Measuring the Impacts

Denver Marijuana Management Symposium
October 2016
Session Agenda

- Legalization Trends
- Colorado – Public Health Data
- Washington & Oregon – Public Health Data
- Economic Impacts
- Crime Impacts
- Environmental Impacts
- Operational Impacts
- Dashboard Technology
Legalization Trends
Legalization Trends
National Expansion of Legalization

8 states with marijuana legalization ballot questions moving forward in 2016:

- Arizona
- Arkansas
- California
- Florida
- Maine
- Massachusetts
- Nevada
- North Dakota
Growing Support for Marijuana Legalization

% saying marijuana should be legal

<table>
<thead>
<tr>
<th>Year</th>
<th>Legal</th>
<th>Illegal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>1974</td>
<td>30</td>
<td>66</td>
</tr>
<tr>
<td>1979</td>
<td>16</td>
<td>81</td>
</tr>
<tr>
<td>1984</td>
<td>31</td>
<td>60</td>
</tr>
<tr>
<td>1989</td>
<td>32</td>
<td>63</td>
</tr>
<tr>
<td>1994</td>
<td>41</td>
<td>52</td>
</tr>
<tr>
<td>1999</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>54</td>
<td></td>
</tr>
</tbody>
</table>


Pew Research Center
CDPHE Report on Marijuana Use and Health Effects

- Analysis of marijuana use, using state & national surveys
- Analysis of potential health impact, using hospital and poison center data
- Evaluation and summary of scientific evidence about health effects of marijuana
- Search “monitoring marijuana Colorado” to see full report, or use this address
Timeline of Marijuana Legalization in Colorado

- 2001: Medical Marijuana Legalized
- 2010: Medical Marijuana Commercially Available
- 2014: Retail (Recreational) Marijuana Commercially Available

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Youth

- Perceptions
- Behaviors
### Student Perceptions About Risk of Harm Associated with Marijuana Use

#### Percent of Colorado high school students who believe that...

<table>
<thead>
<tr>
<th>Perception</th>
<th>2013</th>
<th>2015</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>People who use marijuana regularly have moderate/great risk of harming themselves</td>
<td>54.0% (52.7-55.2)</td>
<td>47.7% (45.5-49.9)</td>
<td>↓</td>
</tr>
<tr>
<td>People who have one or two drinks [of alcohol] nearly every day have moderate/great risk of harming themselves</td>
<td>69.9% (68.7-71.0)</td>
<td>70.7% (68.4-73.0)</td>
<td>↔</td>
</tr>
<tr>
<td>People who smoke one or more packs of cigarettes per day have a moderate/great risk of harming themselves</td>
<td>84.4% (83.1-85.6)</td>
<td>84.3% (81.9-86.6)</td>
<td>↔</td>
</tr>
</tbody>
</table>
Figure 1. Prevalence of Ever and Current Marijuana Use for High School Students in Colorado Compared to the National Prevalence, 2005-2015.

Prevalence (%)


Colorado

United States

U.S. Ever Use

Colorado Ever Use

U.S. Current Use

Colorado Current Use

Produced by: EEOHT, CDPHE 2016

*Black bars indicate margins of error (95% Confidence Intervals).

†Ever Use is defined as marijuana use at least one time during a student’s lifetime and Current Use is defined as marijuana use at least once in the past 30 days.

†Data Source: Healthy Kids Colorado Survey (HKCS) prevalence estimates for 2005-2015 and Youth Risk Behavioral Survey
Percent of Colorado High School Students Who Currently Use Marijuana Compared to Alcohol and Tobacco

Figure 3. Prevalence of Current Marijuana Use For High School Students Compared to Current Alcohol and Tobacco Use in Colorado, 2009-2015.

Produced by: EEOHT, CDPHE 2016
*Black bars indicate margins of error (95% Confidence Intervals).
†Current Use is defined as marijuana/alcohol/tobacco use at least once in the past 30 days.
‡Data Source: Healthy Kids Colorado Survey (HKCS) prevalence estimates for 2009-2015. Note: Data for the years 2005 and 2007 was not included due to low sample sizes.
Percent of Colorado High School Students Who Currently Use Marijuana

Figure 4. Prevalence of Current Marijuana Use For High School and Middle School Students by Grade and Year in Colorado, 2013-2015.

Produced by: EEOHT, CDPHE 2016
*Black bars indicate margins of error (95% Confidence Intervals).
†Current Use is defined as marijuana use at least once in the past 30 days.
‡Data Source: Healthy Kids Colorado Survey (HKCS) prevalence estimates for 2013-2015.
Marijuana Product Type Among Colorado Students Who Currently Use Marijuana

Figure 11. Usual Methods of Marijuana Use among High School Students that Reported Current Marijuana Use by Year in Colorado, 2011-2015.

