarely conducted. This procedure means that a person driving while impaired by both alcohol and marijuana is likely to be categorized as only an alcohol-impaired DUII case, resulting in an under-count of actual marijuana-impaired or other drug-impaired driving. Therefore, trends in marijuana-impaired driving from DRE evaluations may not provide complete information about changes in levels of driving under the influence of both alcohol and marijuana.

A DRE evaluation may not be conducted if there is no DRE-certified officer available in that location or at the time. Changes over time in the number of DRE officers statewide could influence the numbers of completed DRE evaluations. However, monitoring the percentage of marijuana-impairment DRE evaluations, rather than the number of positive evaluations, helps make data comparable over time.

Crime lab test results. As part of a DRE evaluation, a urine sample is collected and tested for drugs, including cannabis metabolites, if a person consents to provide a sample. The Oregon State Police Crime Lab provided information about marijuana-positive urine tests, which were considered for this report. The percentage of cannabis-positive urine tests collected among people who were investigated for impaired driving, but who were not alcohol-impaired, increased by about 7% per year between 2013 (49% positive) and 2016 (61% positive). However, the presence of cannabis metabolites only indicates past use, not impairment at the time of the urine test. An increase in the percentage of marijuana-positive urine tests could be observed if more people are using marijuana generally, even if those people were not driving while marijuana-impaired. Therefore, we did not include this as a surveillance measure in this report.

Traffic crashes: Oregon Department of Transportation

For more information about Oregon transportation data and crash reports, visit http://www.oregon.gov/ODOT/TD/TDATA/Pages/car/CAR_Main.aspx.

Fatal traffic crashes: Fatal Accident Reporting System (FARS)

The National Highway Traffic Safety Administration (NHTSA) provides FARS data. FARS data are collected nationwide, and include data on all motor vehicle traffic crashes with fatal injuries.

For additional information on FARS, https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars.

Marijuana-related crime among Adults: Law Enforcement Data Systems (LEDS)

Law Enforcement Data Systems (LEDS) arrest data were provided by the Oregon State Police for all drug-related charges between 2006 and September 2016. Each record in the data set represents a unique charge in an arrest. This data system captures all adult arrests where the subject is taken into custody (booked and fingerprinted). Juveniles processed as adults are also included in the system. Adult and juvenile arrests that did not result in the subject being taken into custody are not captured in this data set (e.g., citations). The LEDS data includes people who were eventually released without being convicted of a crime.

Rates by race were age-adjusted to the 2000 U.S. standard population (see "Rates" discussion in Appendix A for more information about age-adjusted rates).

Although rates of crime may appear lower than expected, this is likely because reported crime statistics often include citations rather than only criminal offenses. For more explanation of differences, see *Were 12,808 people in Oregon arrested for marijuana-related crimes in 2012?* Reported by I.A. Kullgren, July 18, 2014, on Politifact. Available online at http://www.politifact.com/oregon/statements/2014/jul/18/new-approach-oregon/were-12808-people-oregon-arrested-marijuana-relate/.

For more information about LEDS, go to http://www.oregon.gov/osp/CJIS/Pages/index.aspx.

For more discussion about effects of incarceration on health, go to https://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/CDSummaryNewsletter/Documents/2012/ohd6101.pdf.

Marijuana-related crimes among youth: Oregon Juvenile Justice Information Systems

In Oregon, most illegal activities by youth are reported as "referrals" to county juvenile justice departments (rather than as "crimes"). The Oregon Juvenile Justice Information System (JJIS) is supported by the Oregon Youth Authority (OYA), county juvenile departments and administered by the state. JJIS provides information on numbers of youth processed by the juvenile justice system and the number of referrals received by county juvenile justice departments during the previous year. A single youth can have more than one referral in a year (e.g., a youth may have several separate incidents). A referral's category is based on the most serious charge associated with a referral.

For more on JJIS, see annual Youth and Referrals Data and Evaluation Reports at https://www.oregon.gov/oya/pages/jjis_data_eval_rpts.aspx.

Resources

The following websites provide more information on topics related to this report. Resources available at each website are summarized below each listing.

