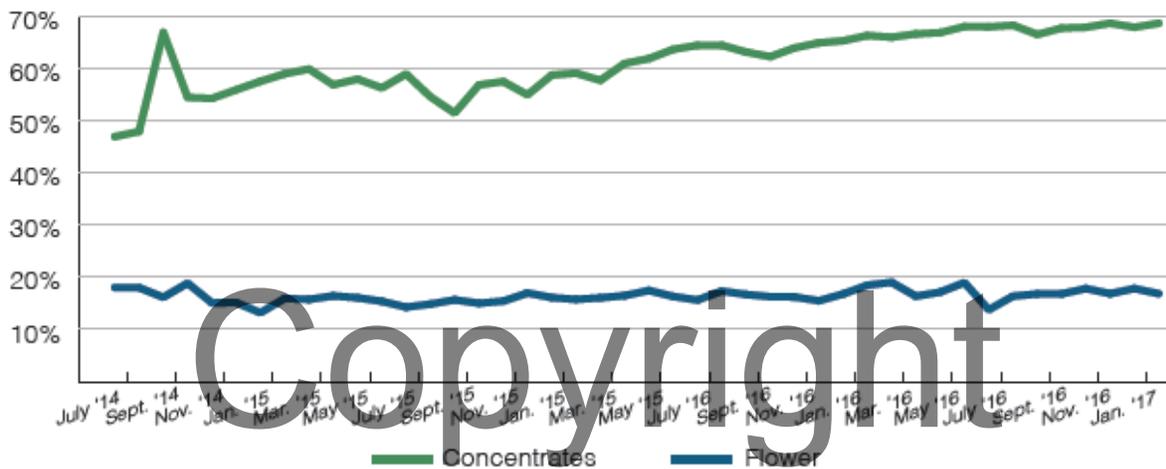


## MEDICAL MARIJUANA CURRENTLY AVAILABLE IN COLORADO IS NOT SUPPORTED BY RESEARCH AND PUTS PEOPLE AT RISK

The Colorado Department of Revenue's Marijuana Enforcement Division (MED) commissioned the *Market Size and Demand for Marijuana in Colorado 2017* market update which is based on official data from the state marijuana inventory tracking system (METRC). The following is directly from that report:

In 2017 more than one third (37.7 percent) of total sales were non-flower products, compared to 25.4 percent in 2015. The most popular alternatives are oil-filled vaporizer cartridges, wax/ shatter concentrates, and infused edibles. **(THE IS NO RESEARCH AT ALL THAT SUPPORTS THE USE OF THESE CONCENTRATED PRODUCTS FOR ANY MEDICAL CONDITION)**

**Figure 9: Potency Trends for Marijuana Products In Colorado**



Source: Study team calculations using state laboratory testing data.

According to state testing data, average marijuana flower potency has increased slightly since 2014. While the data contains **some flower samples with up to 30-35 percent THC**, the **average THC content of all tested flower in 2017 was 19.6 percent** statewide compared to 17.4 percent in 2016, 16.6 percent in 2015, and 16.4 percent in 2014. This trend indicates a slow but steady increase in flower potency.

The average **potency of concentrated extract products increased steadily from 56.6 percent THC content by weight in 2014 to 68.6 percent at the end of 2017**. While **there are concentrate products with potency at 90 percent or above**, such products are outliers, and when considering all forms of concentrates (wax, shatter, oil, vape pens, etc.), the true average is much lower

The increase in average potency, combined with falling prices, result in falling prices per “serving” of THC for most products on the market. This trend means that consumers can achieve the same psychoactive and therapeutic effects at lower prices as the market continues to mature.

