

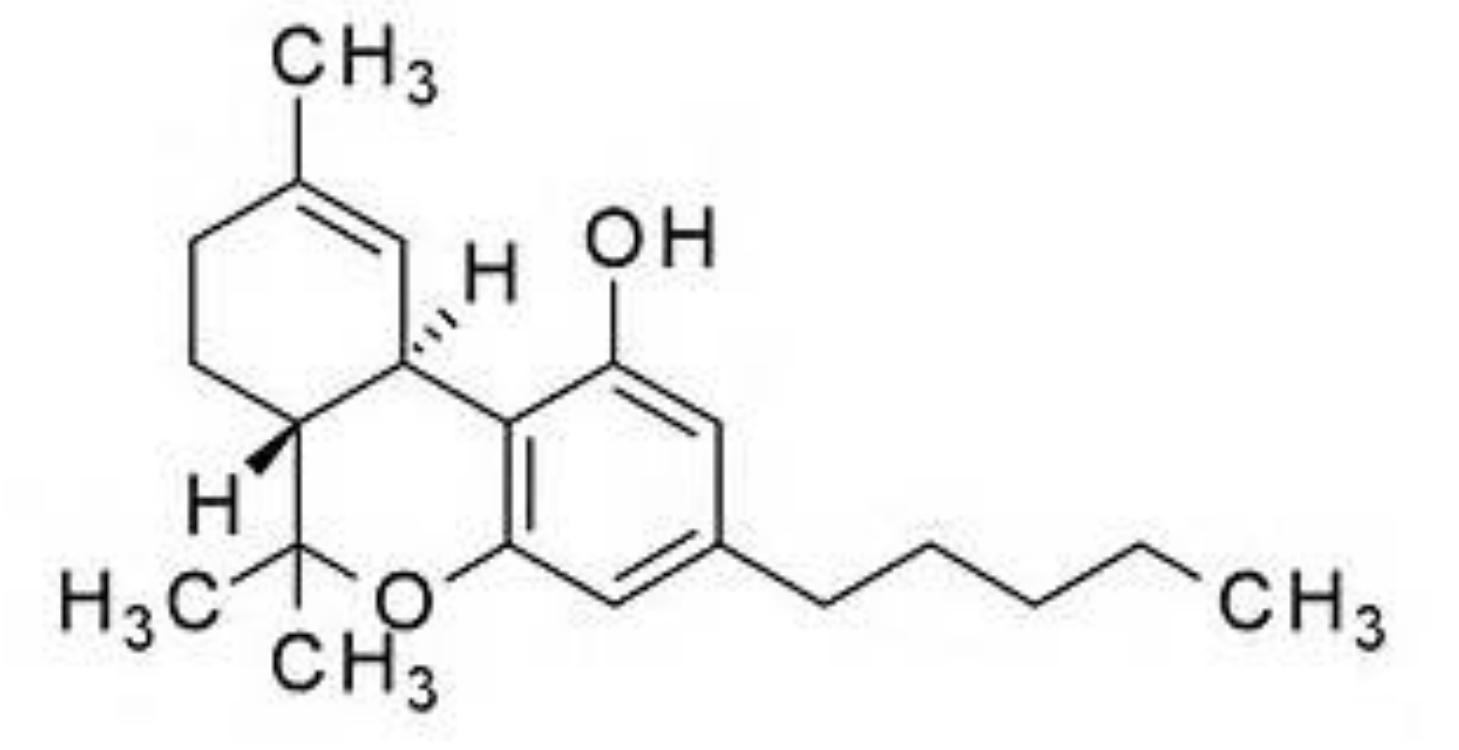
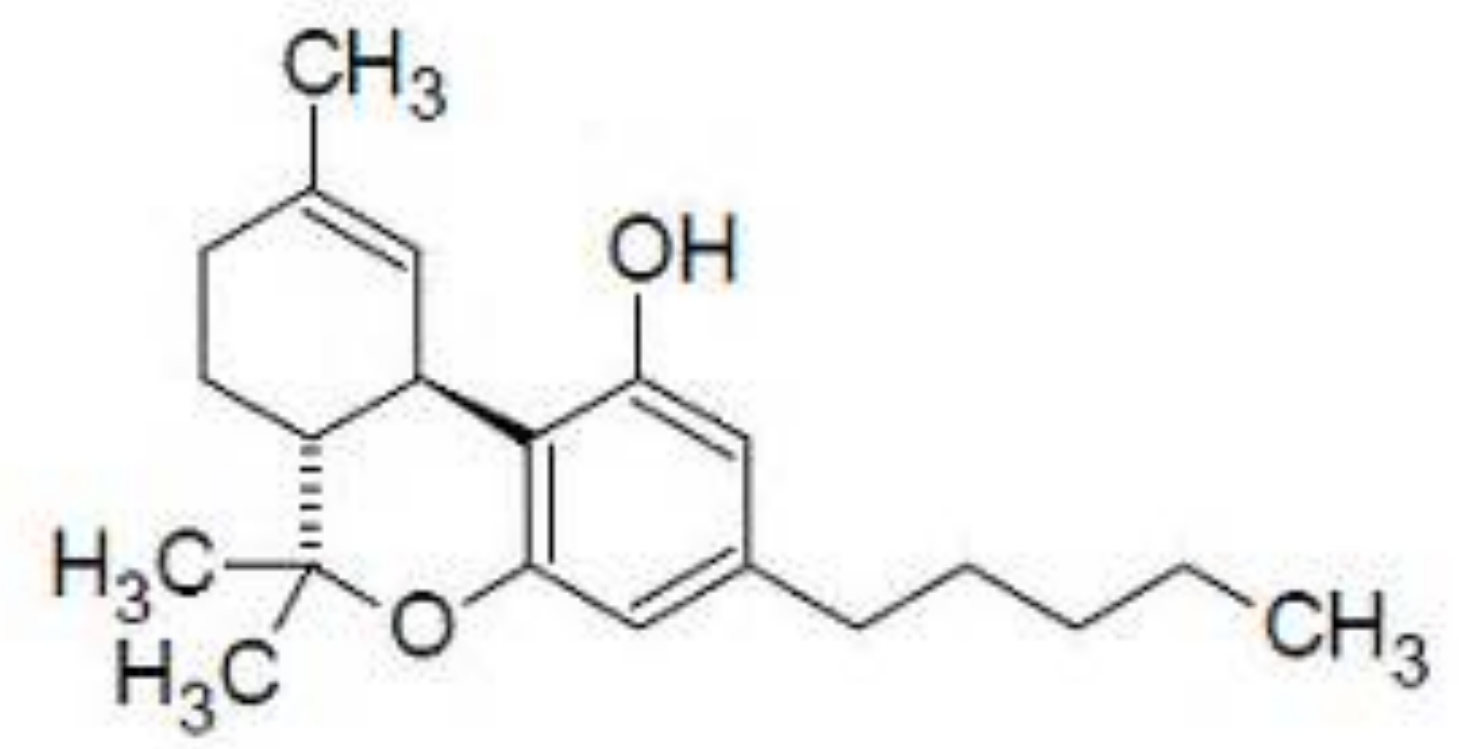
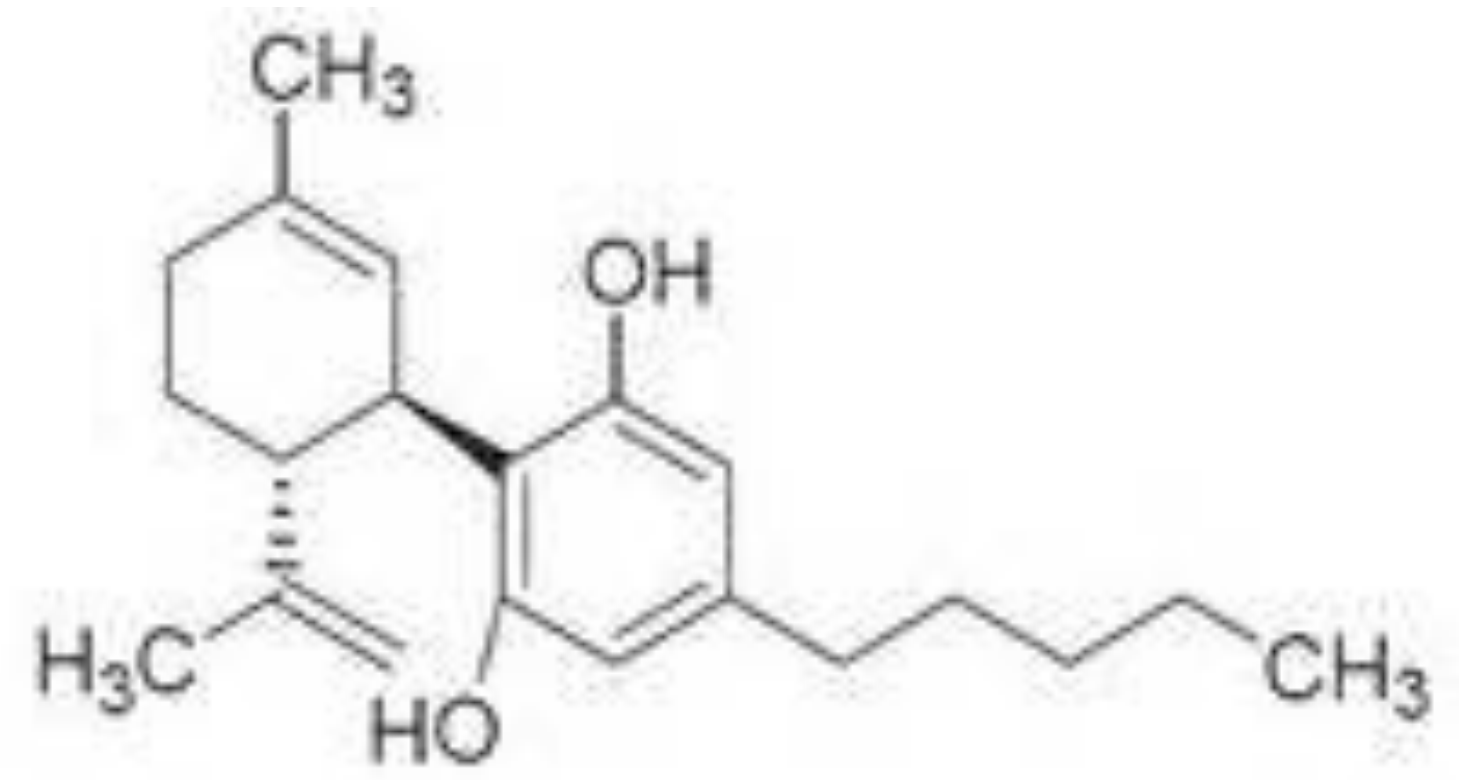
Cannabis and the Opioid Connection

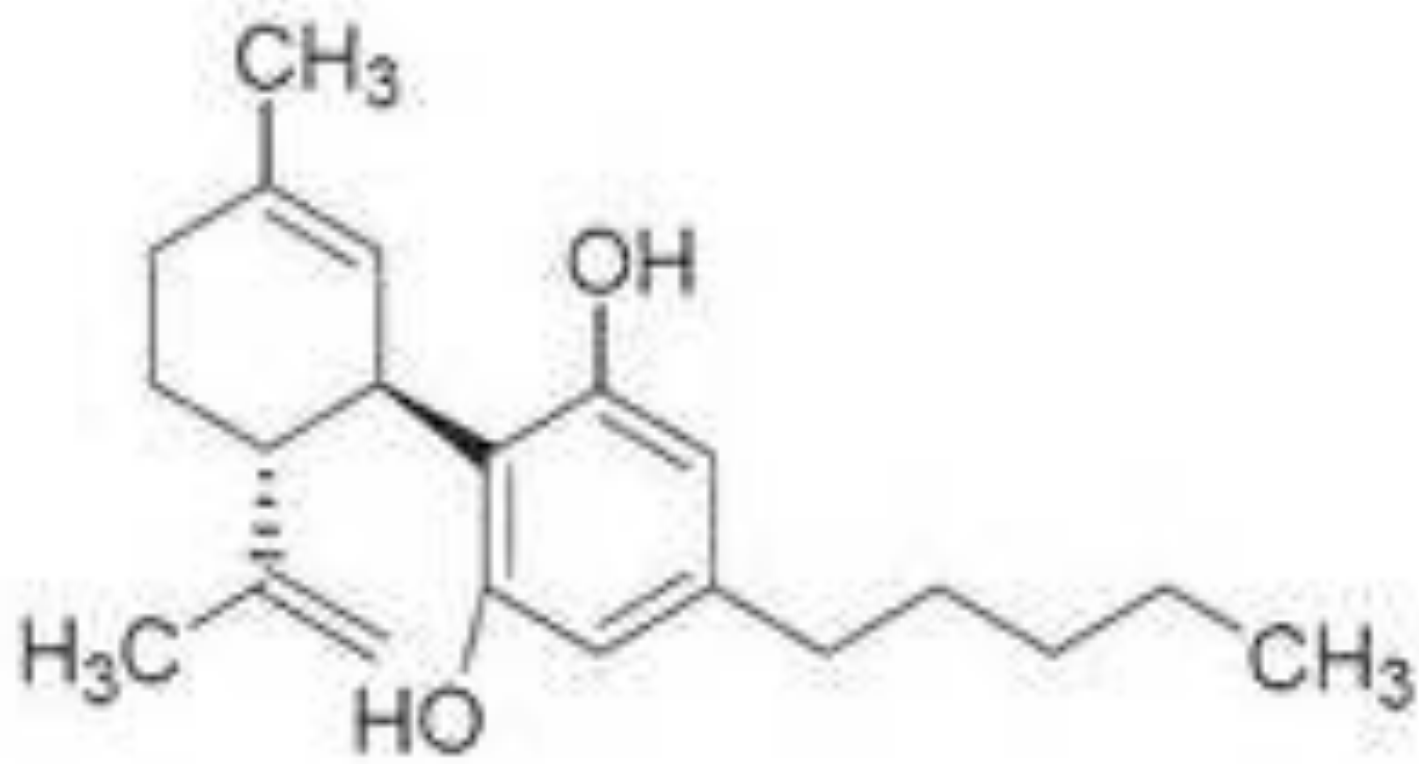
Kenneth Finn, MD

kfinn@springsrehab.net

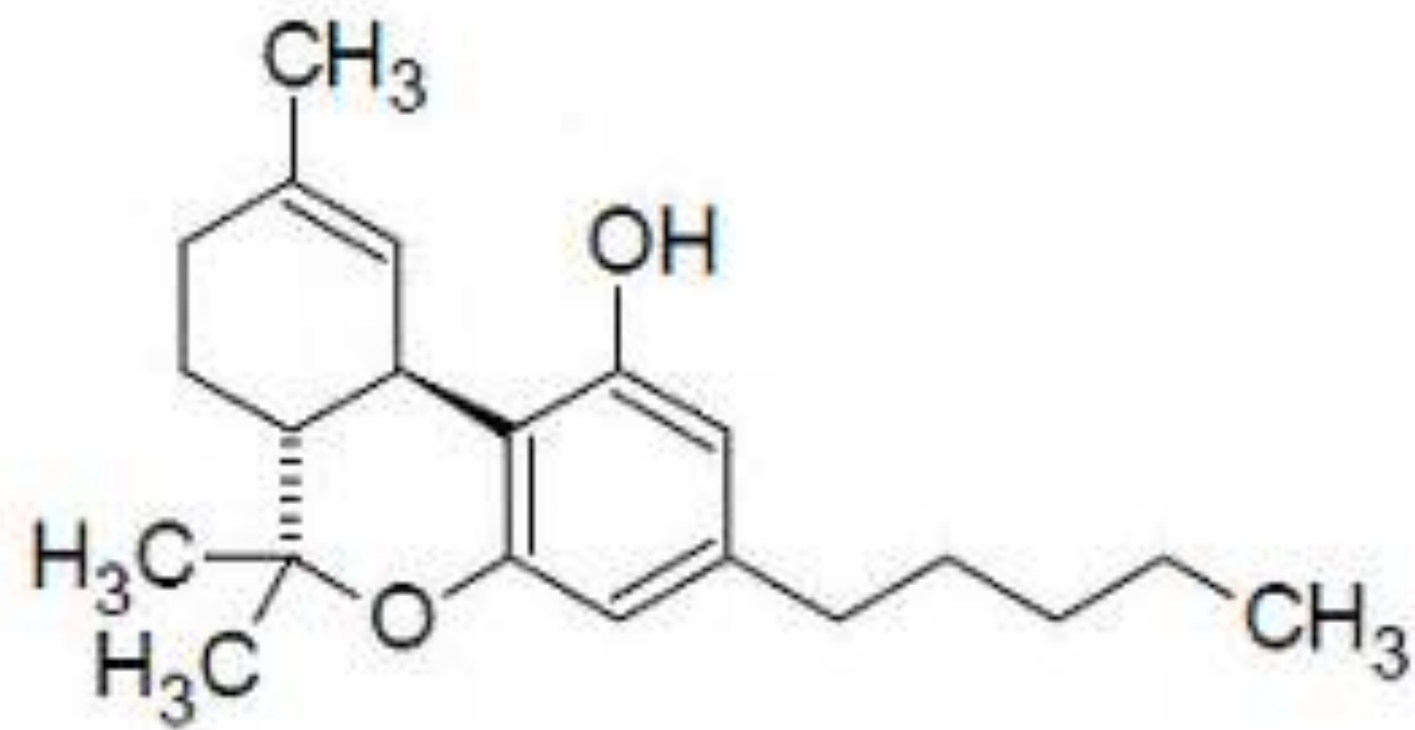
Disclosure

- Honoraria for speaking
- Royalties for Cannabis in Medicine: An Evidence-Based Approach





CBD



Dronabinol



THC



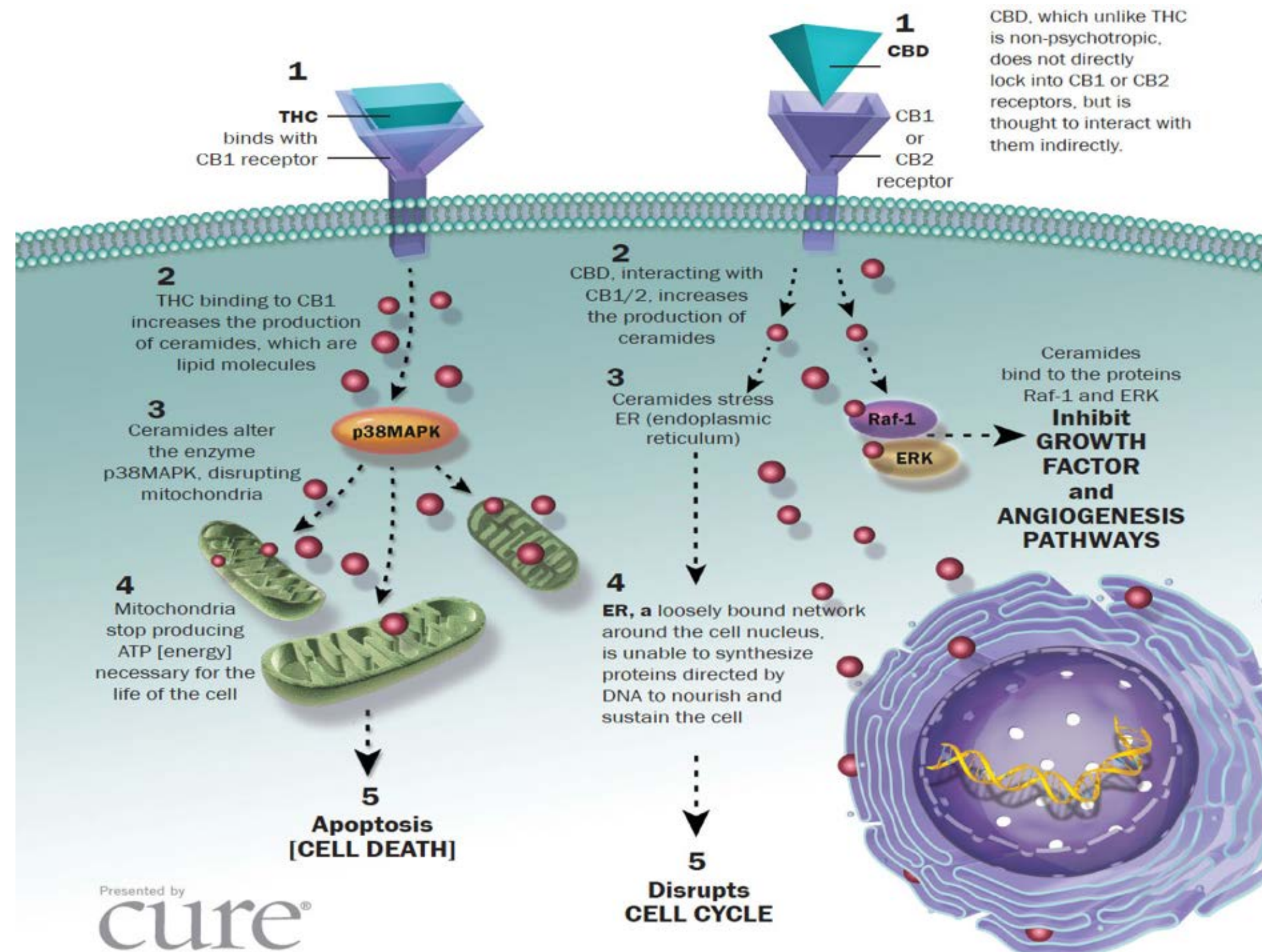
Terminology

- Cannabis-based medication
 - Registered medicinal cannabis extracts with defined and standardized THC and THC/CBD content should be classified as 'cannabis-derived' or 'cannabis-based' medicines.
 - Examples: Epidiolex®, Sativex ®(natural); dronabinol (semi-synthetic); nabilone (synthetic)
- Medical cannabis
 - Cannabis plants and plant material, for example flowers, marijuana, hashish, buds, leaves or full plant extracts used for medical reasons.
 - Poorly regulated and poorly tested for contaminants