Oregon Health Authority: Marijuana and Your Health

http://public.health.oregon.gov/PreventionWellness/marijuana/Pages/index.aspx

- Marijuana and health and safety
- Frequently asked questions
- Summary of the law
- Description of the Public Health Division's role
- Scientific Advisory Committee reviews of evidence on marijuana-related health effects

Oregon Medical Marijuana Program (OMMP)

http://public.health.oregon.gov/DiseasesConditions/ChronicDisease/medicalmarijuanaprogram/Pages/index.aspx

- Registers patients and caregivers including medical marijuana as part of treatment for specific medical conditions

Oregon Medical Marijuana Dispensary Program

http://www.oregon.gov/oha/mmj/Pages/about.aspx

- Information about the licensing, regulation and oversight of medical marijuana facilities in Oregon
- Includes a current directory of medical marijuana dispensaries

Educate Before You Recreate Public Education Campaign

http://whatslegaloregon.com/

- Infographic summarizing marijuana laws in Oregon

Oregon Liquor Control Commission (OLCC)

www.oregon.gov/olcc/marijuana/Pages/default.aspx

- Recreational marijuana licensing: current information about recreational marijuana licensing, including routinely updated lists of cities/counties prohibiting licensed recreational marijuana facilities
- Updates on developing laws and rules

Measure 91: Control, Regulation and Taxation of Marijuana and Industrial Hemp Act

http://www.oregon.gov/olcc/marijuana/Documents/Measure91.pdf

- Measure text, as passed by Oregon voters in November 2014

Appendix A: Methods

Confidence intervals

This report often provides data in charts with confidence intervals (see example in figure on following page). It is unlikely that point estimates (%) reported from any surveys based on a sample of people are *exactly* the same as the "true" value for the total population. Confidence intervals help to understand the size of this uncertainty.

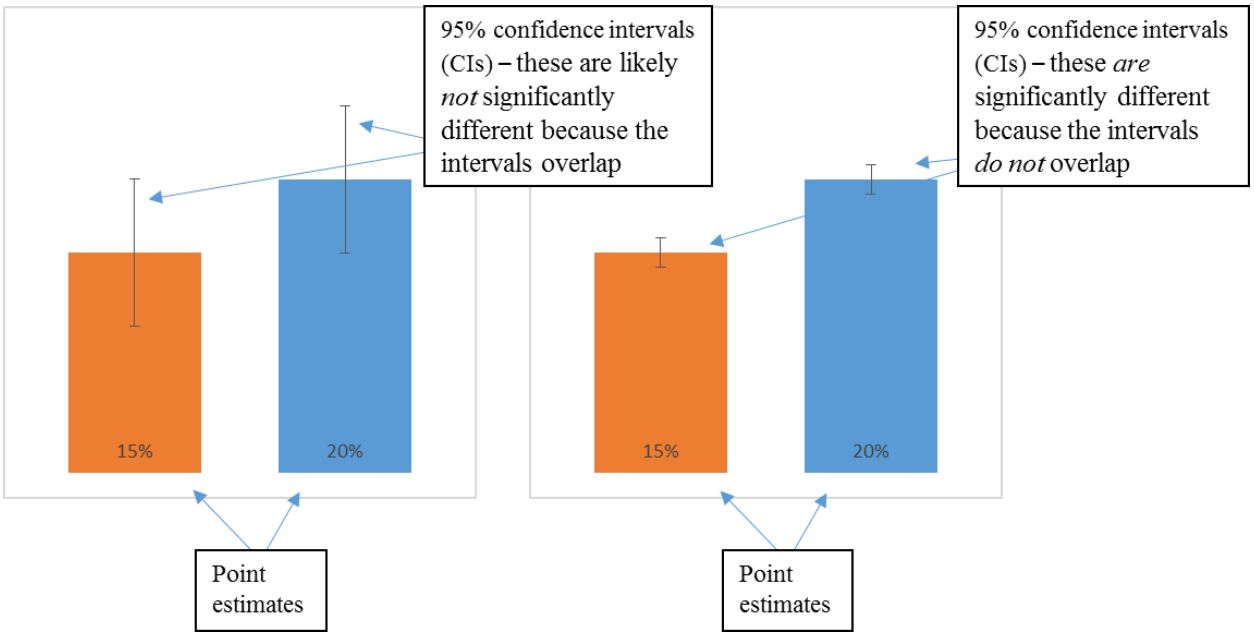
Our report uses 95% confidence intervals. If there is no bias in the data collection system, there is a 95% chance (95 times of 100) that the confidence interval will include the true value for the total population. Groups with smaller numbers of people included in surveys (e.g., racial minorities) will have larger confidence intervals relative to groups with larger numbers of people because there is less precision (or confidence) for those estimates.