- **Smoked**
  - 2011: 88.9%
  - 2013: 85.0%
  - 2015: 86.8%

- **Ate**
  - 2011: 3.8%
  - 2013: 5.2%
  - 2015: 2.1%

- **Vaped**
  - 2011: 5.5%
  - 2013: 6.2%
  - 2015: 5.1%

- **Other**
  - 2011: 1.9%
  - 2013: 3.6%
  - 2015: 6.0%

**Types of Marijuana Use**

Produced by: EEOHT, CDPHE 2016

*Black bars indicate margins of error (95% Confidence Intervals).
†Current Use is defined as marijuana use at least once in the past 30 days.
‡In 2015 the ‘Other’ category includes ‘Other’ and ‘Dabbing.’
Marijuana Use and Driving

- Among Colorado high school students who drove in the past 30 days:
  - 10.9% (10.0-11.8%) had driven after using marijuana in 2013
  - 10.4% (9.0-11.8%) had driven after using marijuana in 2015

- Note: length of time between marijuana use and driving was not specified

http://www.chd.dphe.state.co.us/topics.aspx?q=Adolescent_Health_Data
Adult

• Perceptions
• Behaviors
Percent of Colorado adults who believe that **adults** who use marijuana daily / near daily have...  

<table>
<thead>
<tr>
<th>Perception</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>A moderate / great risk of harming themselves</td>
<td>54.0% (52.4-55.6%)</td>
</tr>
<tr>
<td>A slight / no risk for harming themselves</td>
<td>46.0% (44.4-47.5%)</td>
</tr>
</tbody>
</table>
Ever and Current Marijuana Use Among Colorado Adults (18+ Years of Age)

In 2014:
• 48.9% of Colorado adults (18+ years of age) had ever used marijuana
  • 13.6% had used marijuana in the past 30 days (“current use”)
  • 33.2% of current users reported using marijuana daily

Over time, estimates of current use among Colorado adults have increased slightly:

<table>
<thead>
<tr>
<th>Estimate Source</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Survey of Drug Use and Health</td>
<td>11.3%</td>
<td>11.0%</td>
<td>10.4%</td>
<td>12.9%</td>
<td></td>
</tr>
<tr>
<td>Behavioral Risk Factor Surveillance System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13.6%</td>
</tr>
</tbody>
</table>

http://www.chd.dphe.state.co.us/MJ/2014-Adult-Marijuana-Use-In-Colorado.html

Colorado Behavioral Risk Factor Surveillance System (unpublished)
Among Colorado adults who had used marijuana in the past 30 days in 2014...

**METHOD OF MARIJUANA USE (CHECK ALL THAT APPLY)**

<table>
<thead>
<tr>
<th>Method</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoked</td>
<td>83.1 (80.0-86.3%)</td>
</tr>
<tr>
<td>Eaten</td>
<td>34.4 (30.0-38.7%)</td>
</tr>
<tr>
<td>Vaporized</td>
<td>32.4 (28.0-36.7%)</td>
</tr>
<tr>
<td>Dabbed</td>
<td>17.9 (13.9-21.9%)</td>
</tr>
<tr>
<td>Other</td>
<td>7.4 (4.9-9.9%)</td>
</tr>
<tr>
<td>Drank</td>
<td>5.8 (3.3-8.1%)</td>
</tr>
</tbody>
</table>

18.8% reported driving after using marijuana

*Note: length of time between marijuana use and driving was not specified*

http://www.chd.dphe.state.co.us/MJ/2014-Adult-Marijuana-Use-In-Colorado.html

Colorado Behavioral Risk Factor Surveillance System (unpublished)
Health Effects

• Calls to Rocky Mountain Poison Center
• Emergency Department Visits
• Hospitalizations
Marijuana-Related Calls to the Rocky Mountain Poison Center Over Time

**Figure 1. Number of Human Marijuana Exposure Calls† to Rocky Mountain Poison and Drug Center (RMPDC) by Marijuana Exposure Only and Marijuana Exposure with Other Substances from January 1, 2000 to December 31, 2015 in Colorado (N=1,487).**