National Ambulatory Care Survey, 2018

- National Survey
- Why people see their doctor
- **Knee pain** the only pain diagnosis in top 20 reasons
- Others **not** in top 20: Back pain, Shoulder pain, Neck pain, Neuropathy, Headache, Fibromyalgia, Cancer, Seizure, other
- https://www.cdc.gov/nchs/data/ahcd/namcs_summary/2018-namcs-web-tables-508.pdf

Cannabis and Opioid Relationship



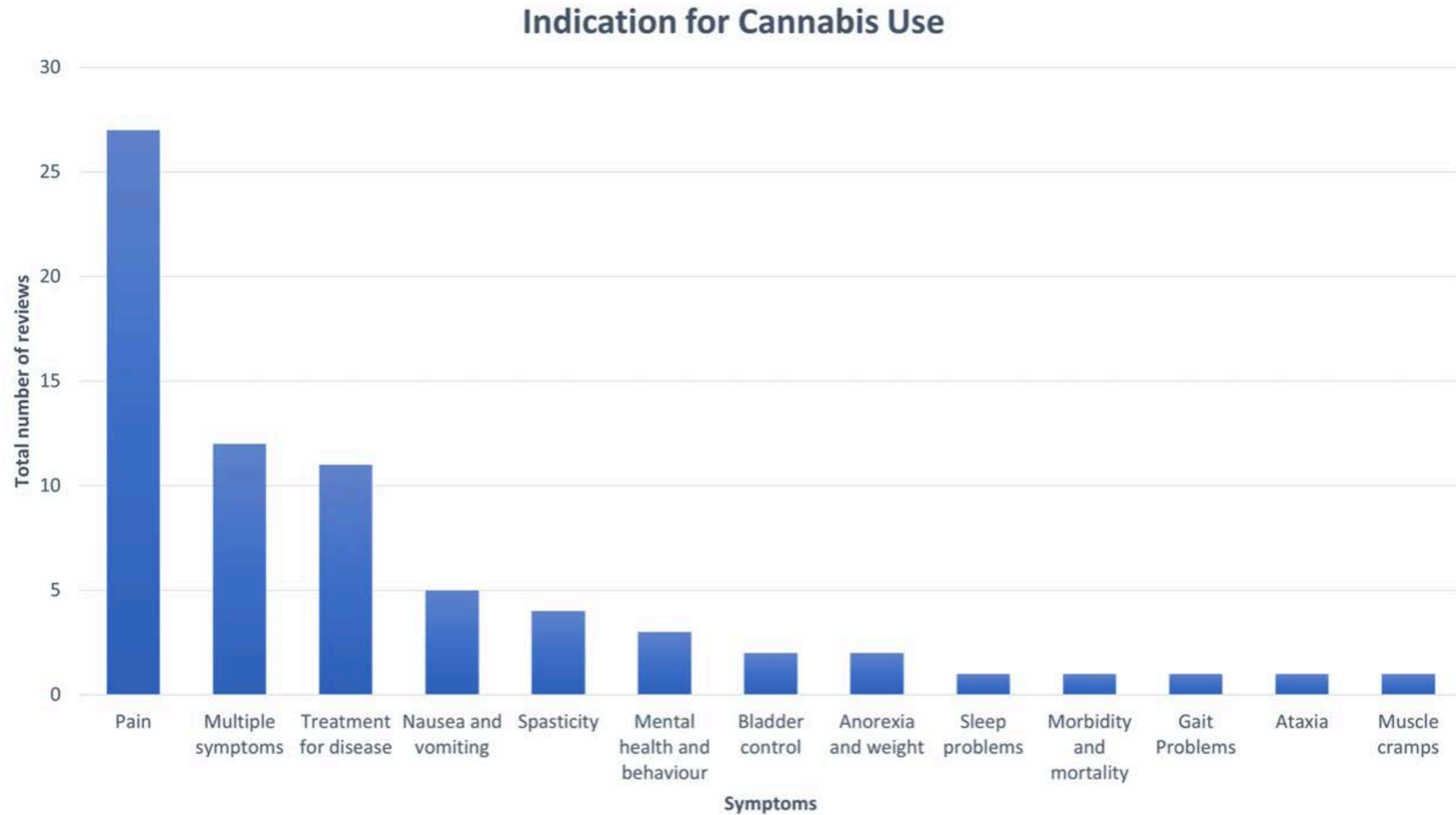
- Synergistic systems

- Both belong to the rhodopsin subfamily of G-protein coupled receptors

- Both, when activated, reduce cellular levels of cyclic adenosine monophosphate (cAMP) by inhibiting adenylyl cyclase

Cannabis and Opioid Relationship

- Both receptors found at presynaptic terminals
- Both receptors co-localize in GABA-ergic neurons
- Both systems share pharmacologic profiles
- Sedation, antinociception, hypotension, hypothermia, decreased intestinal motility, drug-reward reinforcement
- Naloxone may have effects on the cannabinoid system in several animal models



Indications for cannabis use across included reviews



OPIOID EPIDEMIC

Cannabis and Opioid Relationship

- There is **substantial** evidence that cannabis is an effective treatment for chronic pain in adults (National Academies of Science; 2017)
 - <https://www.nap.edu/catalog/24625/the-health-effects-of-cannabis-and-cannabinoids-the-current-state>
 - Nabiximols, synthetic cannabinoids
 - **NOT** dispensary cannabis/medical cannabis

Cannabis and Opioid Relationship

- Medical cannabis laws are associated with significantly **lower** state-level opioid overdose mortality rates (Bachhuber, JAMA, 2014)
 - <https://pubmed.ncbi.nlm.nih.gov/25154332/>
- Medical cannabis laws are associated with significant **reductions in opioid prescribing** in the Medicare Part D population (Bradford, JAMA, 2018)
 - <https://pubmed.ncbi.nlm.nih.gov/29610897/>

Cannabis and Opioid Relationship

- **No evidence** that cannabis use **reduced pain severity** or interference or exerted an **opioid-sparing effect** (Campbell, Lancet, 2018)
 - <https://pubmed.ncbi.nlm.nih.gov/29976328/>
- States passing a medical cannabis law experienced a **22.7% increase** in overdose deaths (Shover, Humphries; Stanford, 2019)
 - <https://www.pnas.org/content/116/26/12624>

Cannabis and Opioid Relationship

- **Data do not strongly support** the use of cannabinoids for **chronic pain** nor do prospective studies demonstrate significant cannabinoid-mediated **opioid-sparing effects** (Babalonis, 2019)
 - <https://www.sciencedirect.com/science/article/pii/S0924977X20300651?via%3Dihub>
- Medical marijuana law enactment was **not associated** with a **reduction** in individual-level non-medical **prescription opioid use**, contradicting the hypothesis that people would substitute marijuana for prescription opioids (Segura, JAMA, 2019)
 - https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2738028?utm_campaign=articlePDF&utm_medium=articlePDFlink&utm_source=articlePDF&utm_content=jamanetworkopen.2019.7216

Cannabis and Opioid Relationship

- **No overall protective relationship** between state MCLs and opioid overdose (Kim, January 2022)
- This is an additional source of information **countering** claims of a protective effect of MCLs on opioid overdoses
 - https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2738028?utm_campaign=articlePDF&utm_medium=articlePDFlink&utm_source=articlePDF&utm_content=jamanetworkopen.2019.7216

Cannabis and Opioid Relationship

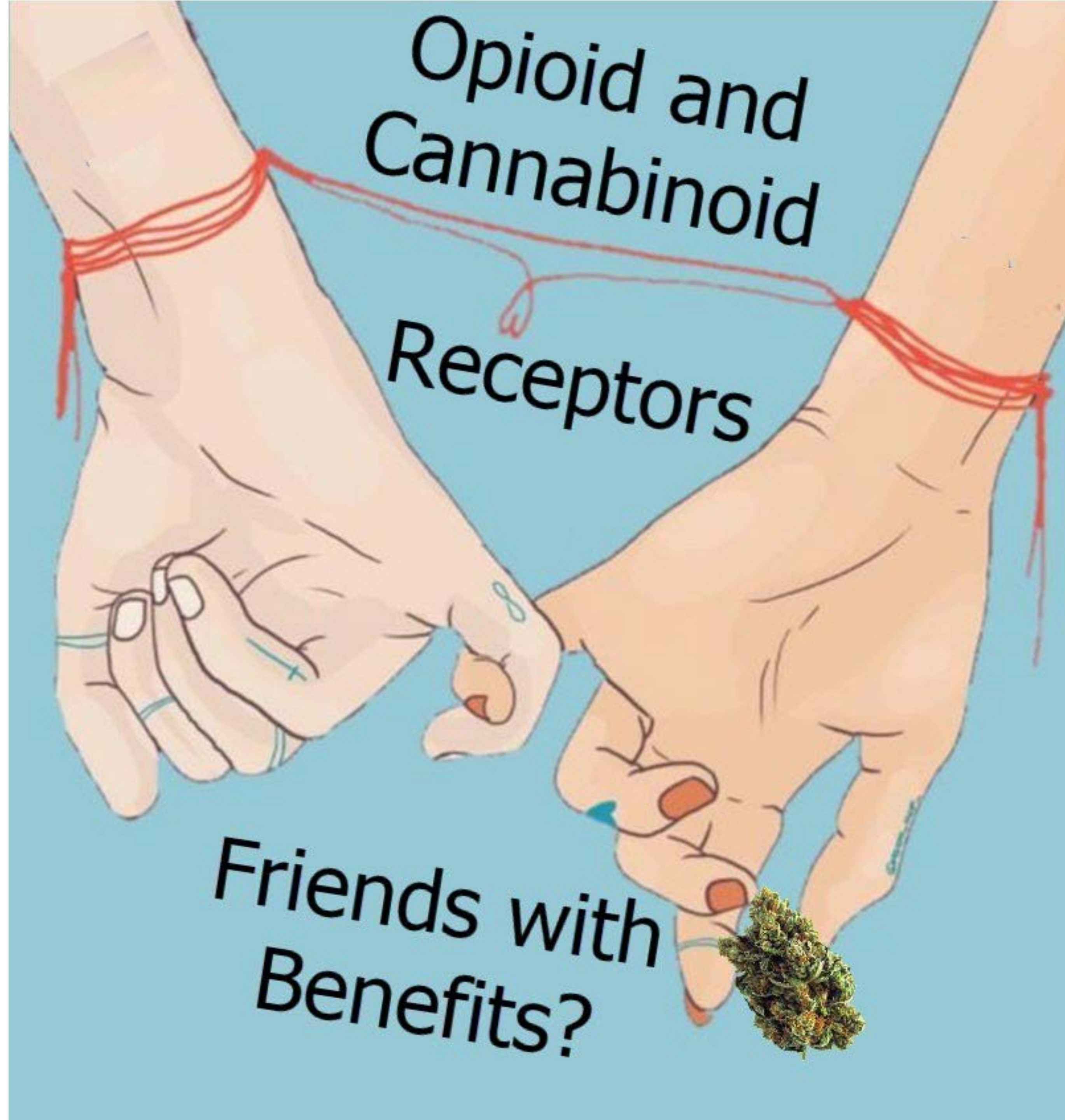
March 1, 2022

- Effect of Medical Marijuana Card Ownership on Pain
- Acquisition of a medical marijuana card led to a **higher incidence and severity of CUD**; resulted in **no significant improvement in pain**
 - <https://pubmed.ncbi.nlm.nih.gov/35302633/>

Opioid and
Cannabinoid

Receptors

Friends with
Benefits?



Cannabis and Opioid Relationship

- The **number one risk factor** for **adolescent** opioid misuse is having **EVER** use marijuana (lifetime use; YRBS, 2020)
 - https://www.cdc.gov/mmwr/volumes/69/su/su6901a5.htm?s_cid=su6901a5_w
- After 3 years of first trying marijuana vs. opioids, marijuana has a much higher percentage of addiction in **adolescents** (NIH; JAMA Pediatrics, 2020)
 - <https://www.nih.gov/news-events/news-releases/younger-age-first-cannabis-use-or-prescription-drug-misuse-associated-faster-development-substance-use-disorders>
- The **predominant predictor** of **adult** opioid misuse is having used marijuana before the age of 18 (Wadekar)
 - <https://www.sciencedirect.com/science/article/abs/pii/S0376871620300041>

Cannabis and Opioid Relationship

- Cannabis use **increases** the risk of developing opioid use disorder (Olfson)
 - <https://pubmed.ncbi.nlm.nih.gov/28946762/>
- Drivers testing positive for marijuana were **28% more likely** to test positive for prescription opioids (FARS, 2017)
- Drivers testing positive for marijuana were **twice as likely** to test positive for prescription opioids (NRS, 2017)
 - <https://pubmed.ncbi.nlm.nih.gov/32066484/>

Cannabis and Opioid Relationship

- 75,949 adults aged ≥ 50 who participated in the year 2002–2014 (NSDUH)
- Past-year marijuana use was significantly associated with an increase in odds of reporting opioid dependence, and past-year non-medical use opioids (Ramadan, 2020)
- <https://www.tandfonline.com/doi/full/10.1080/10550887.2020.1816117>

Cannabis and Opioid Relationship

- 2020, October, Turna; Comprehensive Psychiatry; Of all medical users, only **23.4%** reported authorization from a **health professional**
- Medical users modally reported **daily use**
- Compared to recreational users, medical users reported **more problematic cannabis use** in addition to greater psychiatric symptomatology (anxiety, depression and trauma)
- A large majority of **medical users also reported using recreationally (80.6%)**, while exclusive medical use was less common (19.3%)

Comprehensive Psychiatry 102 (2020)

<https://reader.elsevier.com/reader/sd/pii/S0010440X20300304?>

[token=ADD81539294C448801520F642E22CC784FE39F6711FABD64204D0616210D1F9C3AF71188EF533AAF47676F8EE3ACDC0D](https://reader.elsevier.com/reader/sd/pii/S0010440X20300304?token=ADD81539294C448801520F642E22CC784FE39F6711FABD64204D0616210D1F9C3AF71188EF533AAF47676F8EE3ACDC0D)

IASP/ANZCA

- 2021, International Association for the Study of Pain
- Due to the **lack of high-quality clinical evidence**, IASP does not currently endorse general use of cannabis and cannabinoids for pain relief.
- 2021, Australian and New Zealand College of Anaesthetists, Faculty of Pain Medicine
- The evidence available is either **unsupportive** of using cannabinoid products in chronic non-cancer pain (CNCP), or is of **such low quality** that no valid scientific conclusion can be drawn

https://journals.lww.com/pain/toc/2021/07001?mkt_tok=NjgxLUZIRS00MjkAAAF-

[ZOn80Q54bTKbENgZ3CikwcGIDuzvbXB0sth7I0yLASDAQkmUhNSUWJMXyEsUCpb72qELLRWvatQm0HzsEL00wg7Oibe363pyu8vEngW4QtH78YSqvg](https://www.choosingwisely.org.au/recommendations/fpm6)

<https://www.choosingwisely.org.au/recommendations/fpm6>

Australian Pain Society



- Relies heavily on the International Association for the Study of Pain as well as the Australian and New Zealand College of Anesthetists, Faculty of Pain Medicine

<https://www.apsoc.org.au/position-papers>

New Zealand Pain Society



- Relies heavily on the International Association for the Study of Pain as well as the Australian and New Zealand College of Anesthetists, Faculty of Pain Medicine

<https://www.apsoc.org.au/position-papers>

British Pain Society

2018

- Meta-analyses of clinical studies on cannabinoids for the management of pain conclude that there is **no positive evidence** to support routine use in pain management
- These include neuropathic pain, chronic non-malignant pain and cancer pain
- The quality of some studies is **not of a high standard** and supports the need of well-designed robust clinical trials
- More reliable evidence is warranted following robust clinical evaluation

European Pain Federation 2018

- Registered medicinal cannabis extracts with **defined and standardized** THC and THC/CBD content should be classified as ‘cannabis-derived’ or ‘cannabis-based’ medicines.
- There are **differences** in the approval and availability of medical cannabis and cannabis-based medicines
- There is **insufficient evidence** as to whether medical cannabis and cannabis-based medicines differ in their efficacy, tolerability and safety.
- **Do not prescribe** cannabis-based medicines to patients taking high doses of **opioids or benzodiazepines**.
- **Do not prescribe** cannabis flowers with a **high (>12.5%) THC content**

National Institute on Health Care and Excellence

United Kingdom, Nov 2019

- Do not offer the following to manage chronic pain in adults:
 - Nabilone
 - Dronabinol
 - THC (delta-9-tetrahydrocannabinol)
 - a combination of cannabidiol with THC
- Do not offer CBD to manage chronic pain in adults unless as part of a clinical trial.

Colorado Medical Society

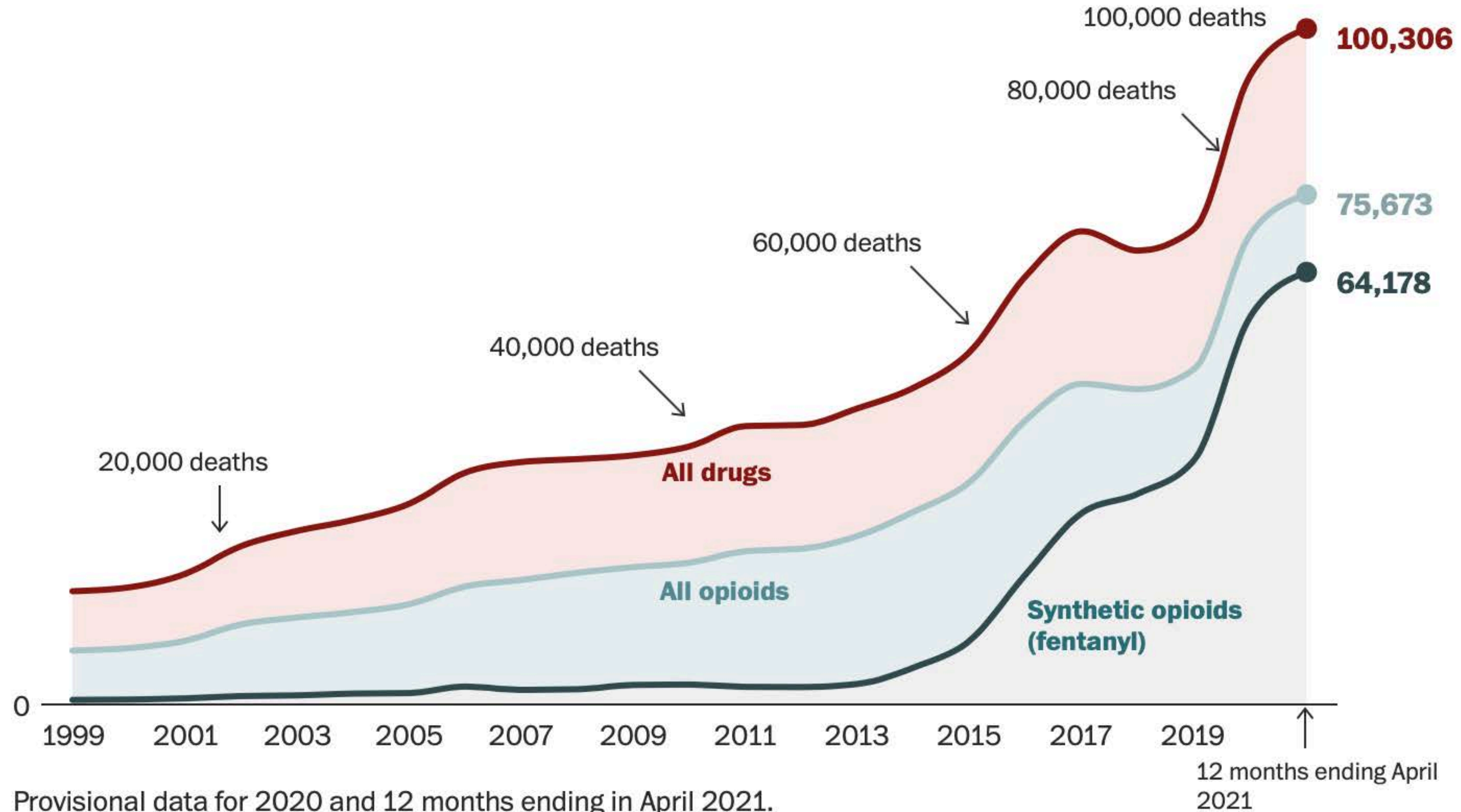
- Opposes inhalation of cannabinoids due to negative health effects
- Opposes self-diagnosing and treating medical conditions
- Recommends any consideration of use for “medical” purposes be under the supervision of providers practicing “within their scope of training”
- Recommends specific time frames of care
- Bonafide doctor-patient relationships and maintaining medical records
- Recommends 15% potency limit

<http://www.cms.org/about/policies/#145-drug-abuse>

Texas Medical Association

- Supports rescheduling from CI
- Supports additional research (already >30,000 studies)
- Allow recommendations for CBD
- “Do no harm”
- Follow science-based guidelines

U.S. drug overdose deaths per year



Source: [Centers for Disease Control and Prevention, National Center for Health Statistics](#)

DAN KEATING / THE WASHINGTON POST

<https://www.washingtonpost.com/health/2021/11/17/overdose-deaths-pandemic-fentanyl/>

Drug overdose deaths in the U.S.

