

Annual Causes of Death in the United States

Published: 01/09/2008 - 16:51

Related Chapter:

[Overdose](#)

For facts about specific drugs, [here's a list of Controlled Substance sections](#) .

1.

(Annual Causes of Death in the US, By Cause)

Cause of death (Data from 2014 unless otherwise noted)

Number

All Causes

2,626,418

Major Cardiovascular Diseases [MCD]

803,227

Cerebrovascular Diseases [subset of MCD]

133,103

Essential Hypertension and Hypertensive Renal Disease [subset of MCD]
30,221

Malignant Neoplasms [Cancer]
591,699

Chronic Lower Respiratory Diseases
147,101

Accidents (Unintentional Injuries) [Total]
136,053

Motor Vehicle Accidents [subset of Total Accidents]
35,398

Alzheimer's Disease
93,541

Diabetes Mellitus
76,488

Influenza and Pneumonia
55,227

Drug-Induced Deaths ¹
49,714

Nephritis, Nephrotic Syndrome and Nephrosis

48,146

Intentional Self-Harm (Suicide)

42,773

Septicemia

38,940

Chronic Liver Disease and Cirrhosis

38,170

Alcoholic Liver Disease [subset of Chronic Liver Disease]

19,388

Injury by Firearms

33,599

Alcohol-Induced Deaths

30,722

Parkinson's Disease

26,150

Pneumonitis Due to Solids and Liquids

18,792

Homicide

15,809

Viral Hepatitis

8,081

Human Immunodeficiency Virus (HIV) Disease

6,721

All Illicit Drugs Combined (2000)

17,000

2

Cannabis (Marijuana)

3
0

2014 Data Detailing Drug-Induced Deaths,

Breaking Out Specific Data for Prescription Analgesics and Heroin,

as Reported by the CDC 4

Drug Overdose Total

47,055

Pharmaceutical Opioid Analgesics

18,893

Heroin Overdose
10,574

2010 Drug Overdose Mortality Data In Detail,

Reported By Paulozzi et al. ⁵

Drug Overdose Total
38,329

Pharmaceutical Drugs
22,134

Pharmaceutical Opioid Analgesics
16,651

1 "Drug" includes both legal and illegal drugs.

2 Mokdad, Ali H., PhD, James S. Marks, MD, MPH, Donna F. Stroup, PhD, MSc, Julie L. Gerberding, MD, MPH, "Actual Causes of Death in the United States, 2000," Journal of the American Medical Association, (March 10, 2004), G225 Vol. 291, No. 10, 1242.

3 No recorded cases of overdose deaths from cannabis have been found in extensive literature reviews, see for example Gable, Robert S., "The Toxicity of Recreational Drugs," American Scientist (Research Triangle Park, NC: Sigma Xi, The Scientific Research Society, May-June 2006) Vol. 94, No. 3, p. 207.

4 CDC/NCHS, National Vital Statistics System, Mortality File, 2015, last accessed Dec. 11, 2015.

5 Paulozzi et al analyzed mortality figures and found that of 38,329 drug overdose deaths then reported in 2010, pharmaceutical drugs accounted for 22,134 deaths, of which 16,651 were opioid analgesic overdoses. The data were apparently revised slightly between the time the research letter was published in JAMA (February 2013) and release of the CDC's Deaths: Final Data for 2010 publication report, officially dated May 8, 2013.

Source:

Kochanek KD, Murphy SL, Xu JQ, Tejada-Vera B. Deaths: Final data for 2014. National vital statistics reports; vol 65 no 4. Hyattsville, MD: National Center for Health Statistics. 2016, pp. 41-45, Table 10.

<https://www.cdc.gov/nchs/products/nvsr.htm>

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04.pdf

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04_tables.pdf

CDC/NCHS, National Vital Statistics System, Mortality File, 2015, last accessed Dec. 11, 2015.

http://www.cdc.gov/nchs/data/health_policy/AADR_drug_poisoning_involving...