<table>
<thead>
<tr>
<th>Year</th>
<th>Marijuana Exposures Only</th>
<th>Marijuana and Other Substance Exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>54</td>
<td>13</td>
</tr>
<tr>
<td>2001</td>
<td>60</td>
<td>27</td>
</tr>
<tr>
<td>2002</td>
<td>75</td>
<td>33</td>
</tr>
<tr>
<td>2003</td>
<td>75</td>
<td>22</td>
</tr>
<tr>
<td>2004</td>
<td>67</td>
<td>26</td>
</tr>
<tr>
<td>2005</td>
<td>74</td>
<td>35</td>
</tr>
<tr>
<td>2006</td>
<td>66</td>
<td>28</td>
</tr>
<tr>
<td>2007</td>
<td>61</td>
<td>31</td>
</tr>
<tr>
<td>2008</td>
<td>44</td>
<td>24</td>
</tr>
<tr>
<td>2009†</td>
<td>93</td>
<td>41</td>
</tr>
<tr>
<td>2010</td>
<td>86</td>
<td>40</td>
</tr>
<tr>
<td>2011†</td>
<td>61</td>
<td>39</td>
</tr>
<tr>
<td>2012</td>
<td>88</td>
<td>49</td>
</tr>
<tr>
<td>2013</td>
<td>127</td>
<td>39</td>
</tr>
<tr>
<td>2014</td>
<td>152</td>
<td>70</td>
</tr>
<tr>
<td>2015†</td>
<td>229</td>
<td>77</td>
</tr>
</tbody>
</table>

†Human marijuana exposure calls to RMPDC were determined by the presence of the generic code Marijuana - 0083000 from the National Poison Data System or marijuana exposure mentioned in RMPDC case notes.

*Counts significantly increased from previous year with a p value <0.004.

**Major Findings**
- Counts of calls remain fairly constant from 2000 to 2009.
- In 2010 calls related to marijuana significantly increased by more than double from 44 to 93 and in 2014 calls related to marijuana significantly increased by 74.8% from 127 to 222.

**Data Details**
- Data Source: National Poison Data System, Rocky Mountain Poison & Drug Center Calls received reporting human marijuana exposure.
Marijuana-Related Calls to the Rocky Mountain Poison Center By Age Group and Time

Figure 2. Number of Human Marijuana Exposure Calls* to Rocky Mountain Poison and Drug Center (RMPDC) by Age Groups from January 1, 2000 to December 31, 2015 in Colorado (N=1,487).

**Major Findings**
- Ages 0-17 years and 25 years and older showed increased numbers of marijuana exposure calls in the Medical Marijuana Commercialized era compared to the Medical Marijuana Legalized era, while ages 18-24 years remain fairly constant since the Prior to Legalization of Medical Marijuana era.
- In 2014 with the beginning of the Retail Marijuana Legalized era, all ages showed increased numbers of marijuana exposures calls compared to the Medical Marijuana Commercialized era.

**Data Details**
- Data Source: National Poison Data System, Rocky Mountain Poison & Drug Center Calls received reporting human marijuana exposure.

*Human marijuana exposure calls to RMPDC were determined by the presence of the generic code Marijuana - 008300 from the National Poison Data System or marijuana exposure mentioned in RMPDC case notes.
†Unknown age includes calls with ages recorded as teens, 20s, unknown adult (>=20 yrs), unknown child (<=19 yrs), and unknown age.
Potentially Marijuana-Related Emergency Department Visits and Hospitalizations in Colorado Over Time

Figure 4. Rates of Hospitalizations (HD) and Emergency Department (ED) Visits with Possible Marijuana Exposures, Diagnoses, or Billing Codes† in First Three Codes per 100,000 HD and ED Visits by Legalization Eras in Colorado.

<table>
<thead>
<tr>
<th>Era</th>
<th>HD Visits</th>
<th>ED Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 Prior to Legalized</td>
<td>274</td>
<td>NA</td>
</tr>
<tr>
<td>2001-2009 Medical Marijuana Legalized</td>
<td>288</td>
<td>NA</td>
</tr>
<tr>
<td>2010-2013 Medical Marijuana Commercialized</td>
<td>376</td>
<td>373</td>
</tr>
<tr>
<td>2014-June 2015 Retail Marijuana Legalized</td>
<td>*530</td>
<td>*547</td>
</tr>
</tbody>
</table>

*Rate significantly increased from previous time period with a p-value <0.001.
†ICD-9-CM codes 305.2, 304.3, 969.6, and E854.1 were used to determine HD and ED visits with possible marijuana exposure, diagnoses, or billing codes.
‡The Ns are the total number of HD or ED visits with possible marijuana exposures, diagnoses, or billing codes in the specified time period.
Potentially Marijuana-Related Emergency Department Visits Compared to Other Substances

Substance Related ED Visits in Colorado, 2011-June 2015: Exposures, Diagnoses, Billing Codes, or Poisonings.