Annual deaths ending in November of each year below

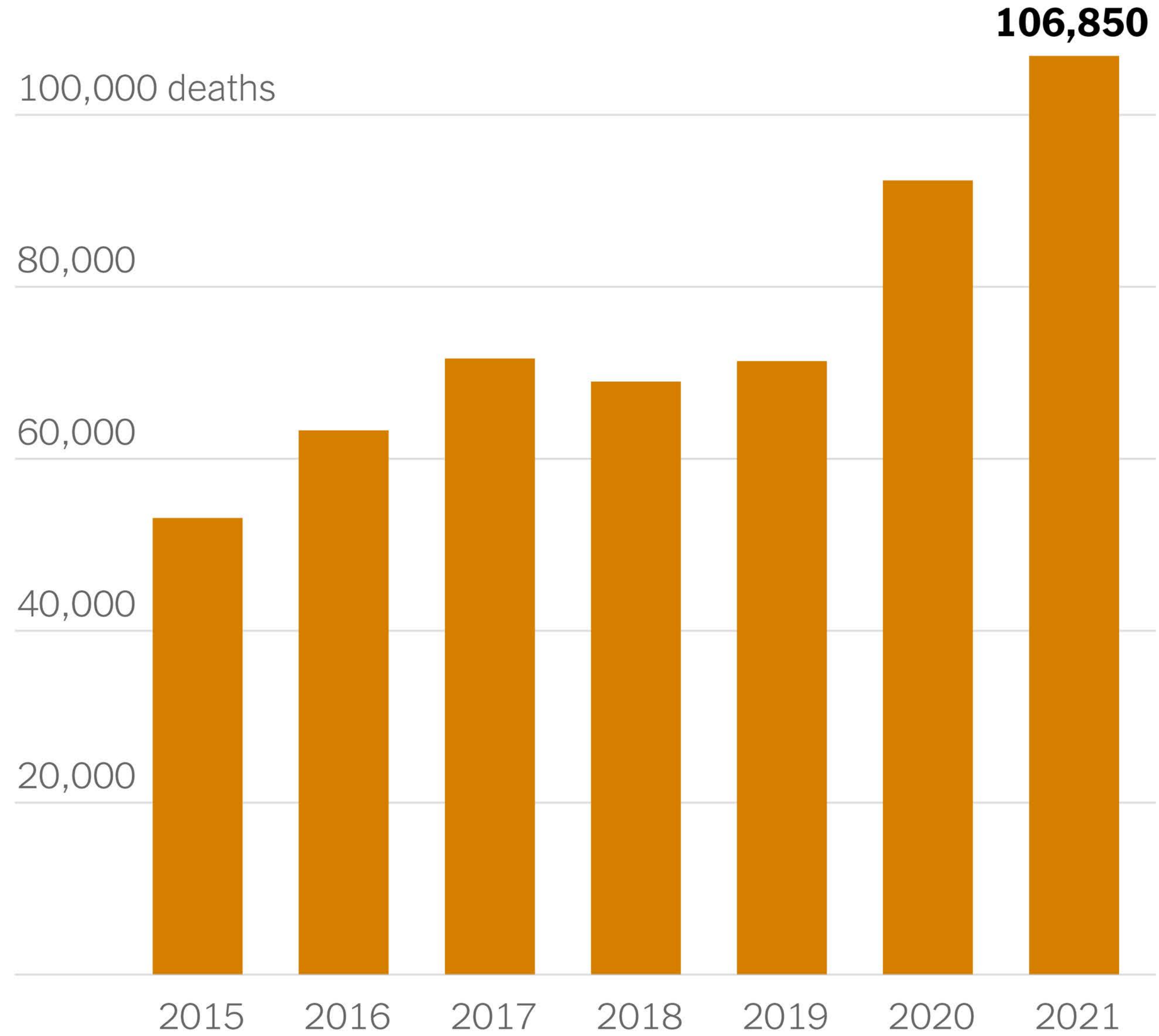
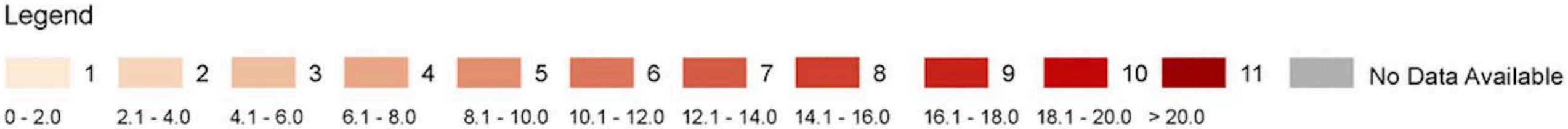
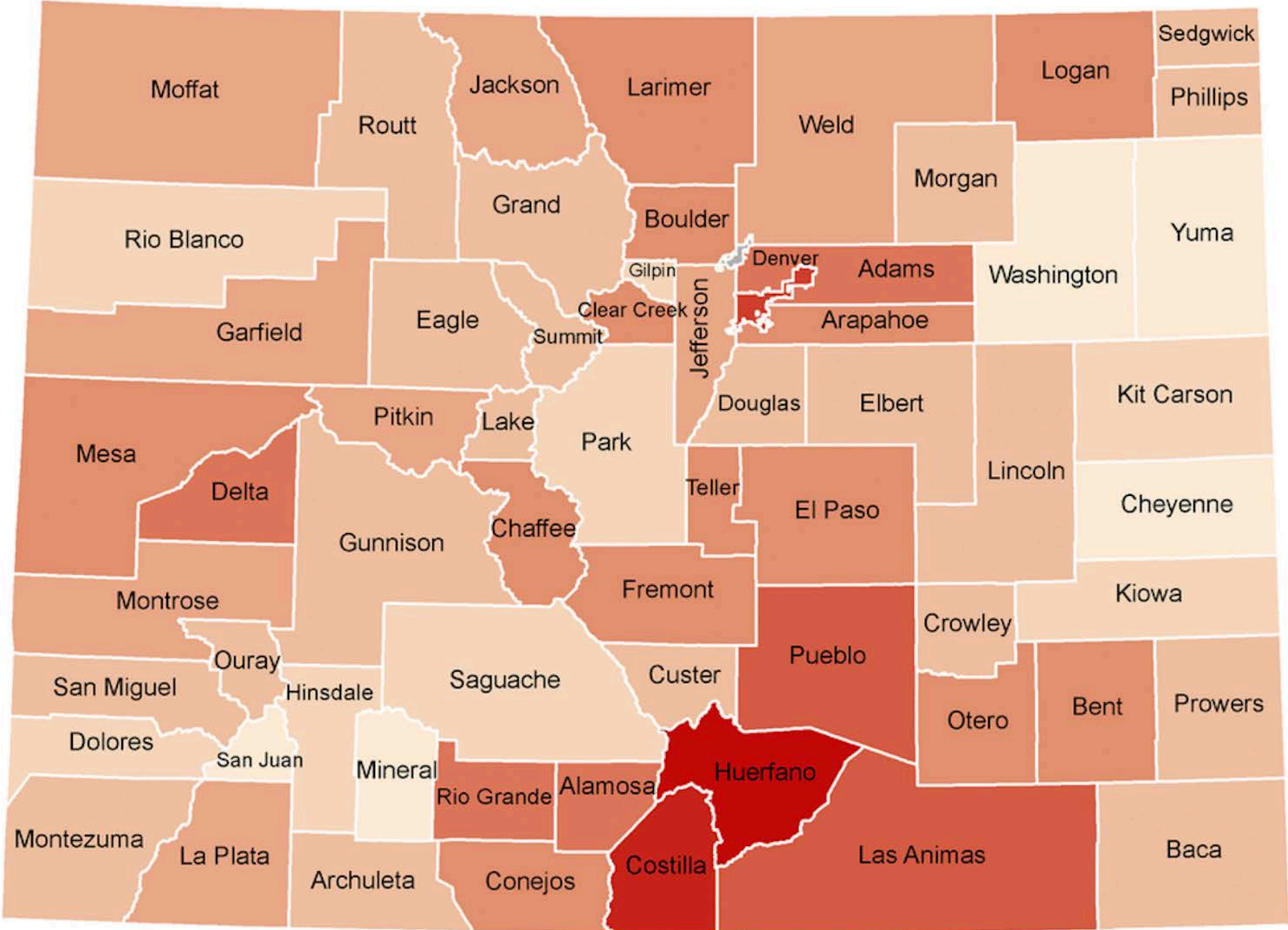


Chart shows provisional figures. | Source: Centers for Disease Control and Prevention

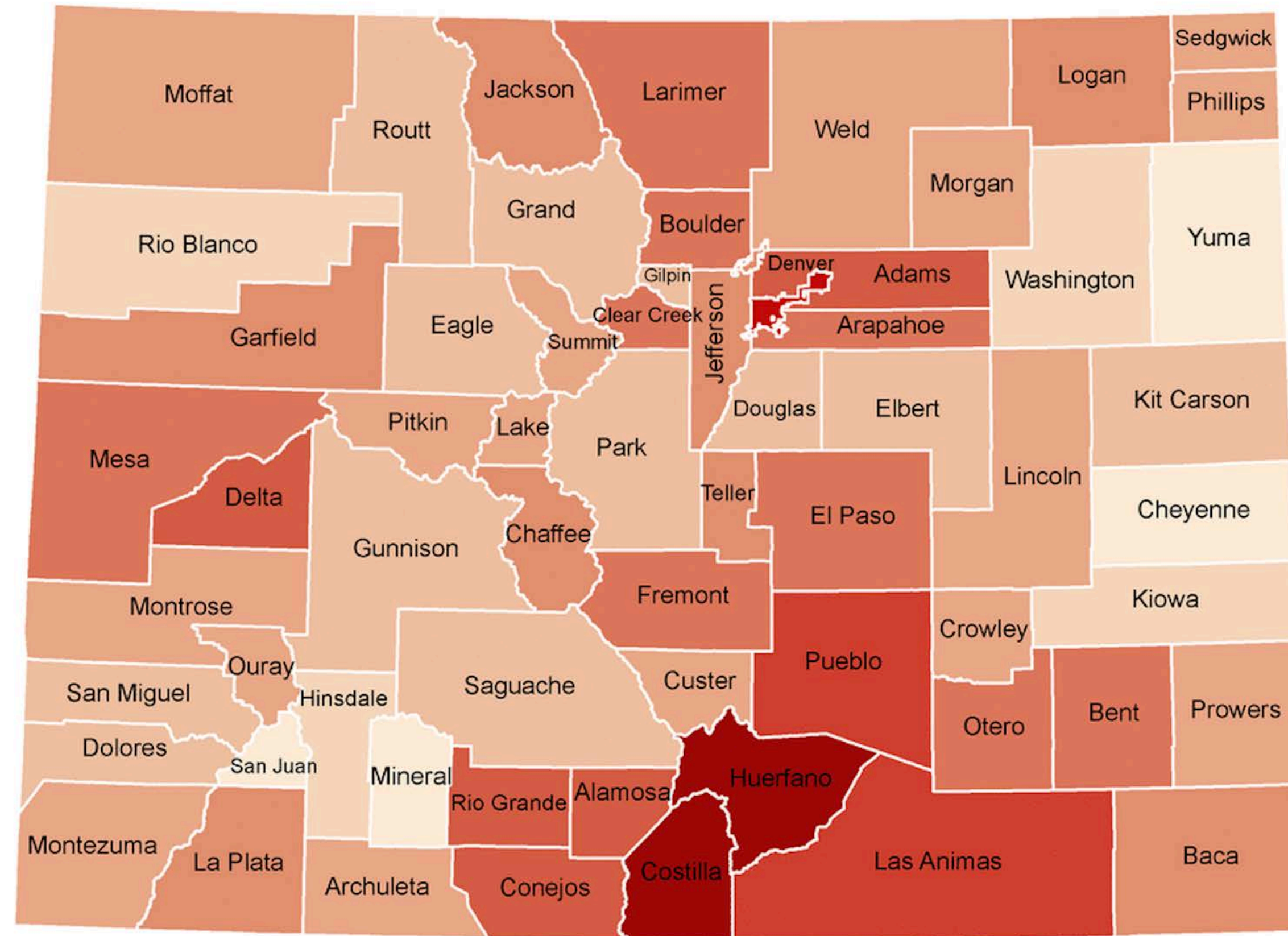
**Colorado Health Institute
Opioid Overdose Deaths
by County 2002-2014**

coloradohealthinstitute.org

Colorado Drug Overdose Death Rate, 2002



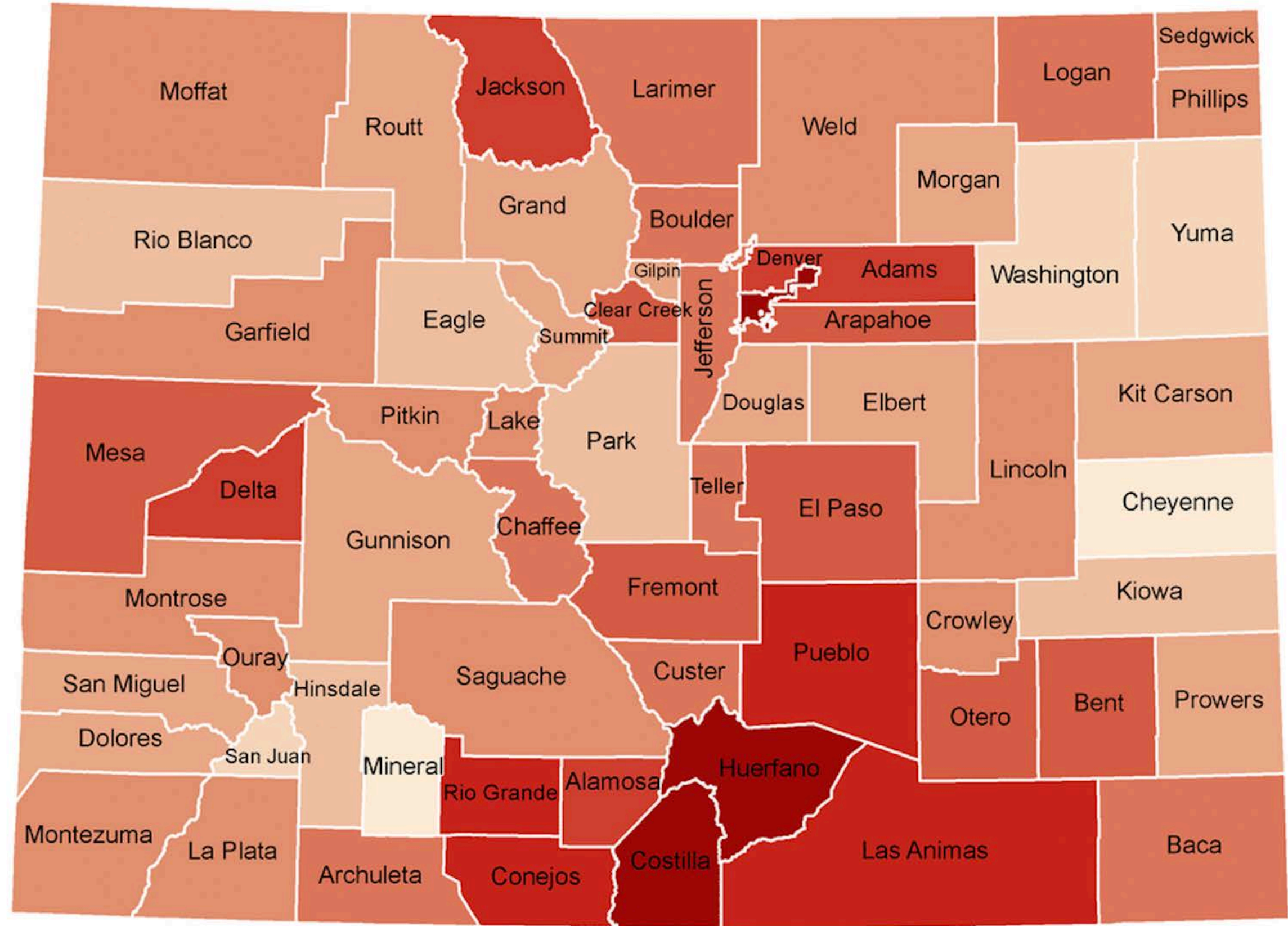
Colorado Drug Overdose Death Rate, 2005



Legend



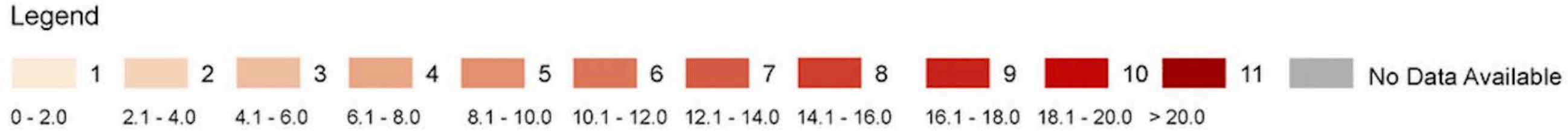
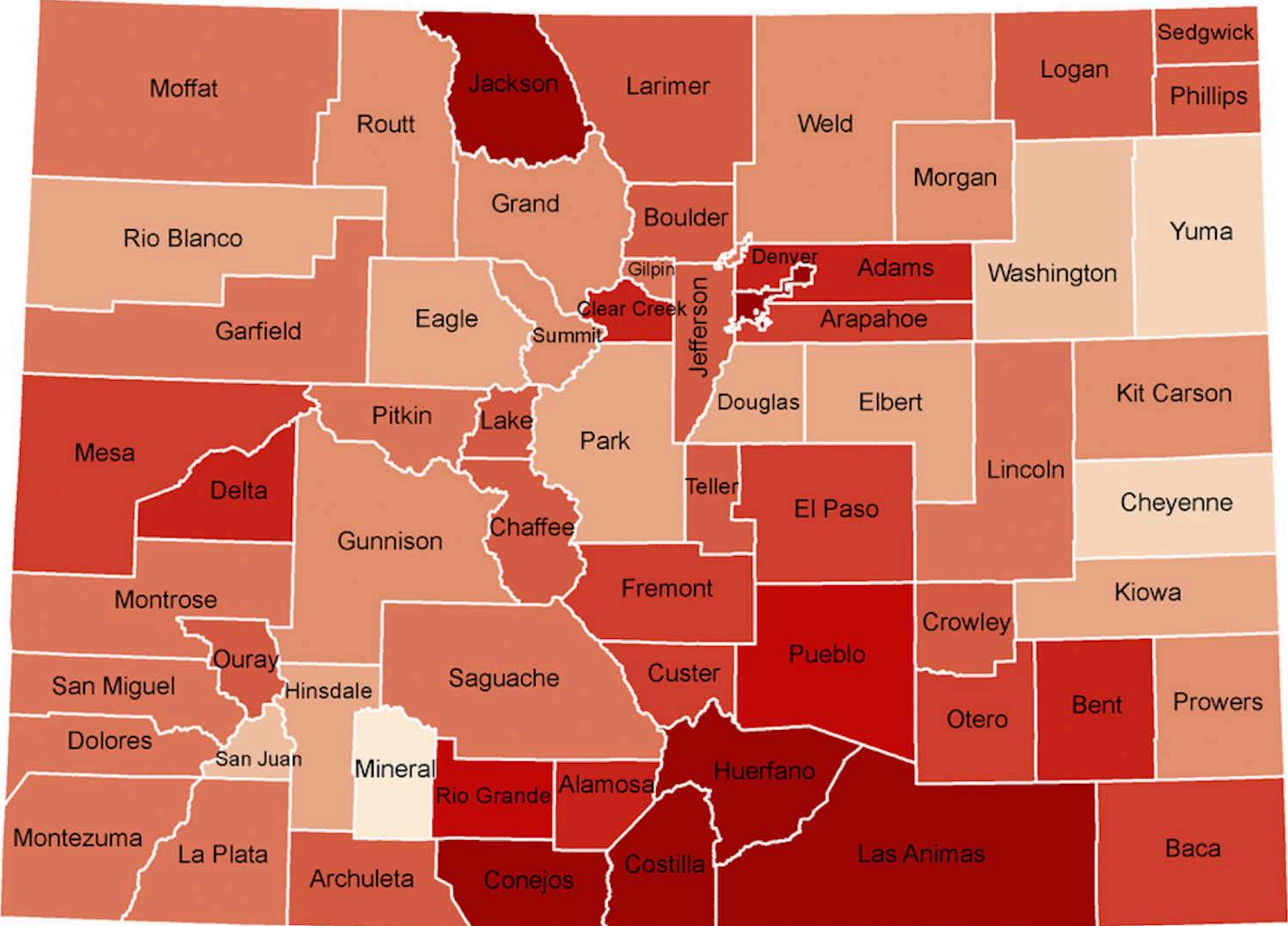
Colorado Drug Overdose Death Rate, 2008