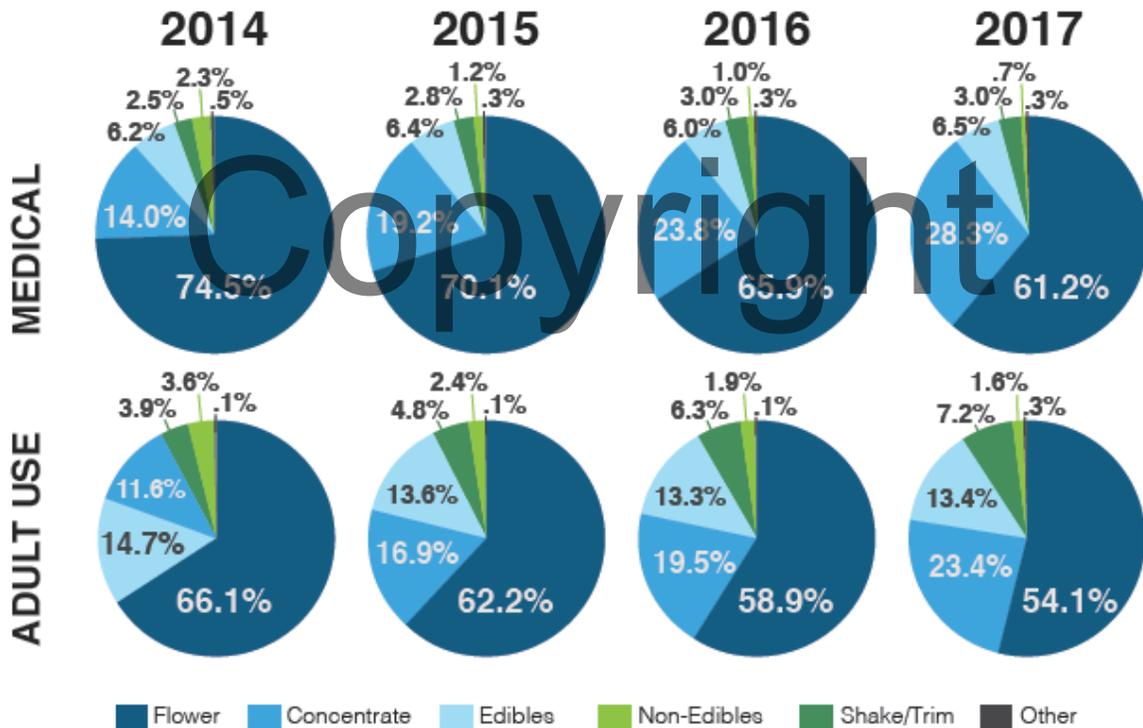
Falling prices in both markets have several implications for consumers, producers, and governments. For consumers, lower prices mean more affordable marijuana, which will likely increase overall demand and total sales, **but may also increase addiction and dependency rates**.

The medical marijuana market still accounts for a major component of the overall marijuana market in the Front Range and Denver Metro area. Colorado lawmakers, regulators, and researchers did not necessarily expect a medical market of this size to endure since there would be no barrier to accessing the adult use market beyond proof of age, whereas medical patients must qualify and apply for a medical card. The lower pricing and abundance of medical marijuana centers are attractive to the patient population that is more likely to live near or travel to the more developed Front Range medical infrastructure.

### Use Amounts per Day

Heavy marijuana consumers have been found to consume approximately 1.6 grams of flower per day. This corresponds to inhaling roughly **314 milligrams of THC per day** based on 2017 average potency in Colorado of **19.6% THC content for flower**.

Figure 11: Product Type Market Share, by Year and Market



Source: Study team calculations using state sales data.  
 Note: "Other" sales includes immature plants, seeds and related products.

(Our interpretation of this data) - The increase in concentrates in the medical marijuana market is concerning, since there is no research supporting the use of concentrates for any medical condition. The higher THC potency in concentrates can result in people using even higher milligrams of THC daily which can result in increase in addiction and other mental health and medical consequences. The following

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table from this report indicates that the people using marijuana daily constitute 22.5% of the users and yet they are using 71.1% of the product. This seems to support the appearance that this is an industry profiting from addiction.

**Table 1: 2017 Consumption by Colorado Residents Age 21+ (In Metric Tons)**

Frequency of Group Use (days per month)	"Group Population"	"Annual Usage Quantity (Metric Tons)"			Share of..	
		Lower Bound	Mean Estimate	Upper Bound	Users	Demand
Less than once	297,592	0.4	0.7	1.3	30.2%	0.3%
1-5	216,387	4.1	6.4	9.0	22.0%	3.4%
6-10	68,694	3.5	5.4	7.7	7.0%	2.8%
11-15	58,390	4.8	7.5	10.6	5.9%	3.9%
16-20	78,998	9.0	14.0	19.8	8.0%	7.4%
21-25	42,590	17.0	20.9	24.8	4.3%	11.0%
26-31	221,882	109.6	134.9	160.2	22.5%	71.1%
<b>Total</b>	<b>984,534</b>	<b>148.3</b>	<b>189.6</b>	<b>233.4</b>	<b>100.0%</b>	<b>100.0%</b>

Source: Study team calculations.

There is research supporting the use of Marijuana or Cannabis products for medical conditions:

The most comprehensive systematic review - Whiting, P. F., R. F. Wolff, S. Deshpande, M. Di Nisio, S. Duffy, A. V. Hernandez, J. C. Keurentjes, S. Lang, K. Misso, S. Ryder, S. Schmidkofer, M. Westwood, and J. Kleijnen. 2015. Cannabinoids for medical use: A systematic review and meta-analysis. *Journal of the American Medical Association* 313(24):2456–2473.