- **Alcohol**
- **Marijuana**
- **Stimulants**
- **Opioids**

Rates per 100,000 ED Visits

<table>
<thead>
<tr>
<th>Year</th>
<th>Medical Marijuana Commercialized (Began in 2010)</th>
<th>Retail Marijuana Legalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015 Jan-June</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* EEOHT, CDPHE 2016
† ICD-9-CM codes 305.2, 304.3, 969.6 and E854.1 in at least one of the 30 diagnosis codes were used to determine ED visits with possible marijuana exposures, diagnoses, billing codes or poisonings.
‡ ED visits involving other substances were identified using at least one of the following ICD-9-CM codes in at least one of the 30 listed diagnosis codes: Alcohol (291[.0-.5, .8, .9], 303[.0, .9], 305.0, 425.5, 571[.0-.6, .8, .9], 790.3, 980[.0-.3, .8, .9], E860[.0-.4, .8]); Prescription Opioid Dependence and Poisoning (304[.0, .7], 305.5, 965[.00, .02, .09], E850[.1, .2]); Heroin Poisoning (E850.0, 965.01); Cocaine Dependence and Poisoning (304.2, 305.6, 970.81, E855.2); Stimulant Dependence and Poisoning (304.4, 305.7, 970.89, 969.72, E854.2, E855.5).
Potentially Marijuana-Related Emergency Department Visits and Hospitalizations in Colorado By Age Group

* Rate significantly increased from previous time period with a p-value <0.001.
† ICD-9-CM codes 305.2, 304.3, 969.6 and E854.1 were used to determine HD and ED visits with possible marijuana exposures, diagnoses, or billing codes.
‡ The Ns are the total number of HD or ED visits with possible marijuana exposures, diagnoses, or billing codes in each age group.
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Marijuana Legalization in Oregon

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October 27, 2016
Denver Marijuana Management Symposium
Oregon marijuana milestones

1998
 Measure 67 establishes Oregon Medical Marijuana Act

2013
 HB 3460 allows medical marijuana dispensaries and establishes registry

August 2015
 HB 3400 allows local control of marijuana sales
 SB 460 allows early sales of non-medical marijuana through dispensaries

October 1, 2015
 Limited retail sales of marijuana through dispensaries

October 2016
 Begin retail marijuana store licensing

June 2016
 Limited retail sales plus (included edibles)

December 31, 2016
 Retail marijuana sales in medical marijuana dispensaries ends
Marijuana Report

Marijuana use, attitudes and health effects in Oregon

Oregon Health Authority
PUBLIC HEALTH DIVISION

Data sources

Oregon Healthy Teens (OHT) & Student Wellness Survey (SWS)

Behavioral Risk Factor Surveillance System & Online Panel Survey
Data sources

Toxic Exposure Surveillance System

Oregon Electronic Surveillance System for the Early Notification of Community-Based Epidemics
Data sources

Oregon Hospital
Discharge Database

Oregon State Police
arrest data
Perceptions and behaviors
Youth
Oregon youth who think weekly marijuana use is harmful, 2010-2016

Perceived harm of weekly marijuana use has decreased steadily over time; 11th graders consistently perceive marijuana use as less harmful than 8th graders.
## Oregon youth who think using select substances is harmful, 2016

8\textsuperscript{th} graders think marijuana use is less harmful than cigarettes, binge drinking, and prescription drugs, while 11\textsuperscript{th} graders think marijuana is the least harmful substance.

<table>
<thead>
<tr>
<th>Substance</th>
<th>8\textsuperscript{th} grade</th>
<th>11\textsuperscript{th} grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription drugs not prescribed to them</td>
<td>84%</td>
<td>84%</td>
</tr>
<tr>
<td>Smoke 1+ packs of cigarettes per day</td>
<td>80%</td>
<td>81%</td>
</tr>
<tr>
<td>Binge drink (5+ drinks) once or twice per week</td>
<td>70%</td>
<td>75%</td>
</tr>
<tr>
<td>Smoke marijuana once or twice per week</td>
<td>59%</td>
<td>39%</td>
</tr>
<tr>
<td>1-2 alcoholic drinks per day</td>
<td>53%</td>
<td>58%</td>
</tr>
</tbody>
</table>
Oregon youth who think marijuana is easy to get, 2010-2016

Perceived easy access to marijuana has remained relatively unchanged over time; 11th graders perceive marijuana as easier to access than 8th graders.

- **8th grade (2010-2016)**: 36%, 33%, 30%, 32%
- **11th grade (2010-2016)**: 66%, 69%, 66%, 68%

Recreational marijuana legalization
Oregon youth who think selected substances are easy to get, 2016

8th graders perceive marijuana as easier to get than prescription drugs and cigarettes, while 11th graders perceive marijuana as easiest to get of all substances.
Current marijuana use among youth over time, 2012-2016

Marijuana use has remained fairly stable over time in Oregon and nationally; youth marijuana use in Oregon has historically been higher than nationally.