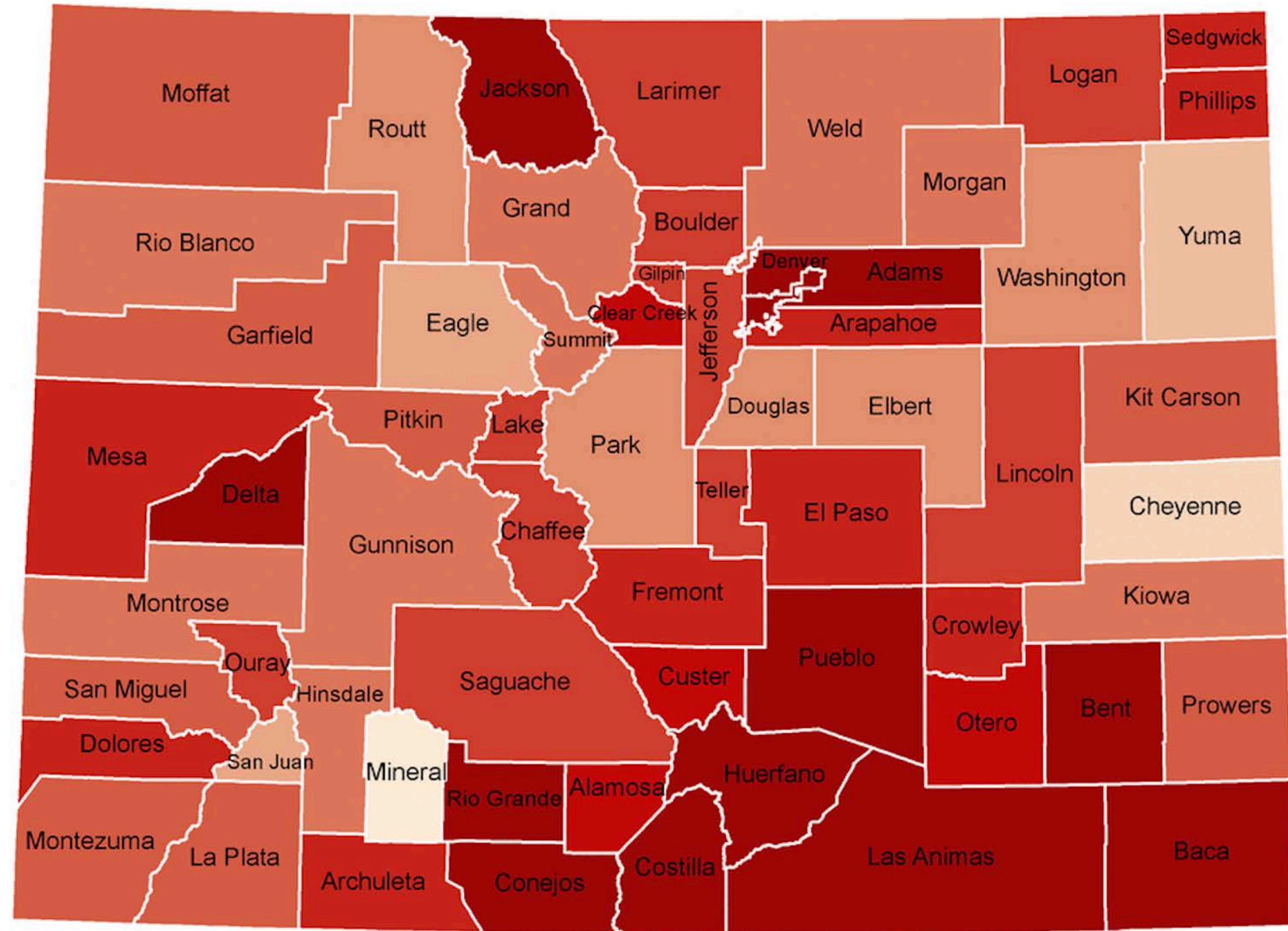
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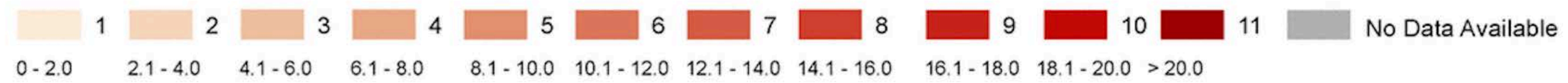
Colorado Drug Overdose Death Rate, 2011



Colorado Drug Overdose Death Rate, 2014



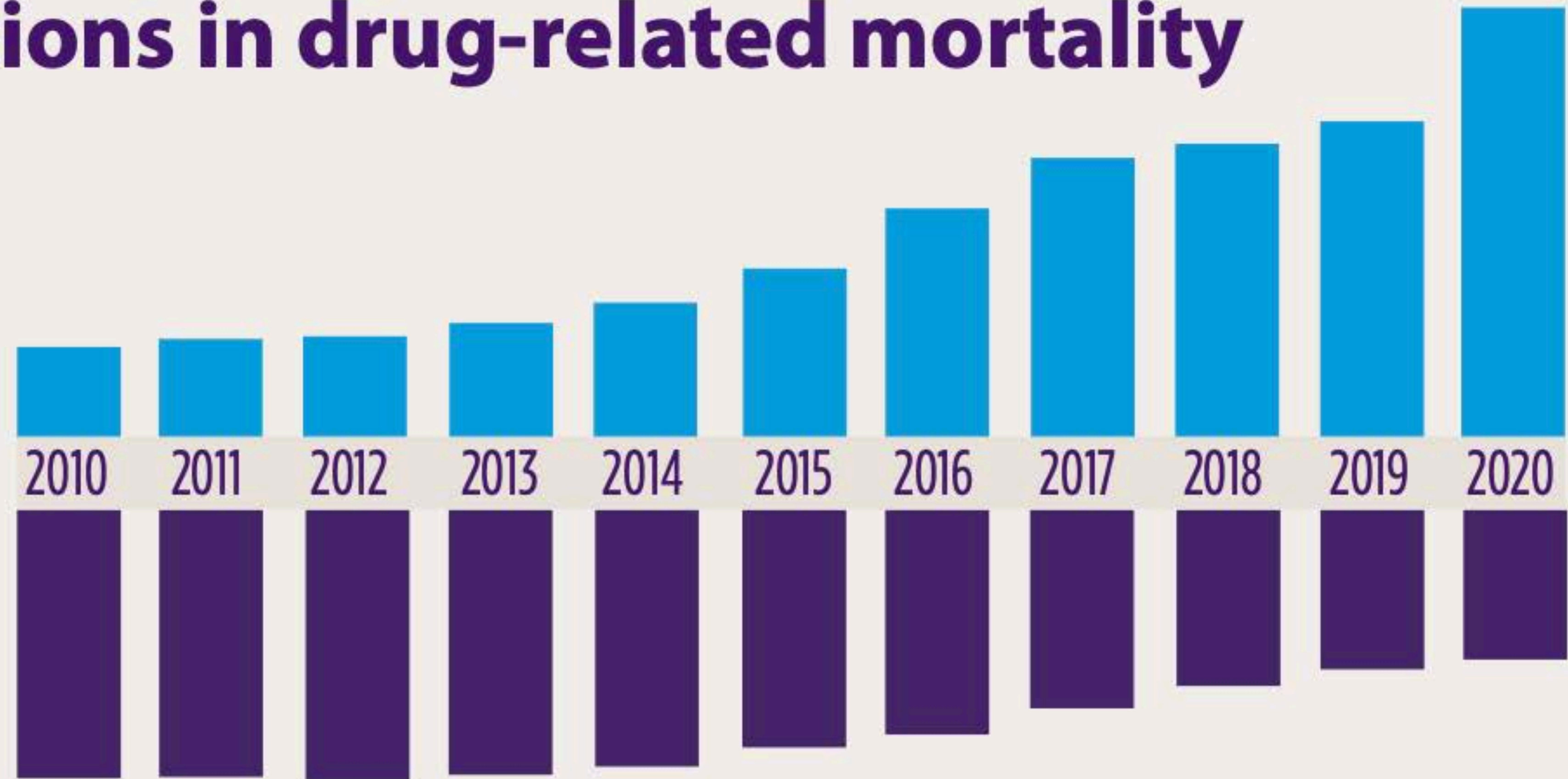
Legend



Reductions in opioid prescribing have not led to reductions in drug-related mortality

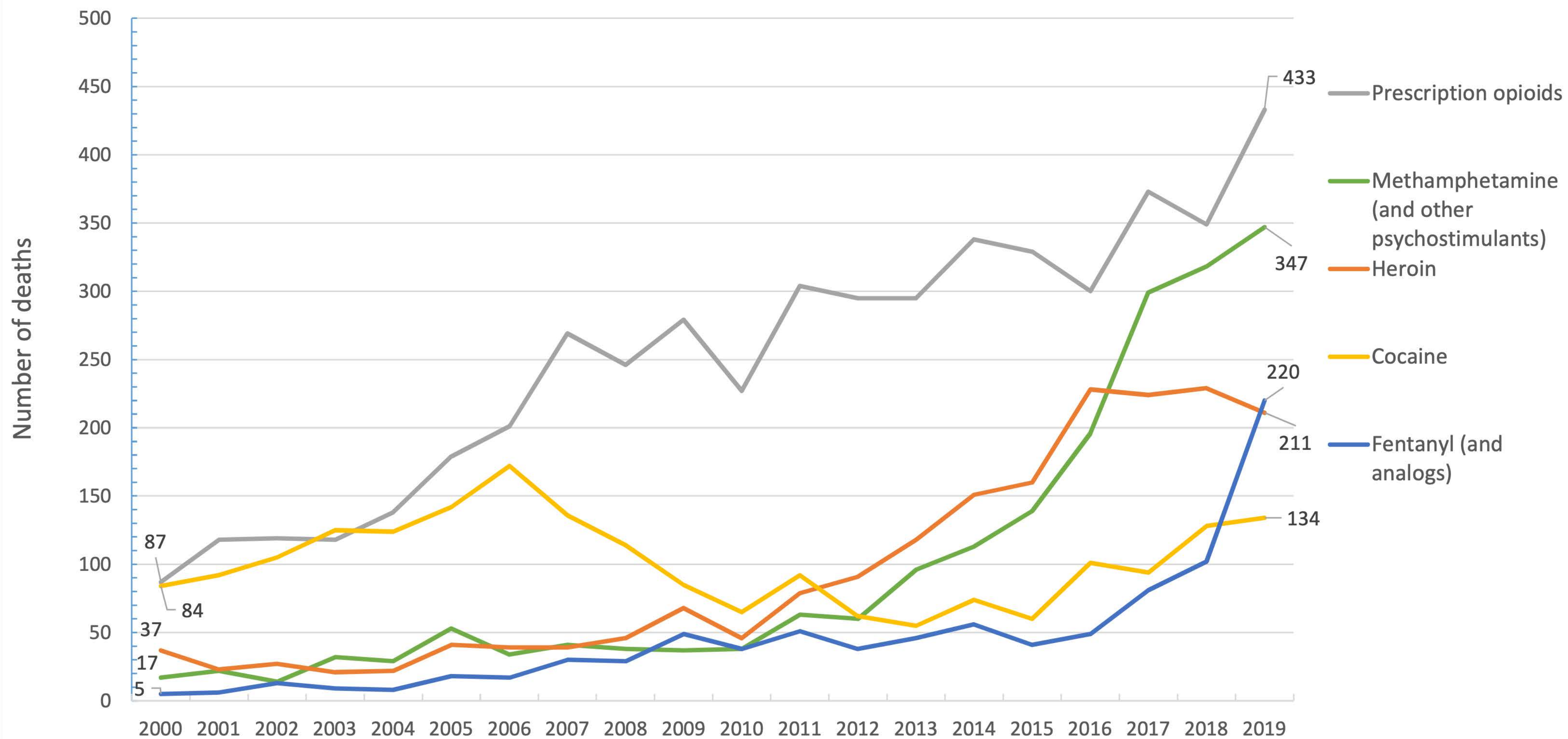
Overdose deaths:
94,134*

Opioid prescriptions:
143,390,951¹
(44.4% decrease since 2011)



*Provisional data for the 12-month period Jan. 2020–Jan. 2021
<https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>

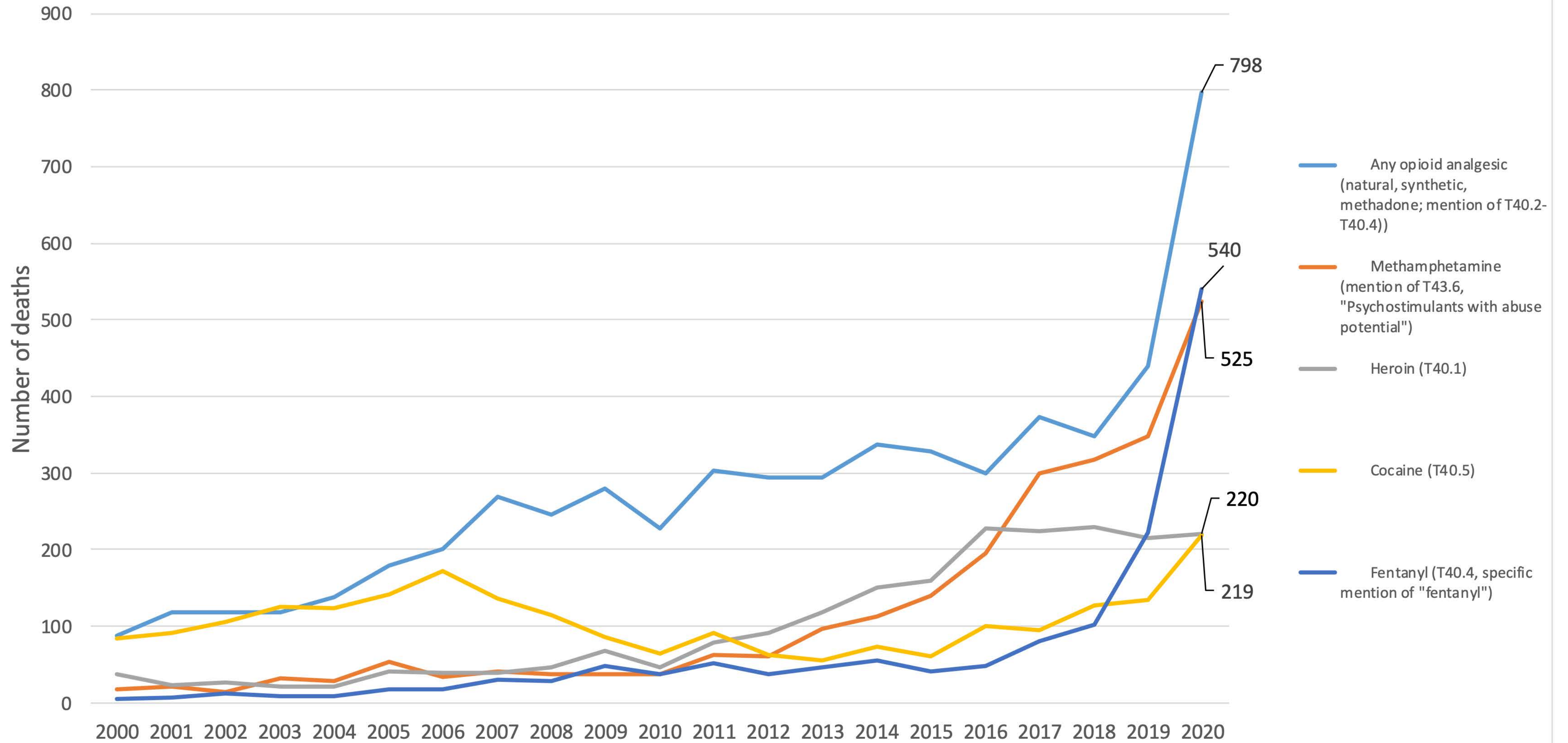
Number of drug overdose deaths by substances mentioned: Colorado residents, 2000-2019



Source: Vital Statistics Program, Colorado Department of Public Health and Environment

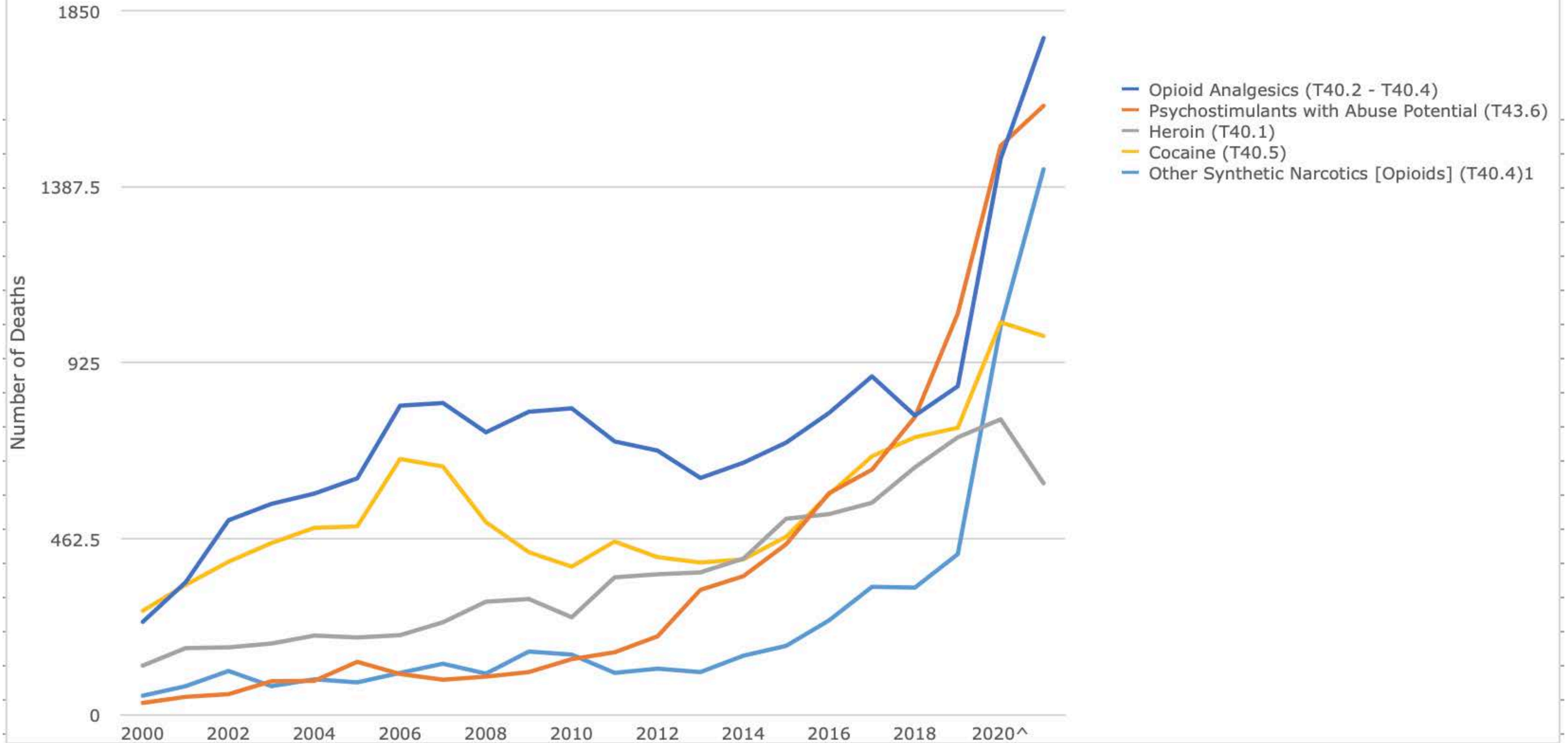
2019 data shows a **24% increase** (433 total) in prescription opioid overdose deaths and **115% increase** (220 total) in fentanyl deaths

Number of drug overdose deaths by substances mentioned: Colorado residents, 2000-2020



Source: Vital Statistics Program, Colorado Department of Public Health and Environment

Number of Drug Overdose Deaths by Substance, Texas Residents, 2000-2021[^]



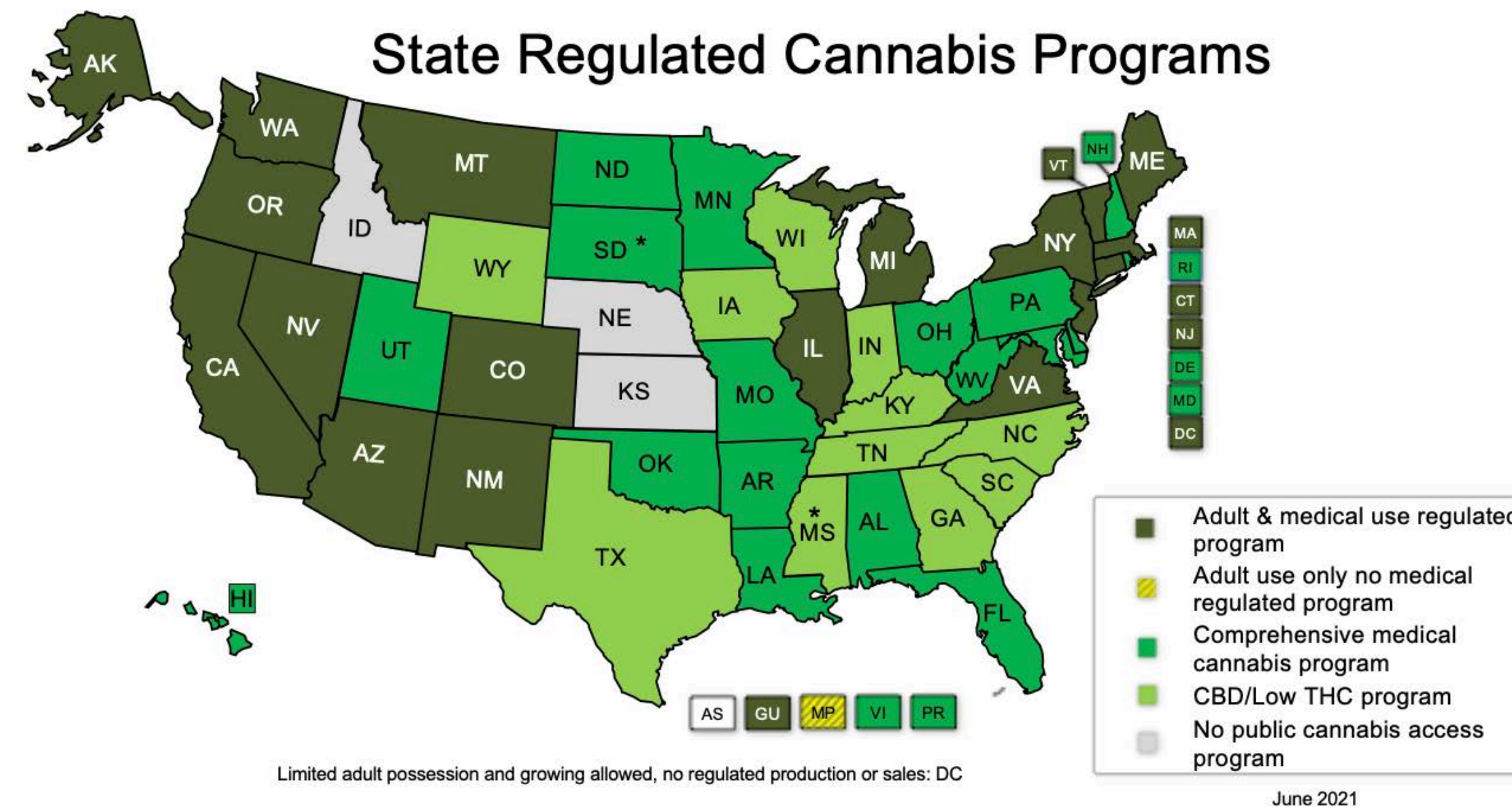
Source: Texas DSHS Center for Health Statistics Vital Events Data Management Team, April 2022