Hedegaard H, Chen LH, Warner M. Drug poisoning deaths involving heroin: United States, 2000–2013. NCHS data brief, no 190. Hyattsville, MD: National Center for Health Statistics. 2015.

<http://www.cdc.gov/nchs/data/databriefs/db190.pdf>

<http://www.cdc.gov/nchs/data/databriefs/db190.htm>

Chen LH, Hedegaard H, Warner M. Drug-poisoning deaths involving opioid analgesics: United States, 1999–2011. NCHS data brief no. 166.

Hyattsville, MD: US Department of Health and Human Services, CDC; 2014, p. 1.

<http://www.cdc.gov/nchs/data/databriefs/db166.htm> .

http://www.cdc.gov/nchs/data/hestat/drug_poisoning/drug_poisoning.htm

http://www.cdc.gov/nchs/data/hestat/drug_poisoning/drug_poisoning_deaths...

Christopher M. Jones, PharmD, Karin A. Mack, PhD, and Leonard J. Paulozzi, MD, "Pharmaceutical Overdose Deaths, United States, 2010," Journal of the American Medical Association, February 20, 2013, Vol 309, No. 7, p. 658.

<http://jama.jamanetwork.com/article.aspx?articleid=1653518>

(Estimated Drug-Induced Mortality in the US, 2014, by Gender and Race/Ethnicity) "In 2014, a total of 49,714 persons died of drug-induced causes in the United States (Tables 10, 12, and 13). This category includes deaths from poisoning and medical conditions caused by use of legal or illegal drugs, as well as deaths from poisoning due to medically prescribed and other drugs. It excludes unintentional injuries, homicides, and other causes indirectly related to drug use, as well as newborn deaths due to the mother's drug use. (For a list of drug-induced causes, see Technical Notes; also see the discussion of poisoning mortality that uses the more narrow definition of poisoning as an injury in the preceding "Injury mortality by mechanism and intent" section.)

"In 2014, the age-adjusted death rate for drug-induced causes for the total population increased significantly, 6.2%, from 14.6 in 2013 to 15.5 in 2014 (Internet Tables I-3 and I-4). For males in 2014, the age-adjusted death rate for drug-induced causes was 1.6 times the rate for females. The age-adjusted death rate for black females was 42.9% lower than for white females, and the rate for black males was 29.3% lower than for white males. The rate for drug-induced causes increased 7.2% for males and 5.4% for females in 2014 from 2013.

"Among the major race-sex and race-ethnicity-sex groups, the age-adjusted death rates for drug-induced causes increased significantly in 2014 from 2013 for white males (7.5%), white females (4.7%), black males (8.6%), non-Hispanic white males (8.0%), non-Hispanic white females (5.5%), non-Hispanic black males (7.6%), and non-Hispanic black females (11.3%). The rate for Hispanic males did not change significantly. The rate for Hispanic females was unchanged."

Source:

Kochanek KD, Murphy SL, Xu JQ, Tejada-Vera B. Deaths: Final data for 2014. National vital statistics reports; vol 65 no 4. Hyattsville, MD: National Center for Health Statistics. 2016, pp. 12-13.

<https://www.cdc.gov/nchs/products/nvsr.htm>

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04.pdf

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04_tables.pdf

3.

(Alcohol-Induced Mortality in the US, 2014, by Gender and Race/Ethnicity) "In 2014, a total of 30,722 persons died of alcohol-induced causes in the United States (Tables 10, 12, and 13). This category includes deaths from dependent and nondependent use of alcohol, as well as deaths from accidental poisoning by alcohol. It excludes unintentional injuries, homicides, and other causes indirectly related to alcohol use, as well as deaths due to fetal alcohol syndrome (for a list of alcohol-induced causes, see Technical Notes).