Recreational marijuana legalization

- 22% in 2012
- 20% in 2013
- 18% in 2014
- 19% in 2015
- 19% in 2016

National 11th grade
- 7% in 2012
- 9% in 2013
- 8% in 2014
- 8% in 2015
- 7% in 2016

Oregon 11th grade
- 7% in 2012
- 9% in 2013
- 8% in 2014
- 9% in 2015
- 7% in 2016

National 8th grade
- 7% in 2012
- 8% in 2013
- 8% in 2014
- 8% in 2015
- 7% in 2016
Usual method of marijuana use among youth current users, 2015

The vast majority of youth reported smoking as their usual method of use.

<table>
<thead>
<tr>
<th>Method</th>
<th>8th grade</th>
<th>11th grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoked it</td>
<td>82%</td>
<td>89%</td>
</tr>
<tr>
<td>Ate it</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Vaporized it</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Dabbed it</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Used in some</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>other way</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drank it</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Driving within 3 hours of using marijuana among Oregon youth and adults who currently use marijuana, 2014 & 2015

6% 11th graders

21% adults
Adults
Marijuana attitudes among adults, 2015 & 2016

During the period of early recreational marijuana sales, adults thought that legalization would increase underage use and would be bothered if adults used in front of children.
Current marijuana use among adults over time, 2002-2014

Oregon marijuana use has been consistently higher than national use and has increased slightly over time, particularly among adults 26 years old and older.
Ever and current marijuana use among adults, 2014 & 2015

Ever and current marijuana use among Oregon adults has not drastically changed from 2014 to 2015, the year in which early sales of recreational marijuana were permitted.
Frequent and every day use of marijuana increased from 2014 to 2015, while less frequent marijuana use (2-3 days in the last 30) has decreased since legalization.
Frequency of current marijuana use among adults, 2014 & 2015

Frequent and every day use of marijuana increased from 2014 to 2015, while less frequent marijuana use (2-3 days in the last 30) has decreased since legalization.
Current marijuana use among adults by age group, 2014 & 2015

Current marijuana use among adults aged 18-24 decreased from 2014 to 2015, while use increased among adults aged 25-44 and 45-65.
Current marijuana use among specific populations, 2014 & 2015

Current marijuana use is higher among vulnerable populations, with notable increases from 2014 to 2015 among people with disabilities, veterans, and Medicaid members.
Methods of marijuana use among adult current users, 2014 & 2015

The vast majority of current marijuana users reported smoking it; use of all forms of marijuana increased from 2014 to 2015 after early sales of recreational marijuana.
Environment
Adult exposure to marijuana stores and advertising, 2015 & 2016

More than half of adults reported seeing marijuana advertising in the last month, while a quarter report seeing or hearing marijuana health risk messages.

Will be interesting to see if this changes with youth marijuana prevention campaign.
Type of marijuana advertising exposure among adults reporting seeing an ad in the past month, 2016

Three-in-four adults report seeing advertising on marijuana dispensary storefronts and one-in-two saw billboards for marijuana in the past month.

- Storefront: 75%
- Streetside marketing: 67%
- Billboard: 56%
- Magazine or newspaper: 40%
- Sign-waver on sidewalk: 29%
- Pamphlet or flyer: 23%
- Online: 22%
- Outdoor event: 16%

Colorado banned the use of billboards for marijuana advertising.
GREENSKY
COLLECTIVE

CRAFT CANNABIS
OPEN TO ANYONE
21 OR OVER

ONE MILE UP INTERSTATE ON YOUR LEFT
503-208-9775
GREENSKYCOLLECTIVE.COM
THE BUDDY SYSTEM
WE PAIRED GIRL SCOUT COOKIES WITH CANNABIS STRAINS.
Public Health Outcomes
Quarterly marijuana-related calls to the Oregon Poison Center, 2013-2015

Marijuana-related calls have increased yearly since 2013; there were 158 calls in 2015 and 281 calls through Q3 of 2016.
Marijuana-related calls to the Oregon Poison Center by age, 2013-2015

Marijuana-related calls have increased over time among all age groups.
Monthly marijuana-related emergency department visits, March 2013-August 2016

Marijuana-related emergency room visits have increased steadily since marijuana legalization in March 2013.
Quarterly marijuana-related hospitalizations, January 2010-March 2016

Marijuana-related hospitalizations have increased steadily since marijuana legalization in March 2015
Quarterly marijuana arrest rates among Oregon adults, January 2007-September 2015

Rate of marijuana arrests has decreased in the past five years

- **July 2013**: Criminal penalty reductions
- **November 2015**: Measure 91 passed
- **July 2015**: Possession legalized
Contact information