Cannabis and Opioid Relationship

- April 22, 2022, (Bleyer, Barnes, Finn)
- One reason is to expect marijuana to help reduce [opioid dependence](#) and mortality.
- Opioid **deaths have increased** more where marijuana was legalized
- This correlation is highly statistically significant for all opioids and [fentanyl](#) subgroups

More States Legalize Marijuana, 2021

- As of May 18, 2021, 36 states and four territories allow for the medical use of cannabis products.
- <https://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx#1>

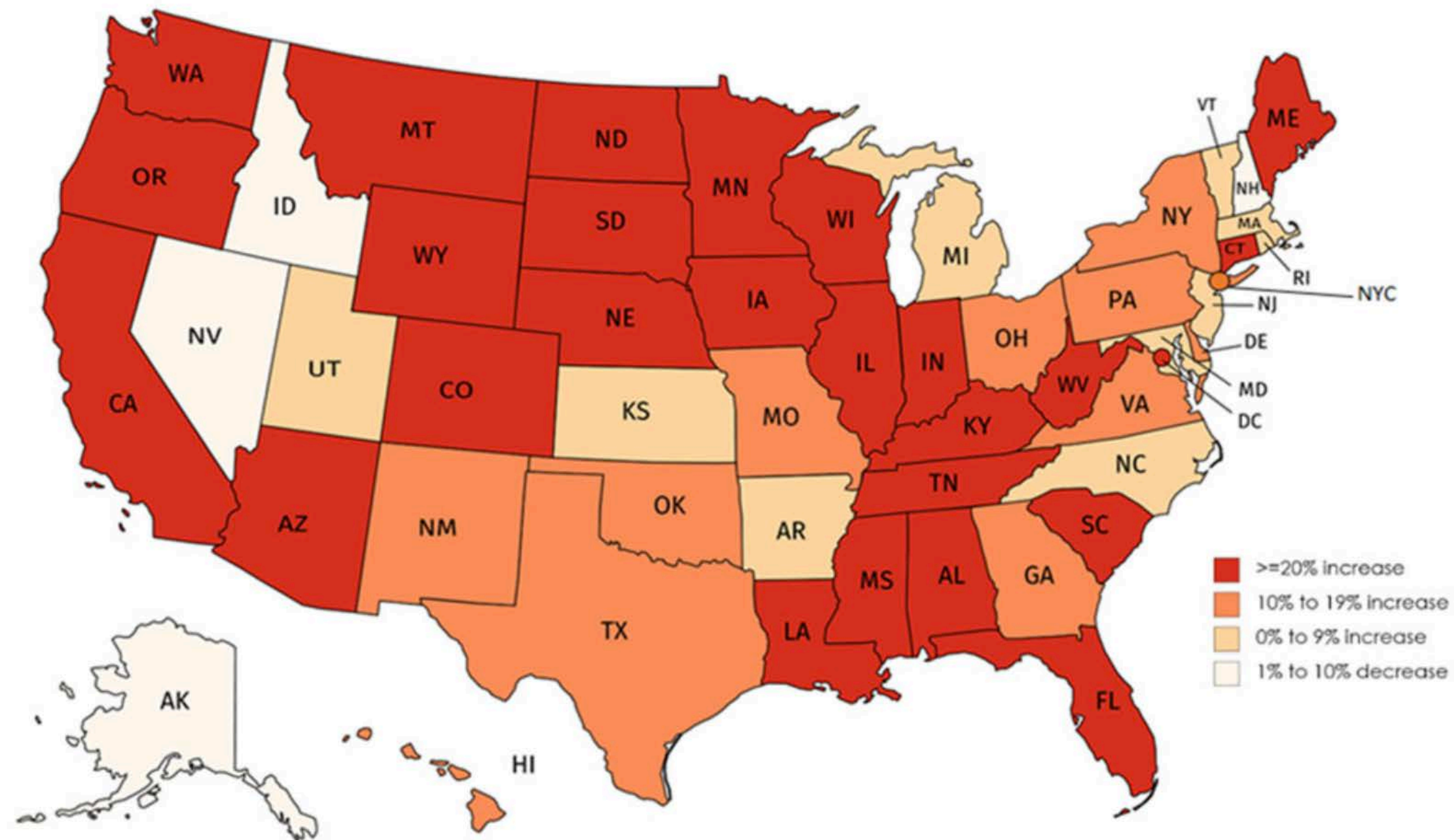


* = 2020 measures in Mississippi for medical use and South Dakota for nonmedical use were overturned in 2021.

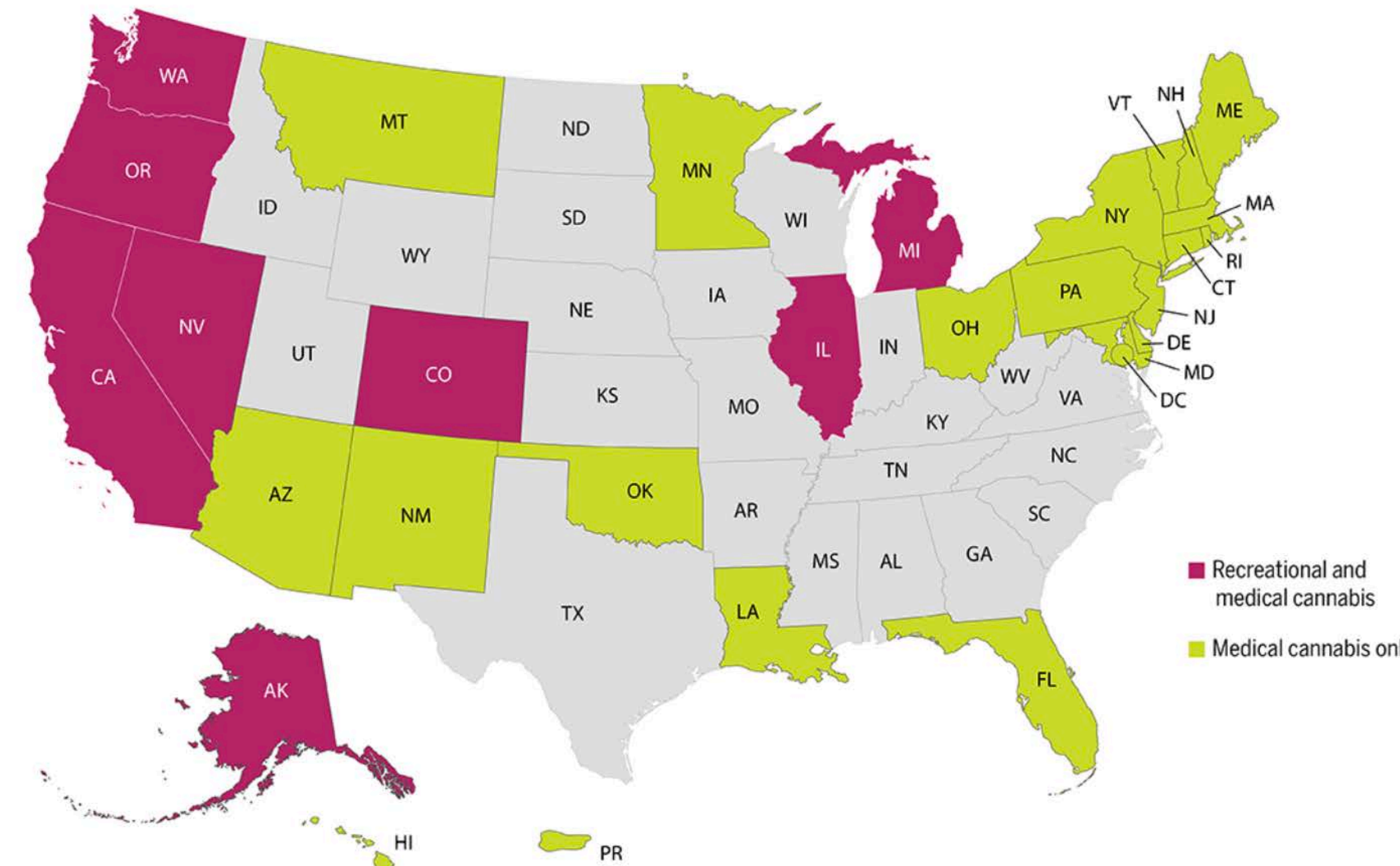


Drug Overdoses and Marijuana is “Essential”

Figure 2: Percentage change in 12-months ending provisional^a data on all fatal drug overdoses^b, 50 states, the District of Columbia, and New York City: Overdose deaths from 12-months ending in June 2019 to 12-months ending in May 2020^c



States allowing marijuana businesses to operate despite lockdown/stay-at-home orders*



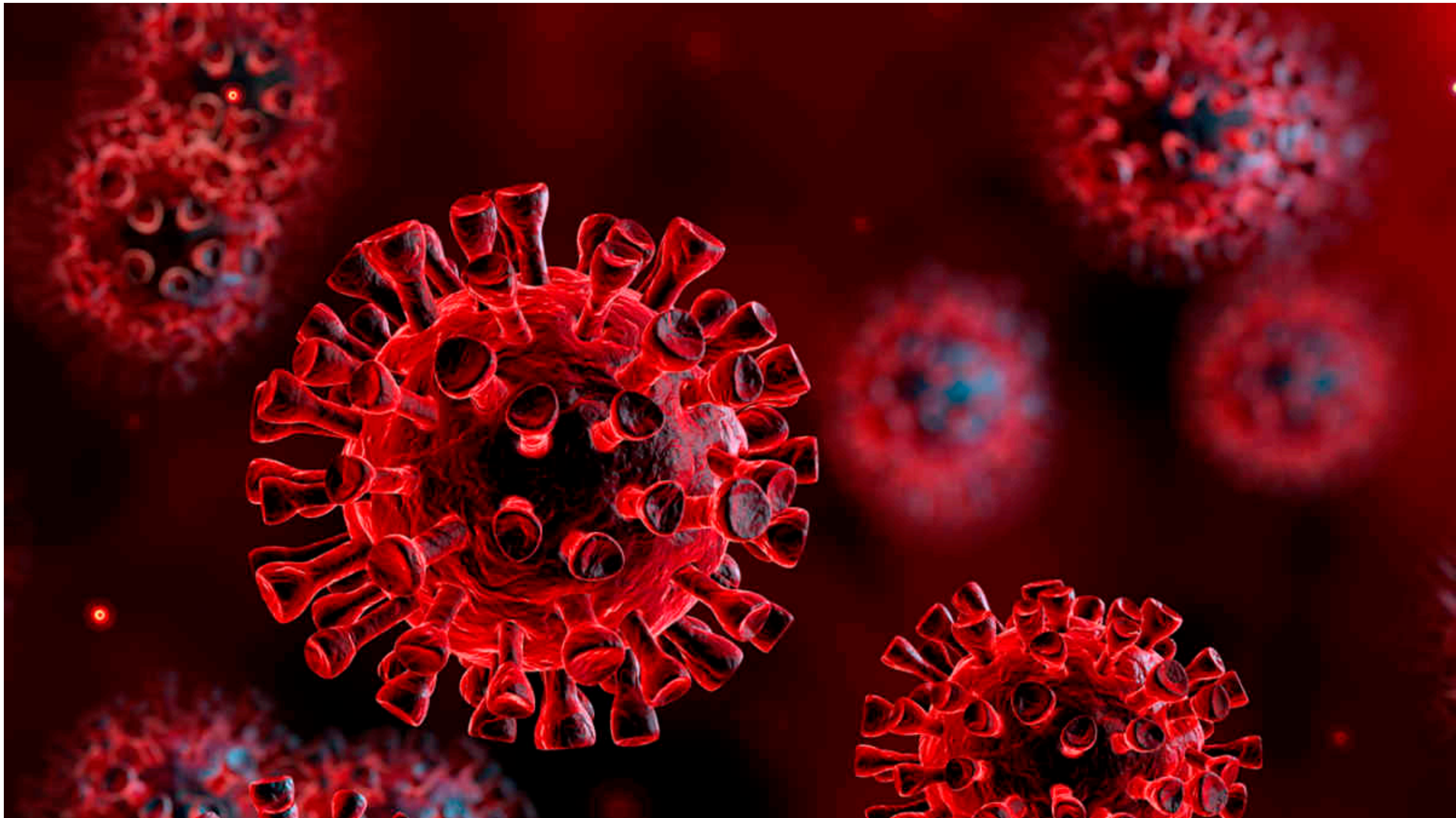
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*As of 10 a.m. MT April 2

Distributed via the CDC Health Alert Network
December 17, 2020, 8:00 AM ET

Cannabis and Opioids

- There is **no evidence** supporting the use of **dispensary** cannabis for chronic non-cancer pain
- There is **no evidence** for substituting opioids with **dispensary** cannabis
- Cannabis users are **more likely** to develop opioid use disorder or misuse their opioids and have higher depression and anxiety scores, and other negative psychiatric effects
- States with medical marijuana programs typically have **higher opioid overdose deaths** than non-medical marijuana states
- Any real or perceived benefit **outweighed** by current evidence



Global Drug Survey Results During Pandemic

September 11, 2020

- N=55,000
- A considerable proportion of respondents **increased their use of cannabis** (44%), prescription benzodiazepines (34%) and prescription opioids (28%).
- Almost half (48%) survey respondents said they had increased the amount of **alcohol** they drank during the pandemic

Cannabis and COVID

- December, 2021; Sentinel Surveillance of Substance-Related Poisonings in **Canada**: Spotlight on Cannabis
- 43% reported **increasing** their cannabis consumption during the pandemic
- The prevalence of past-three-month cannabis use **significantly increased** from 14% in 2018, to 20% in 2020 (respondents aged 15 to 29 years)

[https://health-infobase.canada.ca/datalab/poisonings-surveillance/cannabis.html?](https://health-infobase.canada.ca/datalab/poisonings-surveillance/cannabis.html?utm_source=CSIMS&utm_medium=Email&utm_campaign=launch_substance_poisonings_spotlight_on_cannabis_January_2022_ENG)

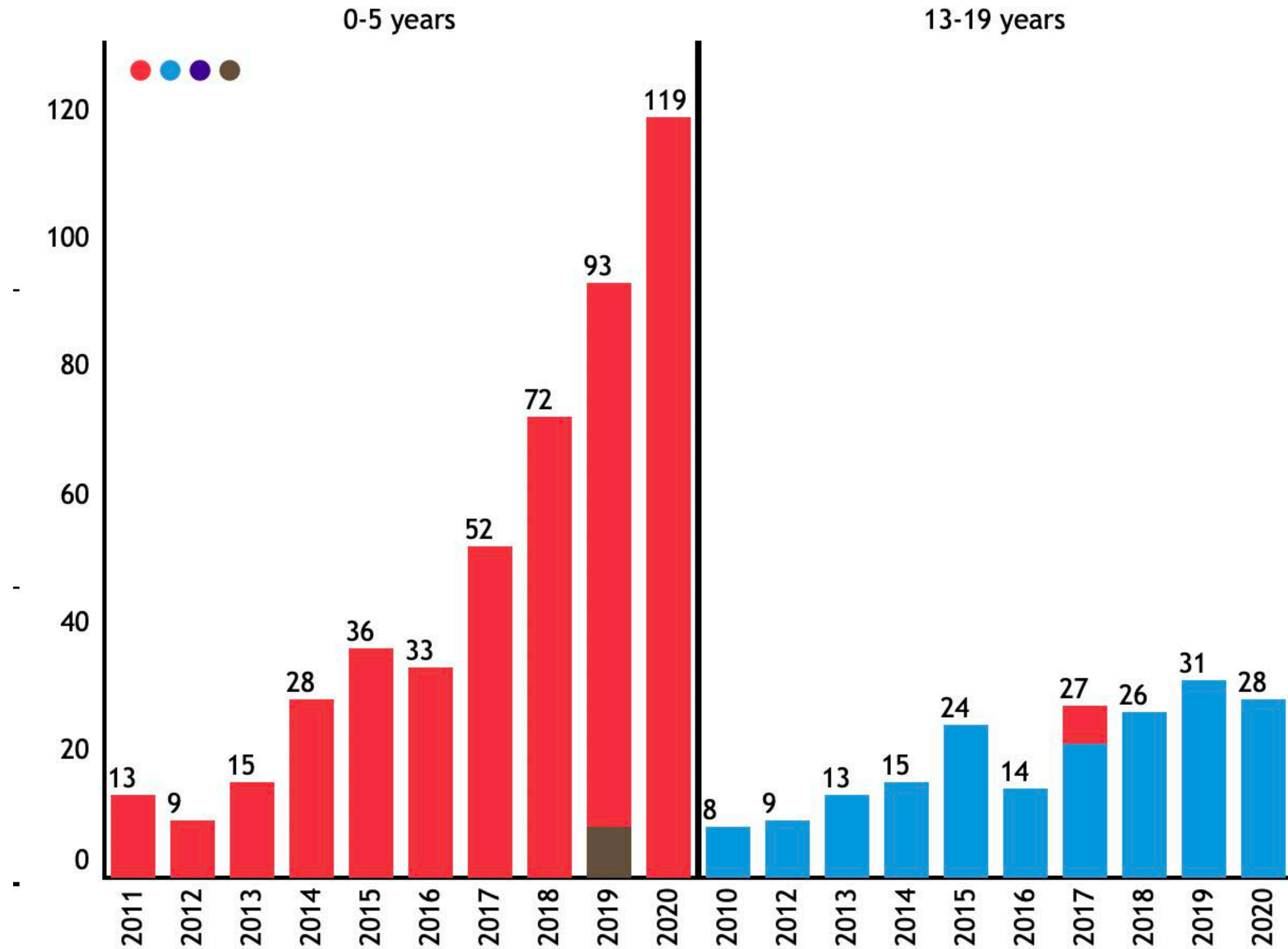
[utm_source=CSIMS&utm_medium=Email&utm_campaign=launch_substance_poisonings_spotlight_on_cannabis_January_2022_ENG](https://health-infobase.canada.ca/datalab/poisonings-surveillance/cannabis.html?utm_source=CSIMS&utm_medium=Email&utm_campaign=launch_substance_poisonings_spotlight_on_cannabis_January_2022_ENG)

Cannabis and COVID

- Risk of breakthrough COVID infections and Substance Use Disorder (SUD)
- 2021, N = 579,372
- The risk for breakthrough infection ranged from 6.8% for tobacco use disorder to **7.8% for cannabis use disorder**, all significantly higher than the 3.6% in non-SUD population ($p < 0.001$)
- Breakthrough infection risk remained significantly higher after controlling for demographics (age, gender, ethnicity) and vaccine types for all SUD subtypes, and was **highest for cocaine and cannabis use disorders**



Figure 3: Annual Marijuana Only Cases by Exposure Reason and Ages 0-5 years & 13-19 years (Including All Sexes), Colorado 2010 to 2020



Filter Figure 3

Age:

(Multiple values) ▼

Sex:

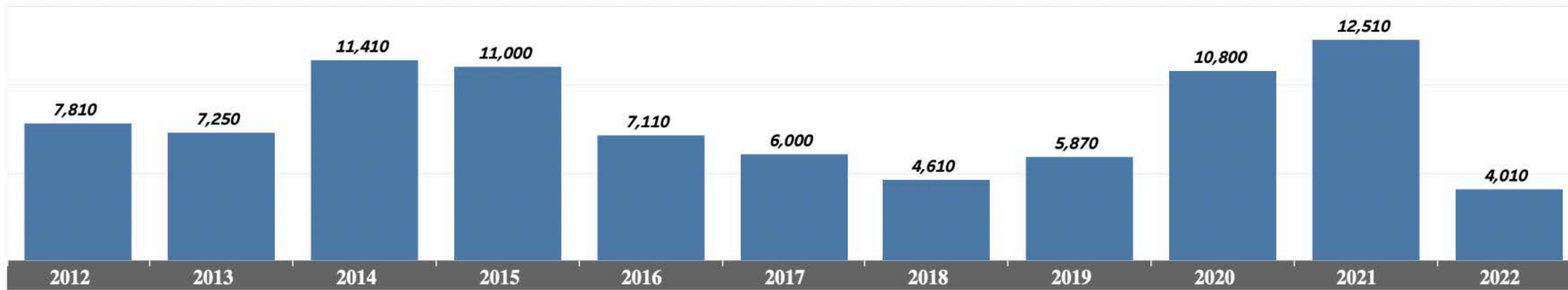
(All) ▼

Type of Marijuana Case:

Marijuana Only ▼

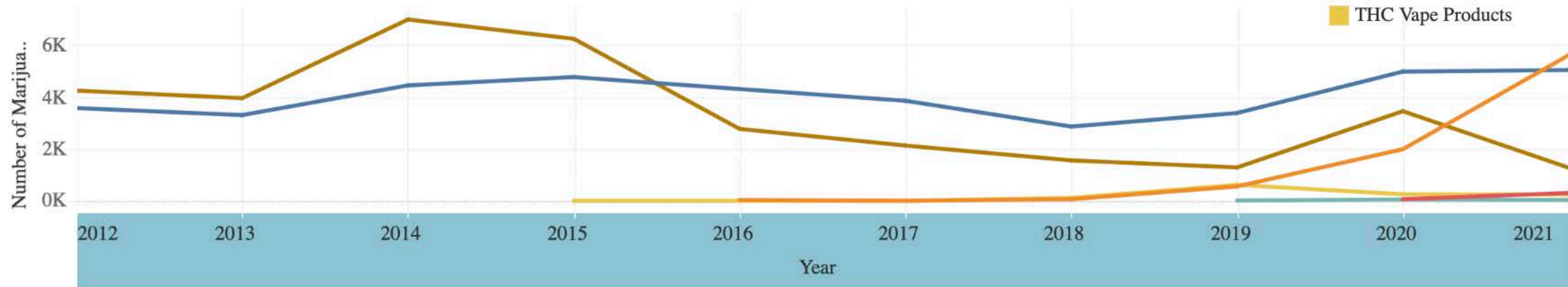
<https://marijuanahealthinfo.colorado.gov/health-data/poison-center-data>

MARIJUANA EXPOSURE CALLS TO POISON CENTERS BY YEAR



TYPE OF CALLS BY YEAR

Each line refers to specific type of marijuana-exposure related exposure calls to the poison center by year. Marijuana includes the subcategories: edible marijuana, medical marijuana, and smokeable marijuana. Also includes vape products such as e-cigarettes, vape pens, vaporizers that had marijuana or THC in them. These also include vape liquids, or e-juice that had THC.