"The age-adjusted death rate for alcohol-induced causes for the total population increased significantly, 3.7%, from 8.2 in 2013 to 8.5 in 2014 (Tables I-5 and I-6). For males, the age-adjusted death rate for alcohol-induced causes in 2014 was 2.8 times the rate for females. Compared with the rate for the white population, the rate for the black population was 31.9% lower.

"Among the major race-sex and race-ethnicity-sex groups, the age-adjusted rate for alcohol-induced death increased significantly in 2014 from 2013 for white males (3.8%), white females (8.9%), black females (13.8%), Hispanic males (7.2%),

non-Hispanic white males (3.2%), non-Hispanic white females (6.3%), and non-Hispanic black females (13.3%). The rate for non-Hispanic black males did not change significantly."

Source:

Kochanek KD, Murphy SL, Xu JQ, Tejada-Vera B. Deaths: Final data for 2014. National vital statistics reports; vol 65 no 4. Hyattsville, MD: National Center for Health Statistics. 2016, p. 13.

<https://www.cdc.gov/nchs/products/nvsr.htm>

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04.pdf

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04_tables.pdf

4.

(Drug Overdose Deaths in the US, 2014) "Of the 36,667 drug overdose deaths with at least one mention of a specific drug, 52% mentioned only one specific drug (18,931 deaths), 26% mentioned two (9,351 deaths), 12% mentioned three (4,521 deaths), 6% mentioned four (2,041 deaths), and 5% mentioned five or more (1,823 deaths). Among drug overdose deaths with at least one mention of a specific drug, the average number of specific drugs mentioned was 1.9.

"Table C shows the percentage of drug overdose deaths with concomitant drugs for drug overdose deaths involving the top 10 drugs in 2014. The percentage of deaths involving concomitant drugs varied by referent drug. For example, the majority of the drug overdose deaths involving methamphetamine did not involve other drugs. In contrast, among deaths involving alprazolam and diazepam, more than 95% involved other drugs.

"The average number of concomitant drugs involved (excluding the referent drug) also varied among the top 10 drugs involved in drug overdose deaths. For example, drug overdose deaths involving diazepam or alprazolam had on average more than two additional drugs involved in death. Drug overdose deaths involving fentanyl, heroin, cocaine, or methamphetamine had on average fewer than two additional drugs involved in death.

"Figure 5 shows the percent distribution of the number of concomitant drugs for overdose deaths involving the top 10 drugs in 2014 (Table 5). For example, for drug overdose deaths involving methamphetamine, 55% had no concomitant mentions, 25% mentioned one other drug, 18% mentioned two to four other drugs, and 1% mentioned five or more drugs. In contrast, for drug overdose deaths involving diazepam, 3% had no concomitant mentions, 22% mentioned one other drug, 62% mentioned two to four other drugs, and 13% mentioned five or more other drugs.

"Table D shows the most frequent concomitant drugs for each of the top 10 drugs involved in drug overdose deaths in 2014.

"□ One in five drug overdose deaths involving heroin also involved cocaine.

"□ Alprazolam was involved in 26% of the drug overdose deaths involving hydrocodone, 23% of the deaths involving oxycodone, and 18% of the deaths involving methadone.

"□ More than one-third (37%) of the drug overdose deaths involving cocaine also involved heroin.

"□ Nearly 20% of the overdose deaths involving methamphetamine also involved heroin."

Source:

Warner M, Trinidad JP, Bastian BA, et al. Drugs most frequently involved in drug overdose deaths: United States, 2010–2014. National vital statistics reports; vol 65 no 10. Hyattsville, MD: National Center for Health Statistics. 2016, pp. 5-6.

<https://www.cdc.gov/nchs/products/nvsr.htm>

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_10.pdf

5.

(Alcohol as a Factor in Overdose Deaths Attributed to Other Drugs, US, 2014) "In 2014, alcohols, including ethanol and isopropyl alcohol, were involved in 15% of all drug overdose deaths and 17% of the drug overdose deaths that mentioned involvement of at least one specific drug. Table E shows the frequency of alcohol involvement among drug overdose deaths involving specific drugs.