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ECONOMIC OUTCOMES

COLORADO TWO YEARS IN

PRESENTED BY
Adam Orens, Founding Partner

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www.mjpolicygroup.com
ABOUT

Leaders in economics, finance & policy
Market intelligence – policy design
Colorado MED cannabis economist

FOUNDED IN 2014

Experience in 17 states

- Market sizing
- Demand estimation
- Market analytics
- Business modeling and planning
- Government consulting
ECONOMICS OF REGULATED CANNABIS

- Prevalence
- Elements of supply
- Demand characteristics
- Product mix
- Tourism
- Economic impacts
- Jobs
- Commercial Real Estate
PAST YEAR AND PAST MONTH MARIJUANA USERS - COLORADO

![Graph showing past year and past month marijuana users in Colorado from 2002/03 to 2013/14.]
PREVALENCE AND DEMAND

Frequency by User Type

Source: Marijuana Policy Group, using SAMHSA NSDUH 2012 - 2014
DEMAND

**2014**
- Total metric tons: 130,300
  - Tourist: 7%
  - <1 days/mo.: 3%
  - 1-5 days/mo.: 4%
  - 6-10 days/mo.: 19%
  - 11-15 days/mo.: 62%

**2015**
- Total metric tons: 148,700
  - Tourist: 9%
  - <1 days/mo.: 3%
  - 1-5 days/mo.: 5%
  - 6-10 days/mo.: 7%
  - 11-15 days/mo.: 69%

**Cohorts for Use Days per Month**
- Tourist
- <1 days/mo.
- 1-5 days/mo.
- 6-10 days/mo.
- 11-15 days/mo.
- 16-20 days/mo.
- 21-25 days/mo.
- 26-31 days/mo.
ASSESSING THE TOURISM IMPACT

MJ REPORTED INFLUENCE ON LIKELIHOOD TO VISIT CO

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>More Likely To Visit</td>
<td>19%</td>
<td>19%</td>
<td>21%</td>
<td>16%</td>
<td>15%</td>
</tr>
<tr>
<td>No Influence</td>
<td>72%</td>
<td>64%</td>
<td>62%</td>
<td>63%</td>
<td>65%</td>
</tr>
<tr>
<td>Less Likely To Visit</td>
<td>19%</td>
<td>19%</td>
<td>21%</td>
<td>16%</td>
<td>15%</td>
</tr>
</tbody>
</table>

ELEMENTS OF SUPPLY

- Total metric tons: 148.7
- 2014:
  - Medical: 32.6% (130.3 total metric tons)
  - Regulated market: 26.5%
  - Unregulated market: 40.9%
- 2015:
  - Medical: 29.7%
  - Regulated market: 42.7%
  - Unregulated market: 27.6%

Regulated Market - Medical
Regulated Market - Adult Use
Unregulated Market (Homegrows, Caregivers, Grey Market, Black Market)
PRODUCT MIX — MEDICAL

- **Flower**: 77.3% (2014) - 73.1% (2015)
- **Concentrate**: 14.1% (2014) - 19.3% (2015)
- **Infused Edible**: 6.3% (2014) - 6.4% (2015)
- **Infused NonEdible**: 2.4% (2014) - 1.2% (2015)
PRODUCT MIX — ADULT USE

<table>
<thead>
<tr>
<th>Product Type</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower</td>
<td>70.1%</td>
<td>67.0%</td>
</tr>
<tr>
<td>Concentrate</td>
<td>11.6%</td>
<td>17.0%</td>
</tr>
<tr>
<td>Infused Edible</td>
<td>14.7%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Infused NonEdible</td>
<td>3.6%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>
ECONOMIC IMPACT – MULTIPLIER EFFECT

Investment by business → Direct job creation → Increased local demand for goods and services → Increased local spending by workers → Indirect job creation
ECONOMIC IMPACT – MULTIPLIER EFFECT

**RETAILERS**
- Marijuana product
- Employees
- Rent
- Security
- Electricity
  - Data entry, compliance, POS systems

**CULTIVATORS**
- Employees
- Electricity
- HVAC & mechanical
- Fertilizers/pesticides
- Rent
  - Data entry, compliance, inventory systems

**INFUSED PRODUCT MANUFACTURERS**
- Employees
- Marijuana flower/trim
- Rent
- Food inputs
- Chemical inputs
- Security
- Electricity
ECONOMIC IMPACT – MULTIPLIER EFFECT

For every dollar spent on:

- Federal Government = $2.42
- Marijuana Retail = $2.40
- Marijuana Manufacturing = $2.34
- Business Services = $2.25
- Marijuana Cultivation = $2.13
- General Manufacturing = $1.94
- Retail Trade (incl. alcohol) = $1.88
- Mining Activities = $1.79
- Casinos = $1.73
- Racing Track Operations = $1.51
ECONOMIC IMPACT

Colorado Cannabis Market

Direct Impact
- Retail
- Manufacturing
- Cultivation

Secondary Impact

Total Impact

$996 Million
$1.39 Billion
$2.39 Billion
EMPLOYMENT

Employment in Colorado Caused by Legalized Marijuana

2014

9,936 jobs
+ 2,285 jobs
+ 1,987 jobs
= 14,209 jobs

Direct (FTE) employment created
Indirect employment created
Induced employment created

2015

12,591 jobs
+ 2,896 jobs
+ 2,518 jobs
= 18,005 jobs

Number of direct employees by industry segment (FTE)

4,407 Retail operations
2,770 Administration
2,015 Manufacturing
1,889 Management
1,511 Agriculture specialists
COMMERCIAL REAL ESTATE

Marijuana businesses accounted for **36%** of industrial absorption 2009-2014

Source: CBRE 2015
SUMMARY

Prevalence and demand ➪

Heavy (and casual) users ➪

Perception of risk ➥

Concentrate sales ➪

Economic impact ➪

Public health encounters ➪
Assessing the Impact of Crime

Denver MJ Crime Vs Overall Crime

<table>
<thead>
<tr>
<th>Year</th>
<th>MJ Crime</th>
<th>Total Crime</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1,854</td>
<td>44,338</td>
</tr>
<tr>
<td>2013</td>
<td>976</td>
<td>48,153</td>
</tr>
<tr>
<td>2014</td>
<td>1,034</td>
<td>60,788</td>
</tr>
<tr>
<td>2015</td>
<td>1,175</td>
<td>63,816</td>
</tr>
</tbody>
</table>
Assessing the Impact
Crime

Denver - Public Consumption Vs Possession Tickets

<table>
<thead>
<tr>
<th>Year</th>
<th>Possession</th>
<th>Public Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1587</td>
<td>8</td>
</tr>
<tr>
<td>2013</td>
<td>666</td>
<td>184</td>
</tr>
<tr>
<td>2014</td>
<td>408</td>
<td>762</td>
</tr>
<tr>
<td>2015</td>
<td>460</td>
<td>761</td>
</tr>
</tbody>
</table>
Assessing the Impact
Crime

Denver - DPD Pounds of MJ Seized

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>162</td>
<td>3104</td>
<td>515</td>
<td>5724</td>
<td>1220</td>
<td>925</td>
<td>1734</td>
<td>861</td>
<td>3106</td>
<td>2502</td>
</tr>
</tbody>
</table>
Assessing the Impact
Crime

Denver - Impaired Driving Citations

<table>
<thead>
<tr>
<th>Year</th>
<th>DUI</th>
<th>DUID</th>
<th>DUI MJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>2,896</td>
<td>84</td>
<td>33</td>
</tr>
<tr>
<td>2014</td>
<td>2,619</td>
<td>129</td>
<td>66</td>
</tr>
<tr>
<td>2015</td>
<td>2,532</td>
<td>148</td>
<td>73</td>
</tr>
</tbody>
</table>
Assessing the Impact

Crime

MJ Citations Issued by Gender
1/1/2015 - 7/31/16

- Male: 83%
- Female: 17%

MJ Citations Issued by Age
1/1/2015 - 7/31/16

- Under 18: 35%
- 18-20: 53%
- 21 and over: 12%
2014 - MJ industry accounts for just over 2% of total Denver electricity usage.

Nearly half of the city’s electricity usage increase was attributable to the industry.
Assessing the Impact
The Environment

2014 - Megawatt Hours Used by Various Grow Operations

<table>
<thead>
<tr>
<th>Megawatt Hours of Electricity Used</th>
<th>Number of Grow Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>138</td>
</tr>
<tr>
<td>51-100</td>
<td>34</td>
</tr>
<tr>
<td>101-200</td>
<td>33</td>
</tr>
<tr>
<td>201-400</td>
<td>55</td>
</tr>
<tr>
<td>401-700</td>
<td>49</td>
</tr>
<tr>
<td>701-1000</td>
<td>18</td>
</tr>
<tr>
<td>1001-5000</td>
<td>32</td>
</tr>
<tr>
<td>5001-19000</td>
<td>2</td>
</tr>
<tr>
<td>19000+</td>
<td>1</td>
</tr>
</tbody>
</table>
Assessing the Impact
The Environment

Denver Wastewater monitors “loading” impacts of certain industrial industries.