Increased Adolescent Cannabis Use During Pandemic

- September 2020; N=1,054
- Since COVID-19-related social distancing began, the **frequency** of adolescent **alcohol and cannabis** use has **increased**.
- The frequency of **cannabis** use (average number of cannabis using days) **increased significantly** from pre-COVID to post-COVID
- The greatest percentage of adolescents was engaging in **solitary substance use** (49.3%), many were still using substances with peers via technology (31.6%) and, even face to face (23.6%)

Adolescent Cannabis Use and Source

April 1, 2022

- Most youth (72.1%) received cannabis for free
- 50.9% bought cannabis from someone
- 15.9% used a valid medical card at a brick-and-mortar dispensary
- 3.9% grew cannabis
- Those who purchase cannabis illicitly from someone or from a brick-and-mortar dispensary using a valid medical card may be at increased risk for more persistent and frequent patterns of non-medical cannabis use.

- Teen visits to Emergency Departments **increase** post legalization **with 71%** for psychiatric events (Colorado, Wang, 2018)

G.S. Wang et al. / Journal of Adolescent Health 63 (2018) 239–241

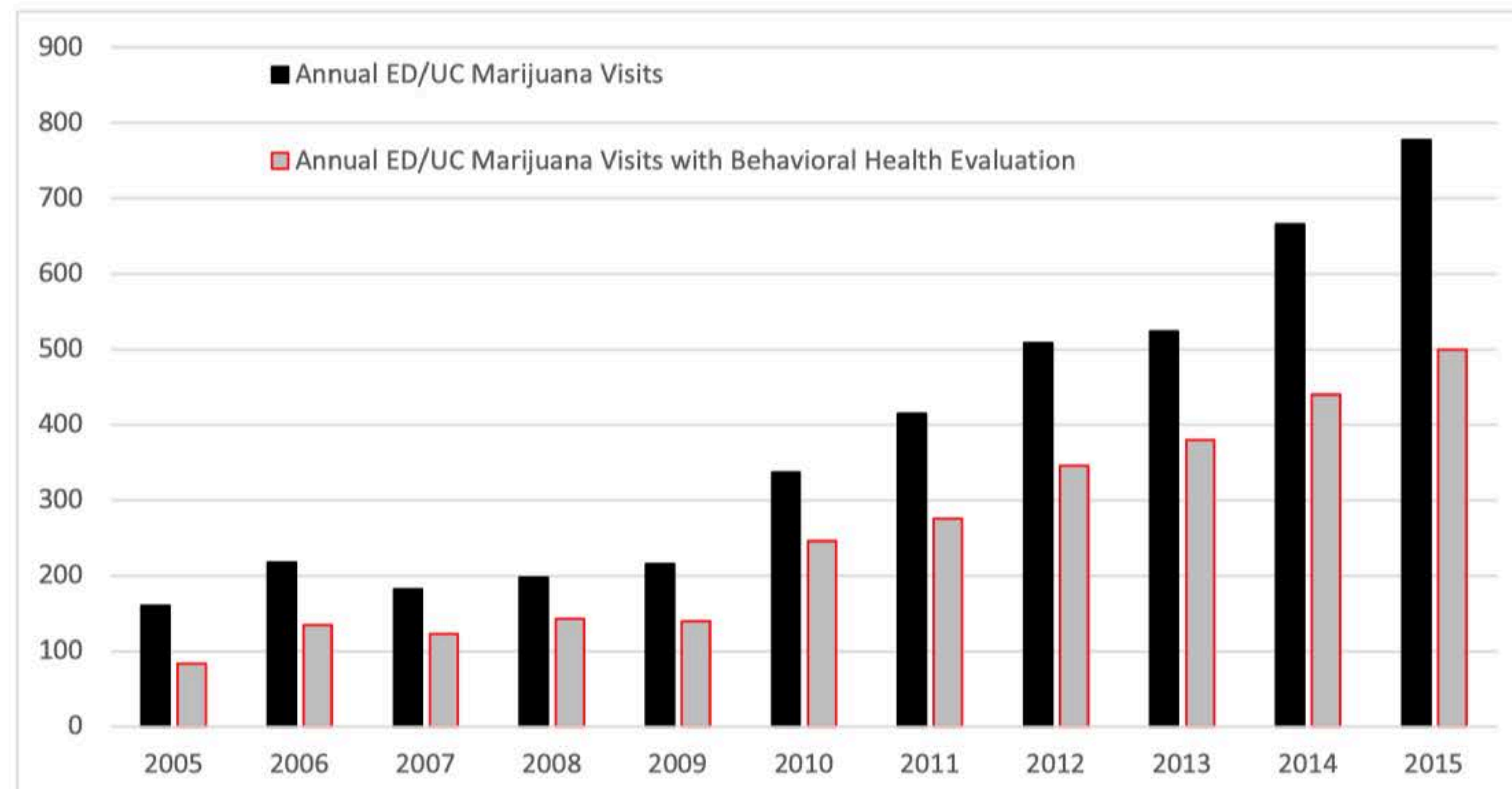


Figure 1. Annual marijuana-related emergency department (ED) and urgent care (UC) visits from a tertiary care children's hospital in Colorado.



wild berry peach

500
MG
THC
PER ROPE

FOR MEDICAL USE ONLY
WARNING:
KEEP OUT OF REACH OF
CHILDREN AND ANIMALS
21 AND OVER

MEDICATED
Nerds

SUPER POTENT FORMULA
Rope

(26g)

HEALTHCARE

Nutrition Facts / Dosage Facts - Per Serving - Total Dosage 420MG / THC Servings 8

Serving Size: 50MG **Amount Per Serving:** **Calories 8, Total Fat 0 g. Protein 0 g.** *Not a significant source of calories from fat, saturated fat, trans fat, cholesterol, dietary fiber, vitamin A, vitamin C, calcium and iron. Percent Daily Values (DV) are based on a 2,000 calorie diet.*

WARRANTY
KEEP
MEDICATED
Nerds

ROPE



SUPER POT

90% Drop In Underage Compliance Checks

April 5, 2022

Marijuana Enforcement Division conducted just 80 underage compliance checks all of last year.

By comparison, the Liquor Enforcement Division conducted 2,400 checks

Liquor Enforcement Division not only conducted **25 times more** underage compliance checks last year, it did so with **half as many** full time employees



Healthy Kids Colorado Survey

August 2020

- **32.4%** of youth **drove a vehicle after using marijuana** in the past month, **up from 9.0%** in 2017
- **More than half** of high school students who use marijuana reported that they **dab marijuana** to get high
 - Dabbing” is a method of inhaling **highly concentrated THC** (commonly referred to as hash oil, wax or shatter) using a **blow torch-heated** delivery system commonly referred to as a dab rig
- Results also show a **69% increase** in students vaping marijuana in two years
- More than 20% of adolescents have **used in the past 30 days** and got their marijuana **from an adult**

Adolescent Cannabis Use and Opioids

- March 29, 2021; JAMA Pediatrics
- “Within a year of first trying marijuana, 10.7% of adolescents (12-17 yo) had become addicted to it....within three years of first trying the drug, 20% of adolescents became addicted to it.”
- Compared to opioids (11.2%, 10.6%)
- At 3 years of first trying marijuana vs. opioids (12-17 yo), marijuana has a higher percentage of addiction

STUDY SUBJECTS (FIRST TIME USERS)	ADDICTION RATE AFTER 1 YEAR	ADDICTION RATE AFTER 3 YEARS
Cannabis (age 12-17)	10.7%	20.1%
Cannabis (18-25)	6.4%	10.9%
Opioid (12-17)	11.2%	10.6%
Opioid (18-25)	6.9%	7.3%
Cocaine (18-25)	5.6%	6.4%
Heroin (18-25)	30.9%	42.5%

Self-Harm and Mortality Risk

January 2021

- Cannabis use disorder is a common comorbidity and **risk marker** for self-harm, all-cause mortality, and **death** by unintentional overdose and **homicide** among youths with mood disorders
- Cannabis use disorder was significantly associated with nonfatal **self-harm** and all-cause **mortality**

JAMA Pediatrics; January 19, 2021

<https://jamanetwork.com/journals/jamapediatrics/article-abstract/2775255>

Cannabis Use and Depression

- JAMA Psychiatry, August 18, 2020
- Adults 20-50 yo, N=16,216
- Individuals with **depression** are at **increasing risk of cannabis use**, with a particularly strong increase in **daily or near daily** cannabis use
- Individuals **with depression** had approximately **double the odds** of using cannabis compared with people without depression

Suicidality

- American Academy of Pediatrics, March 2021
- Current **adolescent prescription opioid misuse** is associated with **increases in the risk for suicide-related behaviors**
- Adolescent marijuana use —> opioid misuse —> suicidality

Circumstances

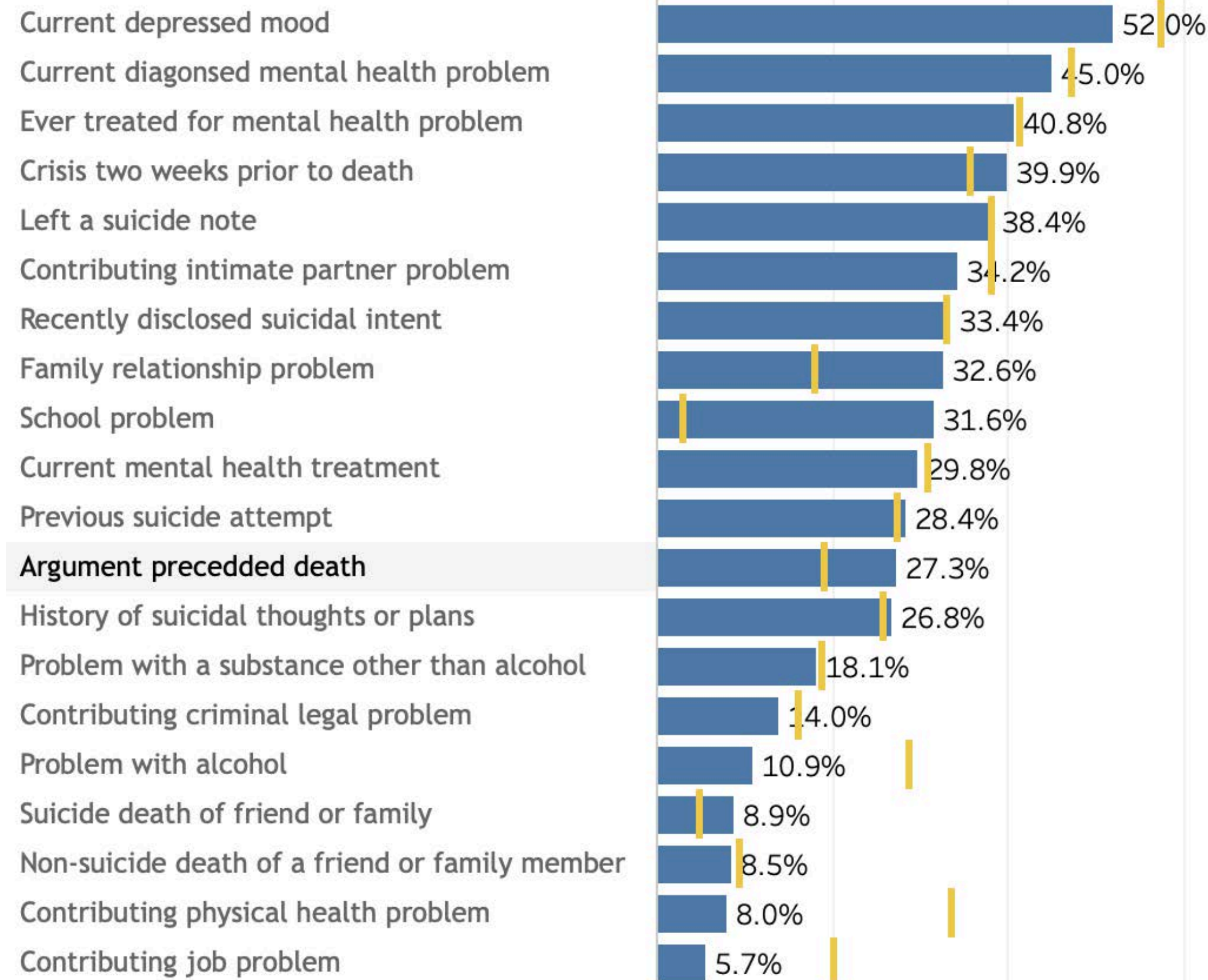
Toxicology

Entire state:

1+ circumstances known	14,727
No circumstances known	794

Selected population:

1+ circumstances known	982
No circumstances known	60

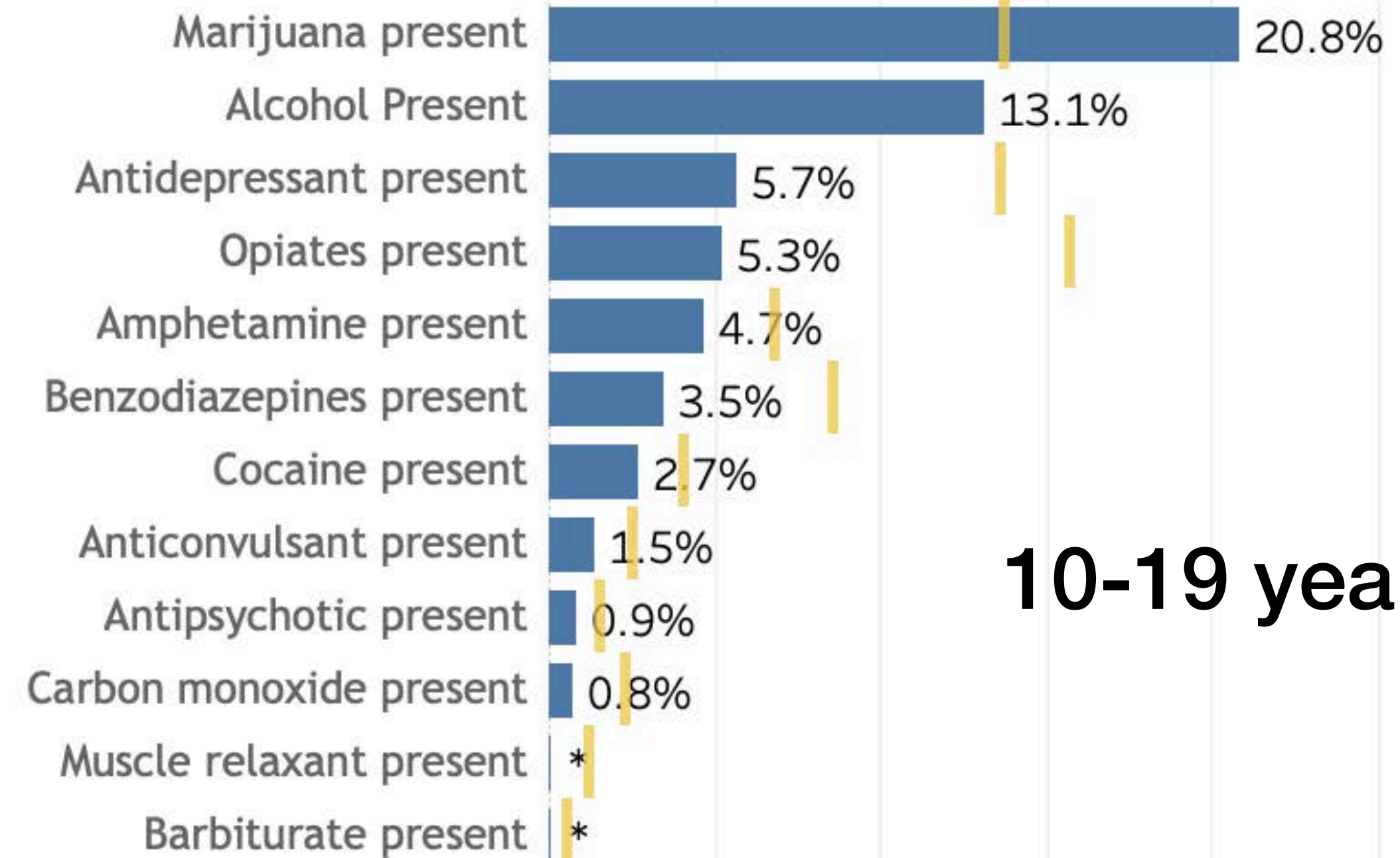


Entire state:

Toxicology info available	12,860
No toxicology info available	2,661

Selected population:

Toxicology info available	893
No toxicology info available	149



10-19 year olds

Trend **began 2012** and has **remained #1** since then

https://cohealthviz.dphe.state.co.us/t/HSEBPublic/views/CoVDRS_12_1_17/

[Story1?:embed=y&:showAppBanner=false&:showShareOptions=true&:display_count=no&:showVizHome=no#4](#)

SOCIAL HISTORY:

Marital Status (Please Circle): Single Married Divorced Widowed Separated

Employment (Please Circle):

Employed Student
Self-Employed Homemaker
Retired Unemployed

If Employed: Where? Autism Center XXXXX his position? 6 months / 3 weeks

What is your job title? Respite therapist

What are your specific job duties? Loop installer for Elight through XXXXX

Have you had a drink containing alcohol in the past year? YES NO
How many alcoholic drinks do you have per week? 0 Per Month? 6 pack every 2 months
On a typical day that you have a drink, how many do you drink? N/A

Are you a current smoker? YES NO Do you smoke everyday? YES NO
How many Cigarettes per day? 7
How soon after you wake up do you smoke your first Cigarette? 20 mins

Are you interested in quitting smoking? YES NO
Are you a former smoker? YES NO How long ago did you quit? _____

Do you use street drugs? YES NO
Do you use Marijuana Products? YES NO (Circle one) medicinal or recreational How much? everyday
What Type? (Circle One) Smoke Edible Hash Oil How Often? every hour

Aside from this problem, what is the most stressful thing in your life?
N/A

HEALTH MAINTENANCE:

How often do you exercise? (Please Circle One)
Daily 3 or more times a week Once a week Seldom Never

Product Integrity

- Cannabinoid Dose and Label Accuracy in Edible Medical Cannabis Products
- San Francisco, Los Angeles, Seattle
- Regarding THC
 - 17% accurately labeled
- Regarding CBD
 - 59% had detectable levels of CBD

<https://pubmed.ncbi.nlm.nih.gov/26103034/>

Product Integrity

- Labeling Accuracy of Cannabidiol Extracts Sold Online
- Wide range of CBD concentrations
 - 0.10 mg/ml to 655.27 mg/ml
- Regarding CBD
 - 31% were accurately labeled
 - THC was detected in 21.4%

Product Integrity

- Among participants who reported using CBD-dominant or equal CBD-THC products, there was no detectable CBD metabolite in 30.3% and 37.0%, respectively
- THC was detected in 78.8% from participants reporting use of CBD-dominant products
- Among samples from participants reporting THC-dominant or equal CBD-THC products, no THC metabolites were present in 10.9% and 35.2%, respectively.