"□ Alcohol involvement was mentioned in 12%–22% of the drug overdose deaths involving fentanyl, heroin, hydrocodone, morphine, oxycodone, alprazolam, diazepam, or cocaine.

"□ Alcohol involvement was mentioned in less than 10% of the drug overdose deaths involving methadone and methamphetamine."

Source:

Warner M, Trinidad JP, Bastian BA, et al. Drugs most frequently involved in drug overdose deaths: United States, 2010–2014. National vital statistics reports; vol 65 no 10. Hyattsville, MD: National Center for Health Statistics. 2016, pp. 5-6.

<https://www.cdc.gov/nchs/products/nvsr.htm>

https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_10.pdf

6.

(Estimated Annual Number of Deaths Caused by Tobacco Use in the US) "The 2014 Surgeon General's report estimates that cigarette smoking causes more than 480,000 deaths each year in the United States. ¹ This widely cited estimate of the mortality burden of smoking may be an underestimate, because it considers deaths only from the 21 diseases that have been formally established as caused by smoking (12 types of cancer, 6 categories of cardiovascular disease, diabetes, chronic obstructive pulmonary disease [COPD], and pneumonia including influenza). Associations between smoking and the 30 most common causes of death in the United Kingdom in the Million Women Study suggest that the excess mortality observed among current smokers cannot be fully explained by these 21 diseases. ²

Source:

Brian D. Carter, M.P.H., Christian C. Abnet, Ph.D., et al., "Smoking and Mortality — Beyond Established Causes," *New England Journal of Medicine*, Feb 12, 2015;372:631-40. DOI: 10.1056/NEJMsa1407211.

<http://www.nejm.org/doi/full/10.1056/NEJMsa1407211>

7.

(Alternative Estimate of Total Number of Deaths In the US Caused By Tobacco Use) "Our results suggest that the Surgeon General's recent estimate of smoking-attributable mortality may have been an underestimate. The Surgeon General's estimate, which took into account only the 21 diseases formally established as caused by smoking, was that approximately 437,000 deaths among adults are caused each year by active smoking (not including secondhand smoke). However, the Surgeon General's report presents an alternative estimate of 556,000 deaths among adults on the basis of the excess mortality from all causes. The difference between these two estimates is nearly 120,000 deaths. ¹ If, as suggested by the results in our cohort, at least half of this difference is due to associations of smoking with diseases that are causal but are not yet formally established as such, then at least 60,000 additional deaths each year among U.S. men and women may be caused by cigarette smoking."

Source:

Brian D. Carter, M.P.H., Christian C. Abnet, Ph.D., et al., "Smoking and Mortality - Beyond Established Causes," *New England Journal of Medicine*, Feb 12, 2015;372:631-40. DOI: 10.1056/NEJMsa1407211.

<http://www.nejm.org/doi/full/10.1056/NEJMsa1407211>

8.

(Drug Poisoning Deaths In The US 2013, and Trends 1999-2013) "In 2013, a total of 43,982 deaths in the United States were attributed to drug poisoning, including 16,235 deaths (37%) involving opioid analgesics. From 1999 to 2013, the drug poisoning death rate more than doubled from 6.1 to 13.8 per 100,000 population, and the rate for drug poisoning deaths

involving opioid analgesics nearly quadrupled from 1.4 to 5.1 per 100,000. For both drug poisoning and drug poisoning involving opioid analgesics, the death rate increased at a faster pace from 1999 to 2006 than from 2006 to 2013."

Source:

Li-Hui Chen, PhD; Holly Hedegaard, MD; Margaret Warner, PhD. Rates of Deaths from Drug Poisoning and Drug Poisoning Involving Opioid Analgesics — United States, 1999–2013. Centers for Disease Control. Morbidity and Mortality Weekly Report. Vol. 64, No. 1. January 16, 2015, p. 32.