The "margin of error" is a common term for the ± (plus or minus) value around a point estimate, which in total represents the confidence interval.

Readers are advised to consider the precision of point estimates provided in this report by using confidence intervals around estimates. Generally, when the confidence intervals for two groups overlap, it is not certain that the true value of results for these groups are truly different. If the confidence intervals do not overlap, then we believe the true values of results for these two groups are different.

Throughout this report, unless otherwise noted, only statistically significant results are described in text as being "higher" or "lower" than other groups.

Example of confidence intervals displayed in report charts



Rates

In this report, data for crime and traffic crash incidents were reported as "rates per 100,000." Rates are obtained by taking the number of incidents, dividing by the number of people in the population (or population subgroup), and multiplying by 100,000.

Reporting in this way helps to distinguish between differences in incidents driven by the total number of people, rather than by other differences. For example, because the total population of the state is growing over time, an increase in the number of marijuana-related hospitalizations could be driven by larger numbers of people rather than more experiences that required hospitalization among those people. Also, because the number of Oregon's population who are non-White is small in comparison to the number of White people, examining simple counts of incidents such as crimes would make it difficult to identify when different race or ethnic groups are disproportionately affected.

Crime rates among adults by race were age-adjusted. This is a method of calculating rates that eliminates the impact of different age structures in different populations, or of changing population age over time. For example, if one population is younger on average than another, and younger people are more likely than older people to have a specific outcome, differences between groups might be partially due to having younger people overall. Effectively, rates for

a specific age group in a population are multiplied by the number of people in the same age group in a standard population (in this case, crime data were age-adjusted to the U.S. 2000 Standard Population).

Population data used as denominators to calculate rates were obtained from the following sources:

- Total population for "Traffic crash" section: Portland State University Population Research Center, available at https://www.pdx.edu/prc/sites/www.pdx.edu.prc/files/Population_Report_2015_tables-3.xlsx.
- Driving age populations (for fatal traffic collisions) were based on annual estimates of state age 16+ populations from U.S. Census Bureau, available at https://www.census.gov/popest/data/state/asrh/2015/index.html.
- Adult and youth subgroups (for "Crime" sections) were based on United States Census Bureau, State Characteristics Datasets: Annual State Resident Population Estimates for 5 Race Groups (5 Race Alone or in Combination Groups) by Age, Sex and Hispanic Origin, April 1, 2010 to July 1, 2015. Available at https://www.census.gov/popest/data/state/asrh/2015/SC-EST2015-ALLDATA5.html. For youth rates, ages 10–17 were combined; for adult rates, ages 18+ were combined.