Unemployed

Disabled

How long in this position? _____

front
back
CSPC

duties? _____

drinking alcohol in the past year? YES NO

do you have per week? _____ Per Month? _____

ve a drink, how many do you drink? _____

YES NO

Do you smoke everyday? YES NO

? _____

do you smoke your first Cigarette? _____

smoking? YES NO N/A

YES NO

How long ago did you quit? _____

YES NO

tried CBD oil got suicidal

s? YES NO (Circle one) medicinal or recreational

How much? _____

How Often? _____

What Type? (Circle One) Smoke Edible Hash Oil

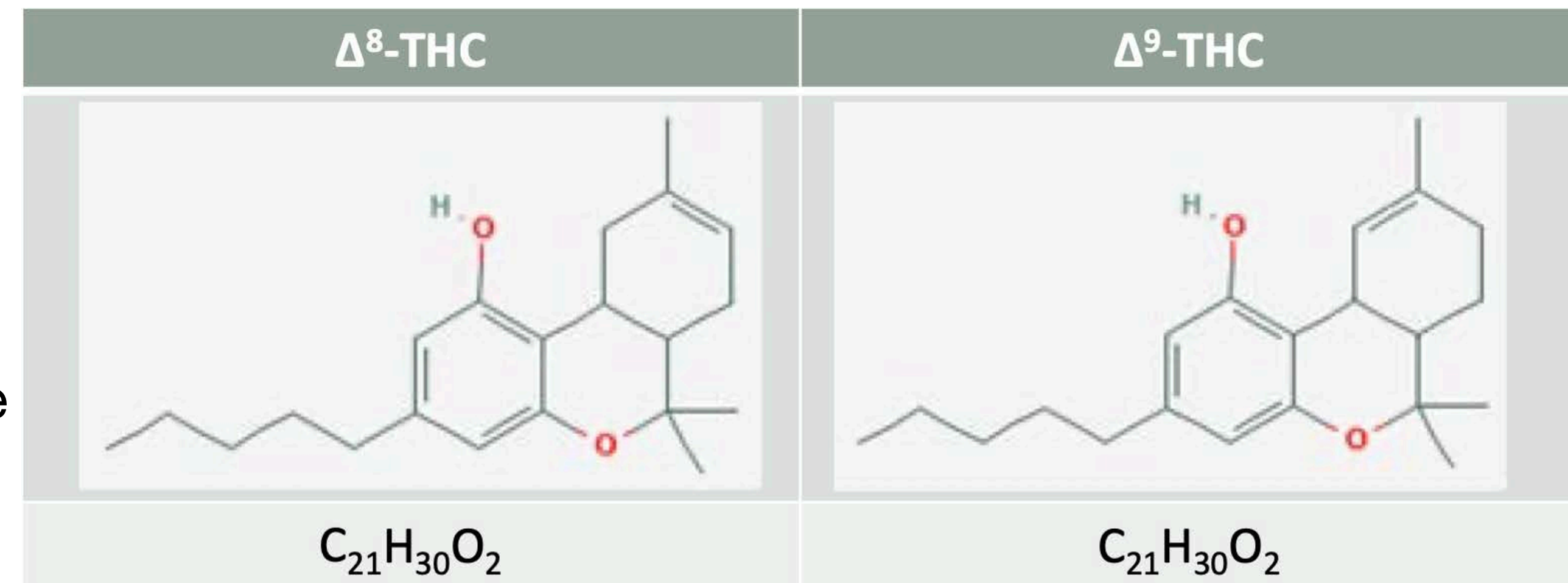
is the most stressful thing in your life?

moving house / going new places / meet people

Please Circle One)

Delta-8 THC

- The majority of Δ^8 -THC on the market is artificially created from CBD
- Users reports effects very similar to Delta-9-THC (Δ^9 -THC), but less potent
- Delta-8-THC is typically made from high-purity CBD isolate, often upwards of 99% purity
- Delta-8-THC has a very similar chemical structure to Δ^9 -THC
- Δ^8 -THC products are primarily labeled as “hemp items” because the vast majority of the CBD used in the isomerization process comes from hemp



THC-O

- Research has found that it's roughly **three times stronger** than conventional THC
- Derived from **federally legal hemp**, THC-O products are becoming increasingly popular in the states where consumers don't have access to legal, state-licensed delta-9 THC products.
- US military began studying its effects as long ago as 1949
- It eroded dogs' **muscle coordination** twice as much as conventional delta-9 THC

<https://www.nap.edu/read/9136/chapter/5#79>

<https://www.leafly.com/news/cannabis-101/what-is-thc-o>

THC-O

This product can be as much as **3 times more potent** than delta 8 or delta 9.

THC-O is **not found** in cannabis in its natural state

People who have taken THC-O in clinical studies have described the experience as “a trip,” not unlike one someone would go on after taking **psychedelics**

<https://thehempdoctor.com/product/thc-o-acetate-oil/>



CBD, a precursor of THC in e-cigarettes

- Experiments were performed in the typical operating temperature range of e-cigarettes (250–400 °C) and at 500 °C under both inert and oxidative conditions
- Pyrolysis products were identified and quantified by GC–MS
- 25–52% of CBD was transformed into other chemical substances: Δ 8-THC, Δ 9-THC, cannabinalol and cannabichromene
- **THC was the main pyrolysis product** at all temperatures under both oxidative and inert conditions
- CBD in e-cigarettes can be considered as a **precursor of THC**

Houston Officials Find Spiked CBD Being Sold in Stores September 2019

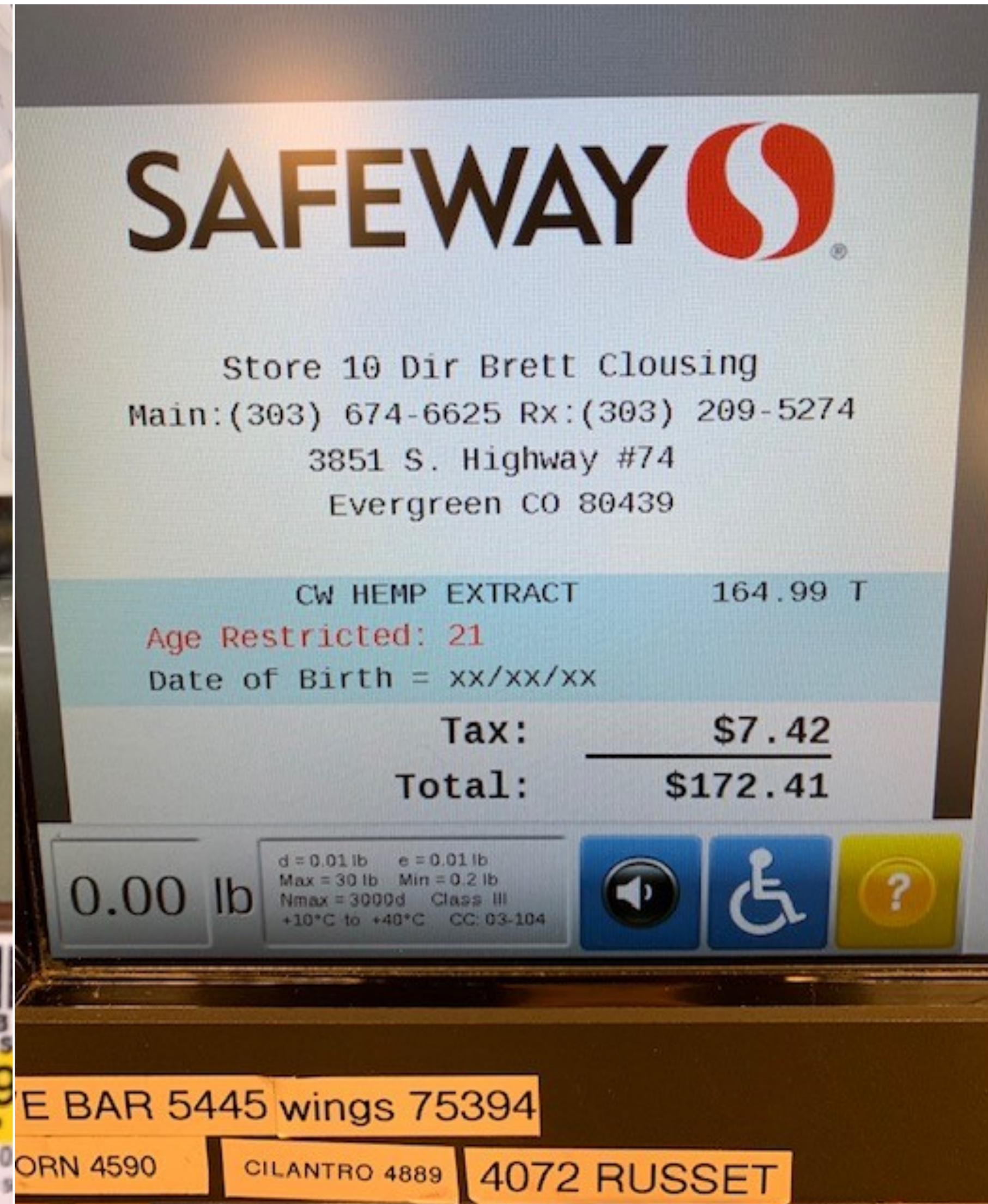
Products promoting the cannabis extract CBD are for sale all over Texas, but they don't always contain what they promise. Houston officials have found spiked CBD vapes sold in stores

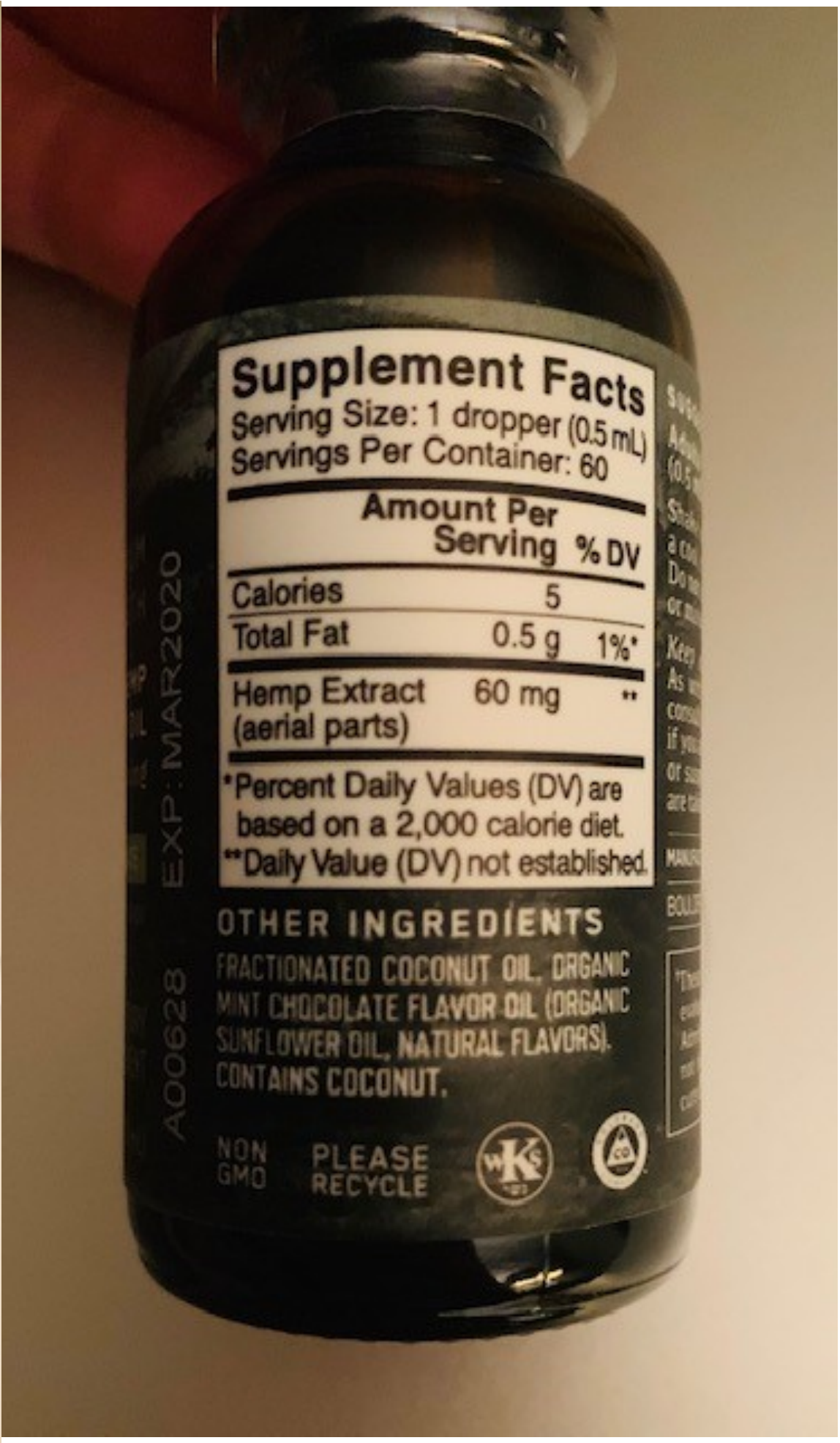
The Associated Press gathered the results for an investigation into how some operators are capitalizing on the CBD boom by substituting the cheap street drug for real CBD.

That practice has sent dozens of people nationwide to emergency rooms. Unlike CBD, synthetic marijuana gives an intense high.



Insidious Products







CHARLOTTE'S WEB™

STANLEY BROTHERS Boulder, CO 80301 • 719-419-8169

CERTIFICATE OF ANALYSIS

Product Name: Charlotte's Web Hemp Extract Oil Maximum Strength Mint Chocolate 30mL

Product Batch: A00700

Product Code: 910.069

Best By: July 2020

Parameter	Result
Cannabinoids	
<i>Testing performed by Eurofins Food Chemistry Testing – Boulder, CO</i>	
THC	2.8 mg/mL
THC-A	0.033 mg/mL
THC-V	None Detected
CBD	64.3 mg/mL
CBD-A	0.44 mg/mL
CBD-V	0.31 mg/mL
CBG	0.32 mg/mL
CBG-A	None Detected
CBN	0.23 mg/mL
CBC	2.3 mg/mL
Total THC per Bottle	84 mg
Total THC per Serving	1.4 mg

Manufactured By: Charlotte's Web Inc.

Manufacture Date: 16JAN19, 18JAN19 - 20JAN19

Batch Size: 297,540 mL

Units Manufactured: 9,773

Industry Failures

- Oregon Secretary of State, 2019: “Oregon’s marijuana testing program **cannot ensure** that test results are reliable, and products are **safe**”. Only **3% of stores** had a compliance inspection. (<https://sos.oregon.gov/audits/Documents/2019-04.pdf>)
- California has an 18% fail rate and “**unacceptable**” levels of pesticides, solvents, and bacteria, including E. coli and Salmonella” (<https://www.breitbart.com/local/2018/09/12/report-california-regulators-fail-18-of-recreational-marijuana-tested/>)
- Colorado **does not test or recall** products on a regular basis

Med Man Issues Voluntary Nationwide Recall of Up2 Due to Presence of Undeclared Sildenafil November 8, 2019 FDA

- Sildenafil is an FDA-approved prescription drug for erectile dysfunction.
- The presence of sildenafil in Up2 products renders them **unapproved drugs** for which safety and efficacy have not been established, therefore subject to recall.
- **Undeclared ingredient** may interact with nitrates found in some prescription drugs, such as nitroglycerin, and may **lower blood pressure** to dangerous levels which can be life threatening

<https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts/med-man-issues-voluntary-nationwide-recall-up2-due-presence-undeclared-sildenafil>

Florida August 18, 2020

- Florida medical cannabis company told to recall moldy flower
- The state health department's Office of Medical Marijuana Use said the product, Granddaddy Purple Whole Flower, tested **above the acceptable limit** for **aspergillus**
- Surterra Wellness dispensed **17,448,318 ounces** of medical marijuana flower, a little more than **545 tons**, in July

Colorado, October 8, 2020



- CDPHE and DOR safety advisory
- Yeast, mold, and arsenic at unacceptable limits
- “Return” your product
 - Dispensaries (med and rec) do not require customers register for recall notices
 - By the time you get notice, product likely consumed

https://drive.google.com/file/d/1xowig7vPtI-lz_xUAALt3DIxeGua1xY6/view

Colorado, March 31, 2021



- Unsafe levels of cadmium
 - Known human carcinogen, teratogen, and can cause renal damage
 - Pulmonary edema, anemia
- Products from November 2020-January 2021

<https://sbg.colorado.gov/sites/sbg/files/documents/20210330%20TZ%20Financial%20LLC%20403R-00123%20HSA%20Final.pdf>

Colorado, February 2, 2022



- Unsafe levels of yeast and mold
 - Confirmed to have failed contaminant testing
- Products from December 28, 29, 2021

Recall deals blow to California's marijuana industry

December 2018

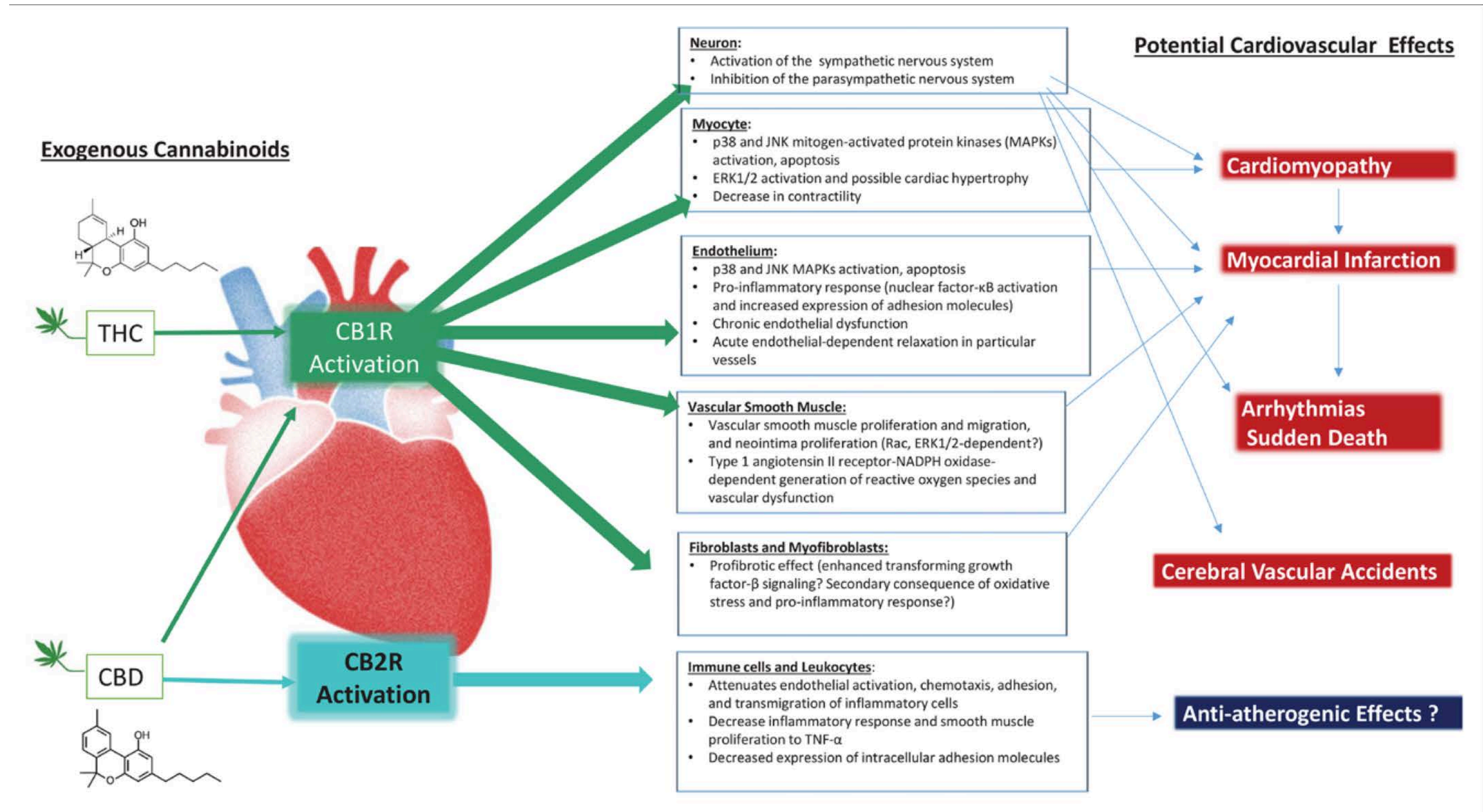
- Sacramento laboratory was caught **faking** pesticide test results
- The director had been **faking test results** for 22 of the 66 pesticides he was required under California law to analyze.
- Nearly 850 batches — tens of **thousands of pounds** of flower, and an **equal amount** of other products, like oils and vaping material — are under the recall.