<http://www.cdc.gov/nchs/data/databriefs/db166.htm>

9.

(Increasing Involvement Of Benzodiazepines In Opioid Overdose Mortality In The US, 2011) "In 2011, 5,188 opioid-analgesic poisoning deaths also involved benzodiazepines (sedatives used to treat anxiety, insomnia, and seizures), up from 527 such deaths in 1999 (Figure 3). From 2006 through 2011, the number of opioid-analgesic poisoning deaths involving benzodiazepines increased 14% on average each year, while the number of opioid-analgesic poisoning deaths not involving benzodiazepines did not change significantly."

Source:

Chen, LH, Hedegaard, H, and Warner, M. Drug-poisoning deaths involving opioid analgesics: United States, 1999–2011. NCHS data brief, No. 166. Hyattsville, MD: National Center for Health Statistics, 2014, p. 3.

<http://www.cdc.gov/nchs/data/databriefs/db166.htm>

<http://www.cdc.gov/nchs/data/databriefs/db166.pdf>

10.

(Polydrug Involvement in Pharmaceutical Overdose Deaths in the US, 2010) "Opioids were frequently implicated in overdose deaths involving other pharmaceuticals. They were involved in the majority of deaths involving benzodiazepines (77.2%), antiepileptic and antiparkinsonism drugs (65.5%), antipsychotic and neuroleptic drugs (58.0%), antidepressants (57.6%), other analgesics, antipyretics, and antirheumatics (56.5%), and other psychotropic drugs (54.2%). Among overdose deaths due to psychotherapeutic and central nervous system pharmaceuticals, the proportion involving only a single class of such drugs was highest for opioids (4903/16 651; 29.4%) and lowest for benzodiazepines (239/6497; 3.7%)."

Source:

Christopher M. Jones, PharmD, Karin A. Mack, PhD, and Leonard J. Paulozzi, MD, "Pharmaceutical Overdose Deaths, United States, 2010," *Journal of the American Medical Association*, February 20, 2013, Vol 309, No. 7, p. 658.

<http://jama.jamanetwork.com/article.aspx?articleid=1653518>

11.

(Role of Psychopharmaceuticals in Overdose Deaths) "This analysis confirms the predominant role opioid analgesics play in pharmaceutical overdose deaths, either alone or in combination with other drugs. It also, however, highlights the frequent involvement of drugs typically prescribed for mental health conditions such as benzodiazepines, antidepressants, and antipsychotics in overdose deaths. People with mental health disorders are at increased risk for heavy therapeutic use, nonmedical use, and overdose of opioids. ⁴⁻⁶ Screening, identification, and appropriate management of such disorders is an important part of both behavioral health and chronic pain management."

Source:

Christopher M. Jones, PharmD, Karin A. Mack, PhD, and Leonard J. Paulozzi, MD, "Pharmaceutical Overdose Deaths, United States, 2010," *Journal of the American Medical Association*, February 20, 2013, Vol 309, No. 7, p. 659.

<http://jama.jamanetwork.com/article.aspx?articleid=1653518>

12.

(Opioid Overdose Deaths In The US, 1999-2007) "From 1999 to 2007, the number of U.S. poisoning deaths involving any opioid analgesic (e.g., oxycodone, methadone, or hydrocodone) more than tripled, from 4,041 to 14,459, or 36% of the 40,059 total poisoning deaths in 2007. In 1999, opioid analgesics were involved in 20% of the 19,741 poisoning deaths. During 1999–2007, the number of poisoning deaths involving specified drugs other than opioid analgesics increased from 9,262 to 12,790, and the number involving nonspecified drugs increased from 3,608 to 8,947."