“Loading” is the introduction of contaminants into the wastewater stream (soil, chemicals, pesticides, etc).

Denver Wastewater previously studied marijuana facilities and found little to no loading occurring.
Alpine Waste & Recycling

• Full service waste disposal company in Denver.

• The only company currently composting for the marijuana industry.

• Average customer recycles and composts approximately 12% of their waste.

• Average marijuana customer recycles and composts approximately 18% of their waste.
2014 Health Impact Assessment of several of Denver’s most industrialized neighborhoods

- Odor is leading quality of life complaint
  - Headaches, nausea, eye & throat irritation
  - Reluctance to exercise, garden, socialize
- 90% of respondents say their lives would be better if odors were reduced
- Marijuana businesses - 4th leading source of odor concerns

City response - adopted new odor ordinance to require marijuana grows & MIPs to have odor mitigation technology by summer of 2017.
Denver currently has 1091 active marijuana business licenses operating out of 481 unique locations.

That’s 37% of the state’s licenses. Denver is home to 12% of the state’s population.
Assessing the Impact City Operations

Denver - Number of Active Marijuana Business Licenses By Month

Denver - Number of Unique Marijuana Business License Locations
Assessing the Impact on City Operations

Marijuana Workload Summary

- New Applications Received
- Transfer of Ownership
- Renewals Performed
- Modification of Premise
- Inspections Performed
- Transfer of Location
- New Applications Received

Graph showing trends from August 2014 to September 2016.
Assessing the Impact City Operations

Number of Inspections Performed by Year

- **2014**
  - CPD Building: 2875
  - CPD Zoning: 557
  - DEH EQ: 408
  - DEH PHI: 599
  - DFD Compliance: 680
  - DFD Licensing: 230
  - EXL: 620

- **2015**
  - CPD Building: 3798
  - CPD Zoning: 641
  - DEH EQ: 437
  - DEH PHI: 1450
  - DFD Compliance: 940
  - DFD Licensing: 305
  - EXL: 515

- **2016**
  - CPD Building: 1822
  - CPD Zoning: 554
  - DEH EQ: 99
  - DEH PHI: 872
  - DFD Compliance: 718
  - DFD Licensing: 205
  - EXL: 398
Assessing the Impact of City Operations

Average Time to Inspect (approximations)

- CPD Building: 50 minutes
- CPD Zoning: 120 minutes
- DEH EQ: 90 minutes
- DEH PHI: 60 minutes
- DFD: 150 minutes
- EXL: 55 minutes

TOTAL: 8.75 hours for inspecting license sign off without reinspections
Assessing the Impact
City Operations

Average Number of Violations Noted per Public Health Compliance Inspection (excluding investigations)
Assessing the Impact
City Operations

City of Denver - Marijuana Revenues

Total Revenue in Millions of Dollars

- Total Revenue
- Licensing Fees
- Special Retail Sales Tax
- State Shareback
- Medical Standard Sales Tax
- Retail Standard Sales Tax

2014 Actuals: 5.4
2015 Actuals: 8.0
2016 Projected: 9.3

<table>
<thead>
<tr>
<th>Year</th>
<th>Licensing Fees</th>
<th>Special Retail Sales Tax</th>
<th>State Shareback</th>
<th>Medical Standard Sales Tax</th>
<th>Retail Standard Sales Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Actuals</td>
<td>5.2</td>
<td>2.3</td>
<td>3.0</td>
<td>5.2</td>
<td>6.6</td>
</tr>
<tr>
<td>2015 Actuals</td>
<td>3.2</td>
<td>3.2</td>
<td>7.7</td>
<td>7.0</td>
<td>6.6</td>
</tr>
<tr>
<td>2016 Projected</td>
<td>3.3</td>
<td>3.8</td>
<td>9.3</td>
<td>7.8</td>
<td>8.0</td>
</tr>
</tbody>
</table>
Assessing the Impact
City Operations

City of Denver - Marijuana Specific Expenditures

<table>
<thead>
<tr>
<th>Year</th>
<th>Education</th>
<th>Enforcement</th>
<th>Regulation</th>
<th>Public Health</th>
<th>Total Expenditures in Millions of Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>0.00</td>
<td>2.51</td>
<td>1.43</td>
<td>0.75</td>
<td>4.67</td>
</tr>
<tr>
<td>2015</td>
<td>1.46</td>
<td>1.39</td>
<td>2.51</td>
<td>1.50</td>
<td>6.86</td>
</tr>
<tr>
<td>2016</td>
<td>1.99</td>
<td>2.37</td>
<td>3.19</td>
<td>1.50</td>
<td>8.15</td>
</tr>
</tbody>
</table>
Assessing the Impact City Operations
Thank You!

Questions?

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