January 2021

Nevada Lab Faking Data

- **Hiding** the presence of potentially **dangerous contaminants** and also **inflating THC levels** in marijuana
- Routinely passing samples that had previously failed testing for **pesticides, microtoxins, heavy metals and microbials**, all regulated contaminants. Samples, which are supposed to be tested once, were **sometimes tested up to five times** before "passing."
- Routinely **inflating THC levels** up to 5 percent higher than the actual THC levels. THC potency is known to drive **higher retail prices**
- **Failing** to properly dispose of more than 12,000 samples

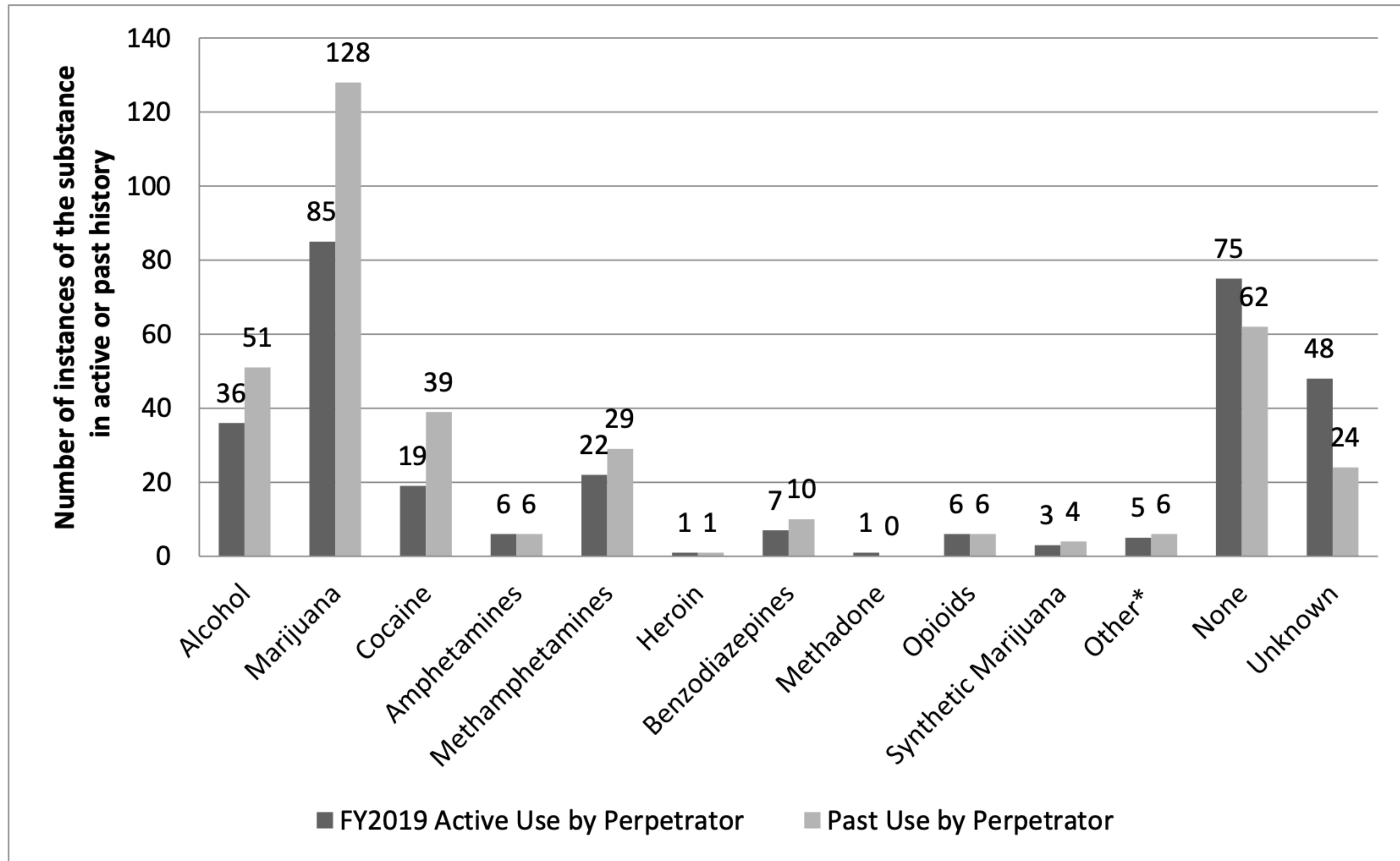
A Few Other Medical Impacts



Brain

- Cohort of 1,037 individuals born in Dunedin, New Zealand, in 1972–1973 and followed to age 45, with **94% retention**
- Long-term cannabis users showed **IQ decline** from childhood to midlife (mean=**-5.5 IQ points**), **poorer learning and processing speed** relative to their childhood IQ
- Cognitive deficits among long-term cannabis users **could not be explained** by persistent tobacco, alcohol, or other illicit drug use
- Long-term cannabis users showed cognitive deficits and **smaller hippocampal** volume in midlife

Figure 11. Confirmed Child Abuse or Neglect Fatality by Substance Abuse by Perpetrator



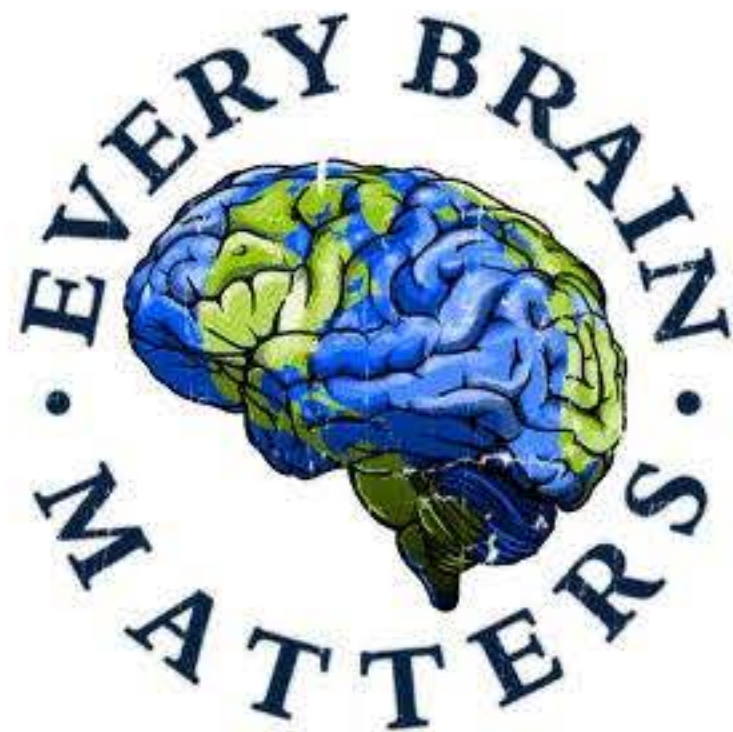
*Other includes lighter fluid, Kratom, ecstasy, morphine and Benadryl.

https://www.dfps.state.tx.us/About_DFPS/Reports_and_Presentations/PEI/documents/2020/2020-03-01_FY2019_Child_Fatality_and_Near_Fatality_Annual_Report.pdf

Out of all the drugs that can induce psychosis, cannabis has the highest conversion rate to bi-polar or schizophrenia.

<u>Drug</u>	<u>Conversion Rate</u>
cannabis	47.00%
amphetamines	30.00%
hallucinogens	24.00%
opioids	21.00%
alcohol	5.00%

<https://ajp.psychiatryonline.org/doi/10.1176/appi.ajp.2017.17020223>



EveryBrainMatters.org



Psychosis

- Causal relationship based on Bradford-Hill Criteria
 - <https://iasic1.org/wp-content/uploads/2021/08/Applyiing-the-Bradford-Hill-Elements-of-Causation-to-Cannabis-causing-psychosis-Edition-2-6-4-21.pdf>
- Hospitalizations for psychosis/cannabis use **more likely** in areas where cannabis legalized, February 2022
- Recreational cannabis legalization associated with **greater rate of hospitalization for psychosis** associated with cannabis use
 - <https://www.sciencedirect.com/science/article/abs/pii/S0165178122000014?via%3Dihub>

Psychosis

- March 24, 2022
- Epidemiological studies show a **dose-response association** between cannabis use and the risk of psychosis
- Individuals using **cannabis frequently** are at **increased risk of psychosis**, with no significant risk associated with less frequent use

Big Tobacco 2.0??

- April, 2022: Cannabis industry lobbying in the Colorado state legislature in fiscal years 2010–2021
- 48% of lobbyist reports lobbyists did not disclose their funder's cannabis affiliation, and cannabis organizations used strategies that may have obscured the true amount and source of funding
- Tobacco companies Altria, Imperial Brands, and British American Tobacco, have all made significant investments in cannabis, a long-anticipated development



Joe Amon, The Denver Post

Marijuana plants are lined up on the driveway outside of a suspected illegal grow operation at a home in Aurora on Wednesday morning, Oct. 10, 2018. Federal and local agents fanned out across the Denver metro area Wednesday morning executing more than two dozen search warrants on suspected illegal marijuana grow houses, authorities say.

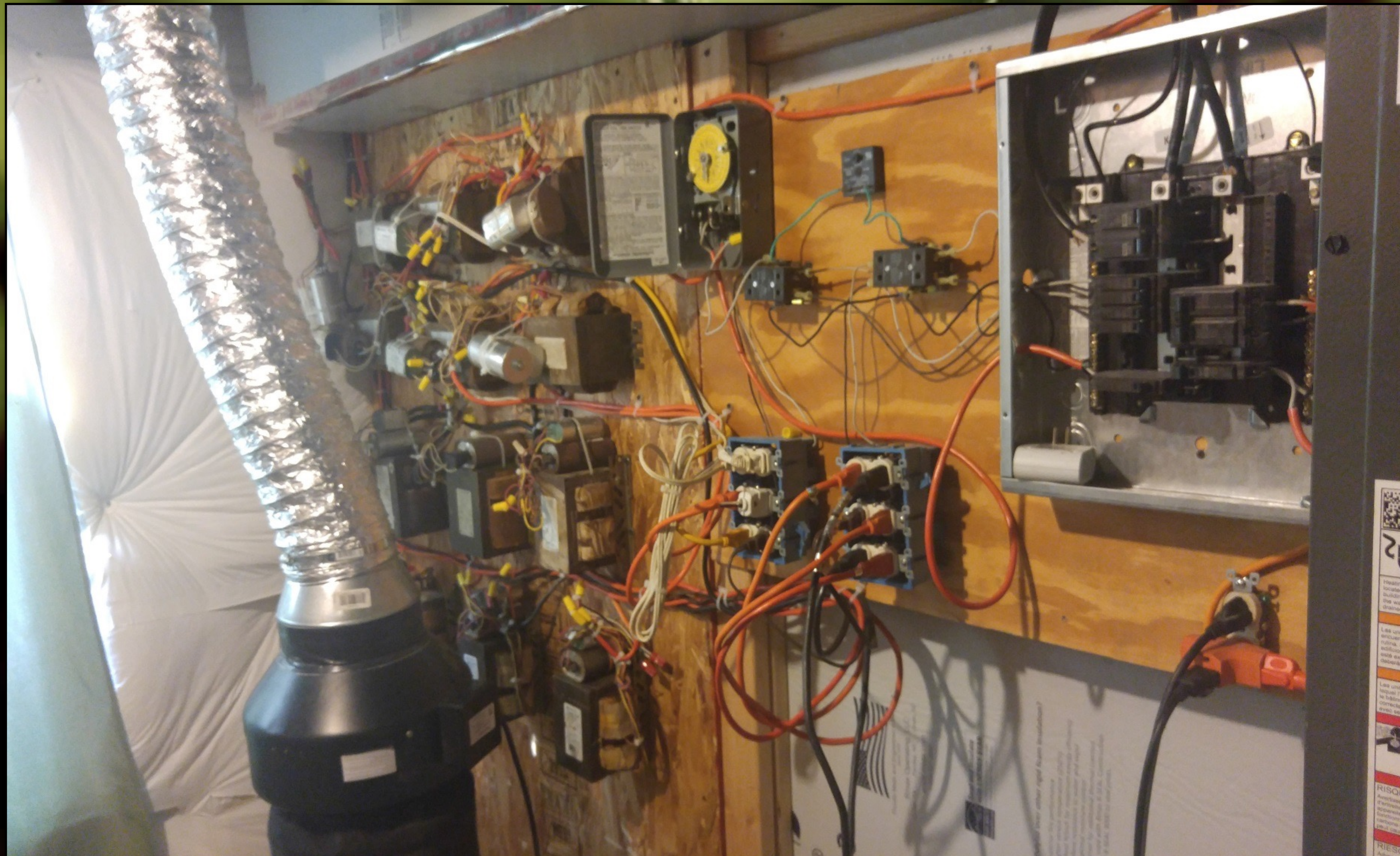


Joe Amon, The Denver Post

A DEA agent carries marijuana plants out of a suspected illegal grow operation at a home in Aurora on Wednesday morning, Oct. 10, 2018. Federal and local agents fanned out across the Denver metro area Wednesday morning executing more than two dozen search warrants on suspected illegal marijuana grow houses, authorities say.



Altered Electrical



Hazards for First Responders



Altered electrical systems and wiring

Hazards for First Responders



Tripping / entanglement hazards

LIGHTS



Grow House Damage



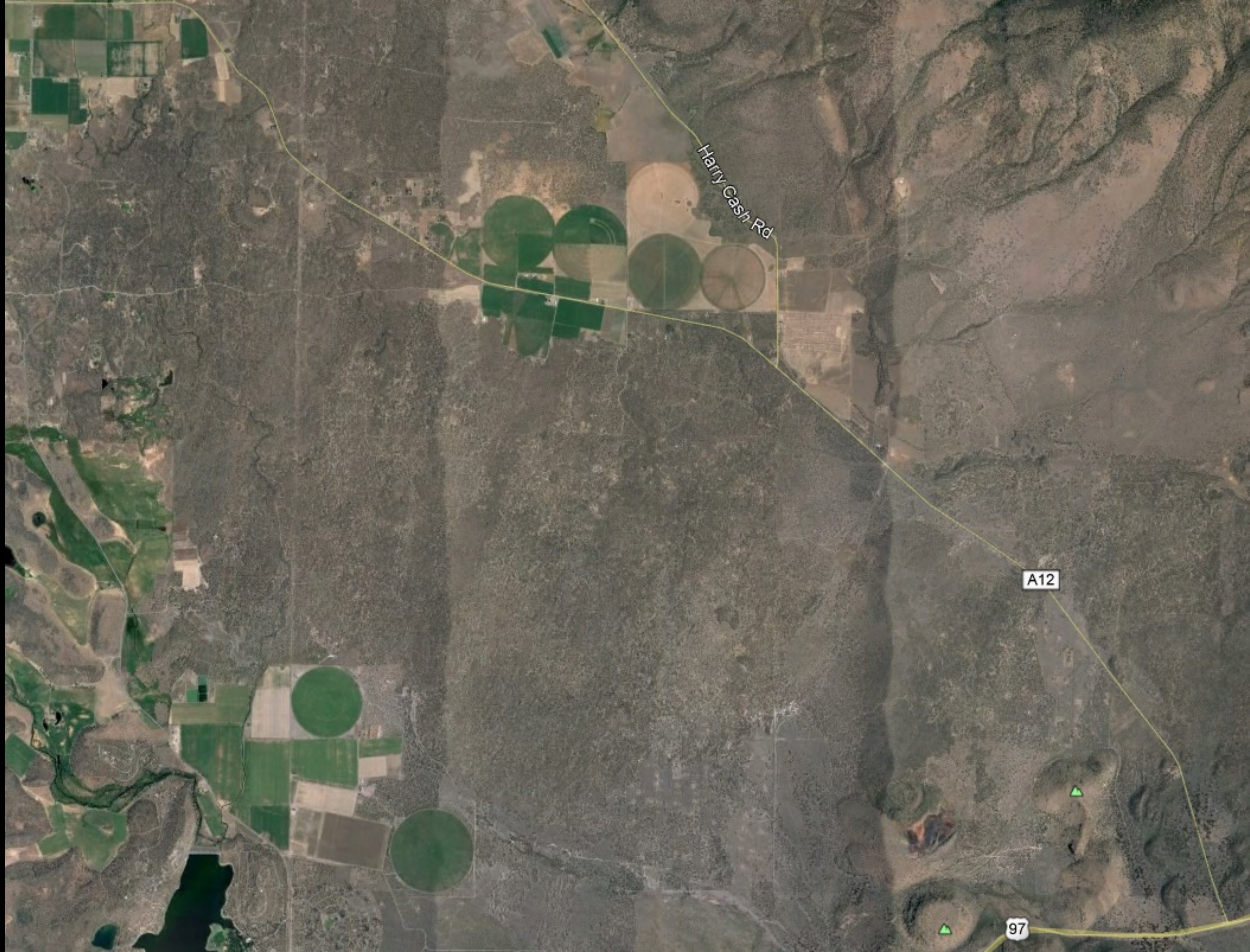
DIY Ventilation



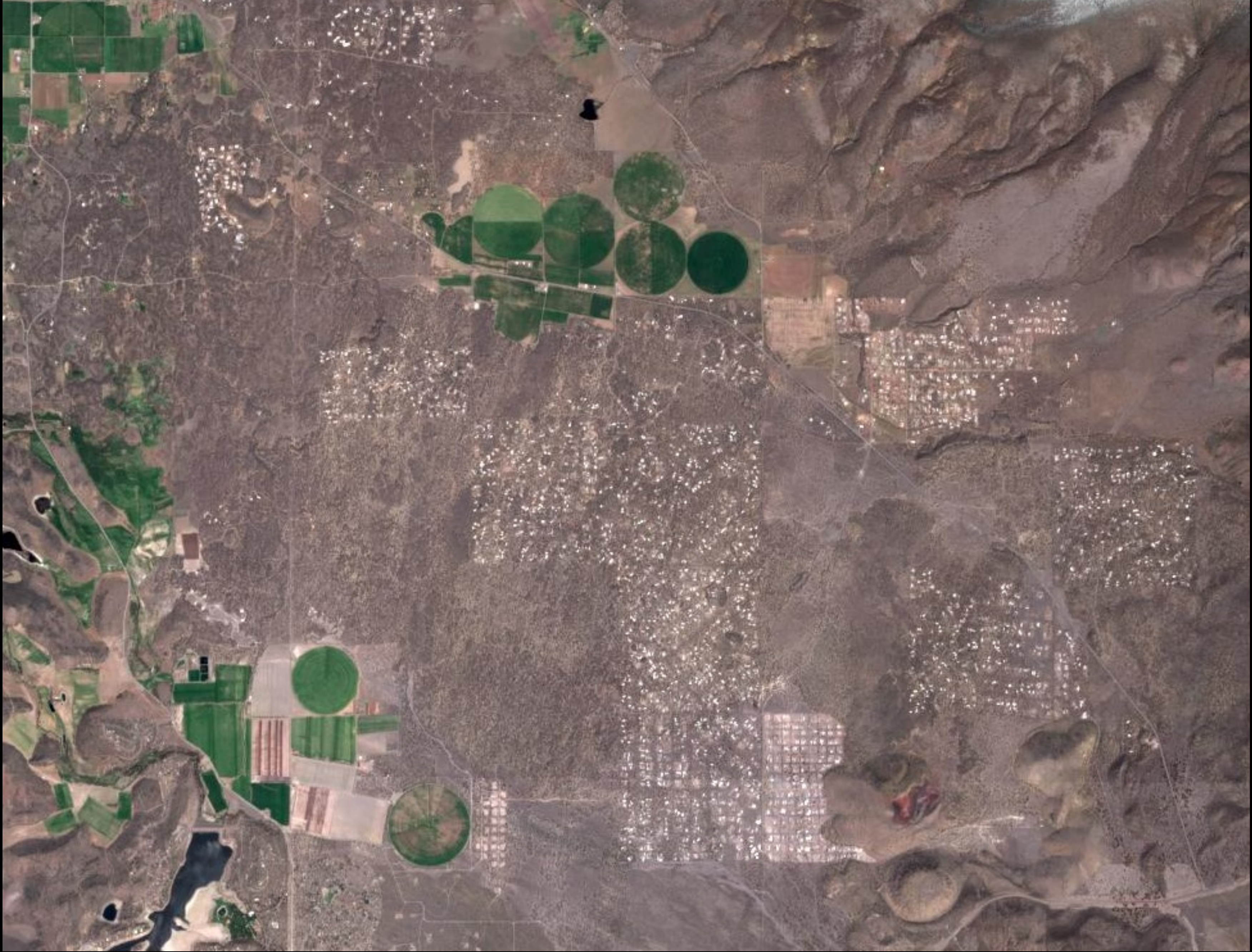
<https://www.greeleytribune.com/news/greeley-police-bust-sizable-black-market-grow-operation-in-t-bone-ranch/>







2017 Google Earth Imagery - Mt. Shasta Vista Subdivision



Law Enforcement Discovers and Reports Dead Wildlife Discovered at Grow Sites



abc 7 11:14 61°











<https://kymkemp.com/2019/04/23/over-4000-pounds-of-trash-cleaned-from-illegal-marijuana-complex-in-klamath-river-watershed-but-crews-face-dilemma-of-how-to-deal-with-miles-of-plastic-waterline/>

Oregon Problem, May 2021



A helicopter flyover of Jackson County focused on large apparent marijuana and hemp growing operations, but the Sheriff's Office said **they don't know** how many are legal and licensed.



Dolan Fire, California, 2020

- April 8, 2022
- The Dolan Fire that killed a firefighter and 12 California condors was started intentionally, and the 31-year-old illegal marijuana grower who started it was found guilty of arson
- Destroyed 10 homes and nearly 125,000 acres
- Nearly cost the lives of 14 firefighters
- Cost: \$62 million

Action Plan

- Marijuana is not a medication. Marijuana is a plant
- Support drug-development process for cannabinoids, including evidence-based dosing guidelines of cannabis-based medications
- Support potency cap (15% THC?)
- Eliminate home grows: breeding ground for illegal activity
- Track, monitor, and document public health impact (health care utilization, ER, birth defects, etc)
- Monitor and publish environmental impacts

Action Plan

- Mandatory drug testing for all violent crimes (cannabis induced psychosis)
- Monitor adolescent use closely
- Discourage smoking and vaping (EVALI)
- Discourage use during pregnancy and lactation
- Drug testing/toxicology on all suicides, including adolescents
- Monitor marijuana-related driving fatalities

COVID: FOLLOW THE SCIENCE



POT: FOLLOW THE MONEY

Kenneth Finn *Editor*
Cannabis in Medicine
An Evidence Based Approach

Legalization of marijuana is becoming increasingly prominent in the United States and around the world. While there is some discussion of the relationship between marijuana and overall health, a comprehensive resource that outlines the medical literature for several organ systems, as well as non-medical societal effects, has yet to be seen. While all physicians strive to practice evidence-based medicine, many clinicians aren't aware of the facts surrounding cannabis and are guided by public opinion.

This first of its kind book is a comprehensive compilation of multiple facets of cannabis recommendation, use and effects from a variety of different perspectives. Comprised of chapters dedicated to separate fields of medicine, this evidence-based guide outlines the current data, or lack thereof, as well as the need for further study. The book begins with a general overview of the neurobiology and pharmacology of THC and hemp. It then delves into various medical concerns that plague specific disciplines of medicine such as psychiatry, cardiology, gastrointestinal and neurology, among others. The end of the book focuses on non-medical concerns such as public health and safety, driving impairment and legal implications.

Comprised of case studies and meta-analyses, *Cannabinoids in Medicine: An Evidence-Based Approach* provides clinicians with a concise, evidence-based guide to various health concerns related to the use of marijuana. By addressing non-medical concerns, this book is also a useful resource for professionals working in the public health and legal fields.

Finn
Ed.



Cannabis in Medicine

Cannabis in Medicine

An Evidence Based Approach

Kenneth Finn
Editor

<https://www.springer.com/us/book/9783030459673>



<https://iasic1.org>