- 79 RCTs were included (No. of reports [No. of patients])
- 28 Nausea and vomiting due to chemotherapy (37 [1772])
- 28 Chronic pain (63 [2454])
- 14 Spasticity due to multiple sclerosis or paraplegia (33 [2280])
- 4 HIV/AIDS (4 [255])
- 2 Sleep disorder (5 [54])
- 2 Psychosis (9 [71])
- 2 Tourette syndrome (7 [36])
- 1 Anxiety disorder (1 [24])
- 1 Glaucoma (1 [6])
- 0 Depression

In all these studies the source of THC was either pharmaceutical grade THC in the form of Dronabinol, Nabilone, Nabiximols or in the form of smoked/vaporized or oral cannabis.

The highest dose of THC in the pharmaceutical products was:

Dronabinol – maximum 5-30 mg/day in 1-4 doses/day (most common, 2 doses)

Nabilone – maximum 0.5 mg – 8 mg, most common 2 mg 2 times per day

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Nabiximols – 2.7 mg THC and 2.5 mg CBD per spray, titrated to a maximum of 4-48 sprays/24 hours, most common maximum was 8 sprays/3 hours or 48 sprays/24 hours.

Cannabis vaporized/smoked – used concentrations of 1.29% and 3.53% THC

Cannabis THC capsules – maximum 5 mg – 60 mg/day

### **NONE OF THESE COME CLOSE TO THE AMOUNT OF THC CONSUMED TODAY IN “MEDICAL MARIJUANA”**

Other studies on smoked cannabis for pain:

1. A Randomized, Placebo-Controlled, Crossover Trial of Cannabis Cigarettes in Neuropathic Pain. Wilsey B et al. Journal of Pain **2008**;9:506-521 – **high dose 7% THC**, low dose 3.5% THC versus placebo cannabis “analgesia appears to be consistent across the low and high dosages, cognitive changes were more problematic with a high dose of delta-9-THC. This suggests that a therapeutic window may exist. Our study indicates that modest declines in cognitive performance occur with cannabis, particularly in learning and recall, and especially at higher doses. In combination with the deficits in baseline neurocognitive performance, however, cannabis compounds this problem. This finding necessitates caution in the prescribing of medical marijuana for neuropathic pain, especially in instances in which learning and memory are integral to a patient’s work and lifestyle.
2. Smoked cannabis for chronic neuropathic pain: a randomized controlled trial. Ware M et al CMAJ **2010**;182:E694-E701. Tested four potencies (0%, 2.5%, 6% and **9.4% THC**)
3. Low-Dose Vaporized Cannabis Significantly Improves Neuropathic Pain. Wilsey B et al. Journal of Pain **2013**;14:136-148. Tested **medium dose 3.53% THC versus low dose 1.29% THC** versus placebo. They found both doses effective for pain. “The analgesia obtained from a low dose of delta-9-tetrahydrocannabinol (1.29%) in patients, most of whom were experiencing neuropathic pain despite conventional treatments, is a clinically significant outcome. In general, the effect sizes on cognitive testing were consistent with this minimal dose. As a result, one might not anticipate a significant impact on daily functioning.”
4. An Exploratory Human Laboratory Experiment Evaluating Vaporized Cannabis in the Treatment of Neuropathic Pain From Spinal Cord Injury and Disease. Wilsey B et al. Journal of Pain **2016**;17:982-1000. Tested **2.9% THC, 6.7% THC and placebo**. “Because the 2 active doses did not significantly differ from each other in terms of analgesic potency, the lower dose appears to offer the best risk-benefit ratio in patients with neuropathic pain associated with injury or disease of the spinal cord.”
5. Dose-dependent Effects of Smoked Cannabis on Capsaicin induced Pain and Hyperalgesia in Healthy Volunteers. Wallace M et al. Anesthesiology 2007;107:785-796. Induced pain by intradermal injection of capsaicin into forearm and tested low-, medium-, and high-dose smoked cannabis (**2% THC, 4% THC and 8% THC**) for pain efficacy. “In summary, in this model of human experimental pain, smoked cannabis was demonstrated to have a delayed biphasic effect on pain scores induced by intradermal capsaicin. The low dose had no effect, the medium dose significantly reduced the pain, and the high dose significantly increased the pain.”

The number one reason people report using medical marijuana according to the CDPHE is for pain. These studies support the use of low dose THC (less than 10%) for treatment of pain and indicate that at

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higher doses there can be cognitive problems as well as problems with hyperalgesia – something that is also found with the use of chronic opioid treatment.

**WE DO NOT HAVE STUDIES ON SMOKED CANNABIS HIGHER THAN 10% THC AND CERTAINLY NOT ON THE 20% THC AVAILABLE TODAY AND EVEN MORE CERTAINLY NOT ON THE CONCENTRATED PRODUCTS. WHY DOES COLORADO CONSIDER THESE TO BE MEDICAL MARIJUANA?**

**To be clear – we are talking about THC content and not CBD which is also part of medical marijuana but is often not clearly differentiated by the industry. There is research on the use of CBD and Epidiolex is a pharmaceutical grade CBD for the treatment of some seizure disorders. There is not yet good research on the use of dispensary cannabis/CBD.**

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