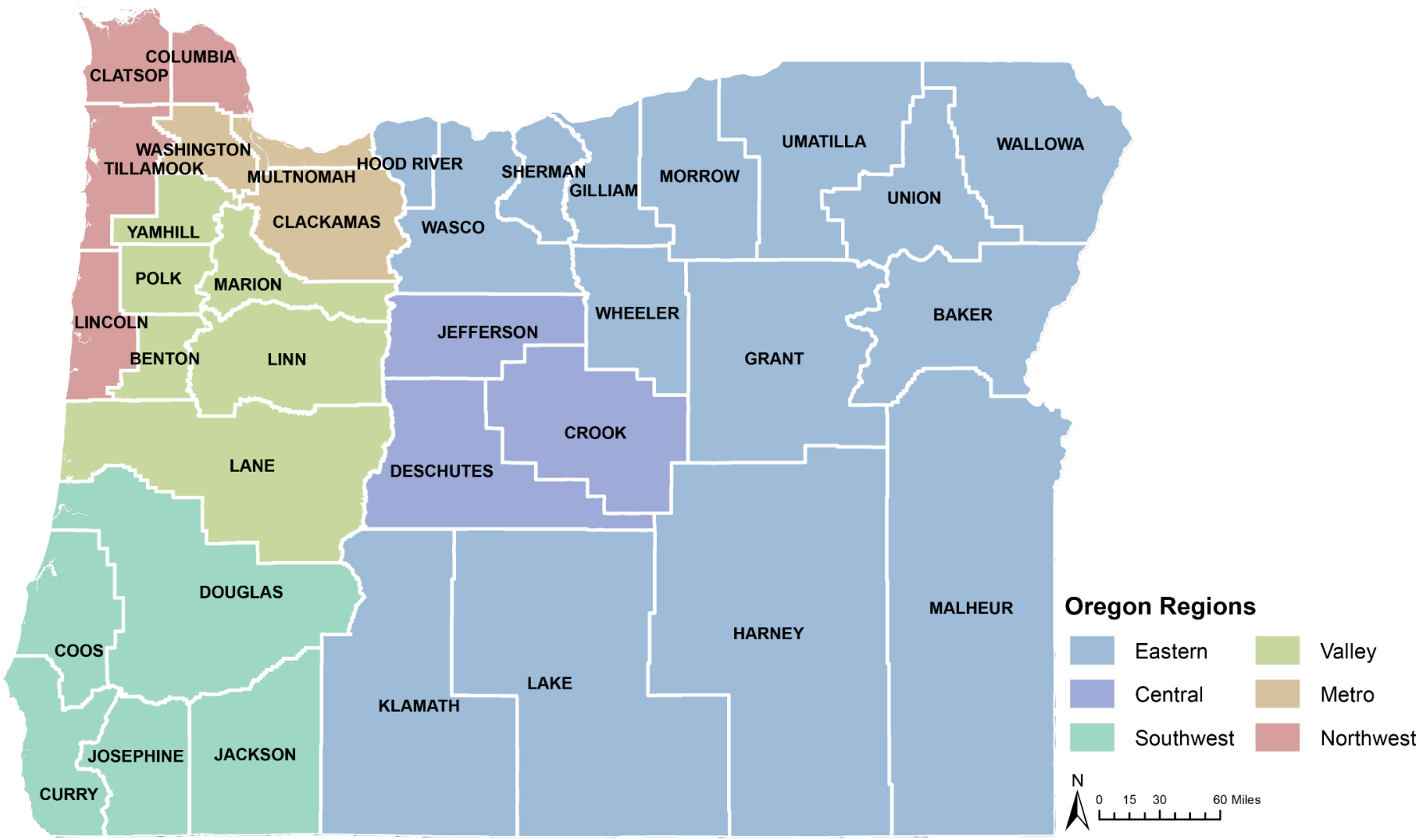
Assessing trends

Trends (changes in rates or levels of public health indicators over time) were assessed to determine whether they were increasing, decreasing or not changing significantly. Trends are described in this report as "changing" or "significant" if they meet criteria for statistical significance at the 95% confidence level. In this report, trends were specifically examined to identify changes that may be associated with marijuana legalization. Although sometimes data may appear to vary over time, only statistically significant trends are described in the text of this report.

For long-term trends (greater than three years or data points), the National Cancer Institute, Division of Cancer Control and Population Sciences' Joinpoint Trend Analysis Software (version 4.3.1.0 – released April 19, 2016) was used to assess significant deviation from prior time periods. For more information about Joinpoint, see https://surveillance.cancer.gov/joinpoint/.

Comparison of changes over two to three time points was conducted using a formal significance test for difference between two measures (e.g., chi-square test or regression test). Again, trends were not described as “changing over time” unless they were statistically significant at the 95% confidence level.

Appendix B: Oregon geographic regions



Oregon regions are delineated by county, as defined by Oregon Geospatial Enterprise Office, Spatial Data Library, February 2011.

The marijuana universal symbol means a product contains marijuana and should be kept in its original packaging, out of the reach of children.

Oregon Health Authority
PUBLIC HEALTH DIVISION
Phone: 971-673-1222
TTY-TDD: 971-673-1222
Fax: 971-673-1299

You can get this document in other languages, large print, braille or a format you prefer. Contact the OHA Office of the State Public Health Director at 971-673-1222 or email health_webmaster@state.or.us. We accept all relay calls or you can dial 711.

OHA 8509B (01/17)