Source:

"Number of Poisoning Deaths* Involving Opioid Analgesics and Other Drugs or Substances — United States, 1999–2007," *Morbidity and Mortality Weekly Report*, August 20, 2010, Vol. 59, No. 32 (Atlanta, GA: US Centers for Disease Control), p. 1026.

<http://www.cdc.gov/mmwr/pdf/wk/mm5932.pdf>

13.

(Cannabis and Mortality) "In summary, this study showed little, if any, effect of marijuana use on non-AIDS mortality in men and on total mortality in women. The increased risk of AIDS mortality in male marijuana users probably did not reflect a causal relationship, but most likely represented uncontrolled confounding by male homosexual behavior. The risk of mortality associated with marijuana use was lower than that associated with tobacco cigarette smoking."

Source:

Stephen Sidney, MD, Jerome E. Beck, DrPH, Irene S. Tekawa, MA, Charles P Quesenberry, Jr, PhD, and Gary D. Friedman, MD, "Marijuana Use and Mortality." American Journal of Public Health 87.4 (1997) pp. 589–590.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1380837/>

14.

(Mortality Risk from MDMA Use) "Hall and Henry (2006) reviewed the medical scenarios and treatment options for physicians dealing with MDMA-related medical emergencies: 'Hyperpyrexia and multi-organ failure are now relatively well-known, other serious effects have become apparent more recently. Patients with acute MDMA toxicity may present to doctors working in Anaesthesia, Intensive Care, and Emergency Medicine. A broad knowledge of these pathologies and their treatment is necessary for those working in an acute medicine speciality'.

"Despite rapid medical intervention, some disorders are difficult to reverse and deteriorate rapidly, with occasional fatal outcomes (Schifano et al., 2003). In an early report, Henry et al. (1992) described MDMA-induced fatalities in seven young party goers, whose body temperatures at the intensive care unit ranged between 40° C and 43° C. The causes of death include various forms of organ failure. MDMA induces apoptosis, or programmed cell death, in cultured liver cells (Montiel-Duarte et al., 2002), and another form of death is from acute liver failure (Smith et al., 2005). Other fatalities result from cardiac arrest, brain seizure, 'rhabdomyolysis' or the destruction of skeletal muscle tissue, and 'disseminated intravascular coagulation' or the failure of blood clotting—which results in uncontrollable bleeding through multiple sites (Henry et al., 1992; Hall and Henry, 2006)."

Source:

Parrott, Andrew C., "Human Psychobiology of MDMA or 'Ecstasy': An Overview of 25 Years of Empirical Research," Human Psychopharmacology: Clinical and Experimental, 2013; 28:289-307. DOI: 10.1002/hup.2318

<http://onlinelibrary.wiley.com/doi/10.1002/hup.2318/pdf>

15.

(Opiate Pain Reliever OD Deaths, 1999-2008) "During 1999–2008, overdose death rates, sales, and substance abuse treatment admissions related to OPR increased in parallel (Figure 2). The overdose death rate in 2008 was nearly four times the rate in 1999. Sales of OPR in 2010 were four times those in 1999."

Source:

Centers for Disease Control and Prevention, "Vital Signs: Overdoses of Prescription Opioid Pain Relievers — United States, 1999–2008," Morbidity and Mortality Weekly Report (Atlanta, GA: 2011), Vol. 60, No. 43, p. 1488.

<http://www.cdc.gov/mmwr/pdf/wk/mm6043.pdf>

16.

(MDMA Mortality Risk) "Schifano et al. (2010) analysed the government data on recreational stimulant deaths in the UK between 1997 and 2007. Over this period, there were 832 deaths related to amphetamine or methamphetamine and 605 deaths related to Ecstasy/MDMA. Many were related to multiple-drug ingestion or 'polydrug' use. However, in the analysis of 'mono-intoxication' fatalities, Schifano et al. (2010) found that deaths following Ecstasy use were significantly more represented than deaths following amphetamine/methamphetamine use ($p < 0.007$)."

Source:

Parrott, Andrew C., "Human Psychobiology of MDMA or 'Ecstasy': An Overview of 25 Years of Empirical Research," Human Psychopharmacology: Clinical and Experimental, 2013; 28:289-307. DOI: 10.1002/hup.2318

<http://onlinelibrary.wiley.com/doi/10.1002/hup.2318/pdf>

17.

(Comparison of Lethal Dose Versus Recreational Dose for Alcohol Compared With Other Drugs) "The lethal dose of alcohol divided by a typical recreational dose (safety ratio) is 10, which places it closer to heroin (6), and GHB (8) in terms of danger from overdose, than MDMA ('Ecstasy' – 16), and considerably more dangerous than LSD (1000) or cannabis (>1000)."

Source:

Sellman, Doug, "If alcohol was a new drug," Journal of the New Zealand Medical Association (Wellington, New Zealand: New Zealand Medical Association, September 2009), p. 6.

http://www.nzma.org.nz/_data/assets/pdf_file/0011/17786/Vol-122-No-1303...

18.

(Drug Overdose Deaths in the US, 2008) "In 2008, a total of 36,450 deaths were attributed to drug overdose, a rate of 11.9 per 100,000 population (Table 1), among which a drug was specified in 27,153 (74.5%) deaths. One or more prescription drugs were involved in 20,044 (73.8%) of the 27,153 deaths, and OPR were involved in 14,800 (73.8%) of the 20,044 prescription drug overdose deaths."

Source:

Centers for Disease Control and Prevention, "Vital Signs: Overdoses of Prescription Opioid Pain Relievers — United States, 1999–2008," *Morbidity and Mortality Weekly Report* (Atlanta, GA: 2011), Vol. 60, No. 43, p. 1488.

<http://www.cdc.gov/mmwr/pdf/wk/mm6043.pdf>

19.

(Marijuana Mortality) "Indeed, epidemiological data indicate that in the general population marijuana use is not associated with increased mortality."

Source:

Janet E. Joy, Stanley J. Watson, Jr., and John A. Benson, Jr., "Marijuana and Medicine: Assessing the Science Base," Division of Neuroscience and Behavioral Research, Institute of Medicine (Washington, DC: National Academy Press, 1999), p. 109.

<http://www.nap.edu/openbook.php?isbn=0309071550&page=109>

20.

(Alcohol Mortality and Other Annual Costs in the US) "Excessive alcohol use* accounted for an estimated average of 80,000 deaths and 2.3 million years of potential life lost (YPLL) in the United States each year during 2001–2005, and an estimated \$223.5 billion in economic costs in 2006. Binge drinking accounted for more than half of those deaths, two thirds of the YPLL, and three quarters of the economic costs."

* Excessive alcohol use includes binge drinking (defined by CDC as consuming four or more drinks per occasion for women or five or more drinks per occasion for men), heavy drinking (defined as consuming more than one drink per day on average for women or more than two drinks per day on average for men), any alcohol consumption by pregnant women, and any

alcohol consumption by youths aged less than 21 years.

Source:

Kanny, Dafna; Garvin, William S.; and Balluz, Lina, "ital Signs: Binge Drinking Prevalence, Frequency, and Intensity Among Adults — United States, 2010," *Morbidity and Mortality Weekly Report* (Atlanta, GA: Centers for Disease Control and Prevention, January 13, 2012) Vol. 61, No. 1, p. 14.

<http://www.cdc.gov/mmwr/pdf/wk/mm6101.pdf>

21.

(Alcohol-Attributable Cancer Deaths and Years of Potential Life Lost (YPLL) in the US) "Overall, we found that alcohol use accounted for approximately 3.5% of all cancer deaths, or about 19 500 persons, in 2009. It was a prominent cause of premature loss of life, with each alcohol-attributable cancer death resulting in about 18 years of potential life lost. Although cancer risks were greater and alcohol-attributable cancer deaths more common among persons who consumed an average of more than 40 grams of alcohol per day (‡ 3 drinks), approximately 30% of alcohol-attributable cancer deaths occurred among persons who consumed 20 grams or less of alcohol per day. About 15% of breast cancer deaths among women in the United States were attributable to alcohol consumption."

Source:

David E. Nelson, Dwayne W. Jarman, Jürgen Rehm, Thomas K. Greenfield, Grégoire Rey, William C. Kerr, Paige Miller, Kevin D. Shield, Yu Ye, and Timothy S. Naimi. (2013). *Alcohol-Attributable Cancer Deaths and Years of Potential Life Lost in the United States*. *American Journal of Public Health*. e-View Ahead of Print. doi: 10.2105/AJPH.2012.301199

Abstract at <http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2012.301199>

22.

(Alcohol-Attributable Cancer Deaths in the US) "Our estimate of 19,500 alcohol-related cancer deaths is greater than the total number of deaths from some types of cancer that receive much more prominent attention, such as melanoma or ovarian cancer, ³⁶ and it amounted to more than two thirds of all prostate cancer deaths in 2009. ³⁶ Reducing alcohol consumption is an important and underemphasized cancer prevention strategy, yet receives surprisingly little attention among public health, medical, cancer, advocacy, and other organizations in the United States, especially when compared with efforts related to other cancer prevention topics such as screening, genetics, tobacco, and obesity."

Source:

David E. Nelson, Dwayne W. Jarman, Jürgen Rehm, Thomas K. Greenfield, Grégoire Rey, William C. Kerr, Paige Miller, Kevin D. Shield, Yu Ye, and Timothy S. Naimi. (2013). Alcohol-Attributable Cancer Deaths and Years of Potential Life Lost in the United States. *American Journal of Public Health*. e-View Ahead of Print. doi: 10.2105/AJPH.2012.301199

Abstract at <http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2012.301199>

23.

(Suicide 2010) The US Centers for Disease Control reports that in 2010, there were a total of 38,364 deaths from suicide in the US.

Source:

Sherry L. Murphy, BS; Jiaquan Xu, MD; and Kenneth D. Kochanek, MA, Division of Vital Statistics, "Deaths: Final Data for 2010," (Atlanta, GA: Centers for Disease Control), Vol. 61, Number 4, May 8, 2013, Table 10.

http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf

24.

(Drug-Induced Deaths 2010) "In 2010, a total of 40,393 persons died of drug-induced causes in the United States (Tables 10, 12 and 13). This category includes deaths from poisoning and medical conditions caused by use of legal or illegal drugs, and also includes deaths from poisoning due to medically prescribed and other drugs. It excludes unintentional injuries, homicides, and other causes indirectly related to drug use, as well as newborn deaths due to the mother's drug use. (For a list of drug-induced causes, see 'Technical Notes.' See also the discussion of poisoning mortality that uses the more narrow definition of poisoning as an injury in the section titled "Injury mortality by mechanism and intent.")

"In 2010, the age-adjusted death rate for drug-induced causes for the U.S. population increased 2.4 percent from 12.6 in 2009 to 12.9 in 2010 (Internet Tables I-3 and I-4). For males in 2010, the age-adjusted death rate for drug-induced causes was 1.6 times the rate for females. The age-adjusted death rate for black females was 45.6 percent lower than the rate for white females, and the rate for black males was 34.5 percent lower than the rate for white males.

"Among the major race-sex and race-ethnic-sex groups in 2010 from 2009, the age-adjusted death rate for drug-induced causes increased significantly for white males (2.3 percent), white females (6.5 percent), non-Hispanic white males (3.1 percent), and non-Hispanic white females (6.6 percent), and decreased significantly for black males (6.5 percent), AIAN males (16.3 percent), and non-Hispanic black males (7.0 percent). Other major race-sex and race-ethnic-sex groups did not change significantly."

Source:

Sherry L. Murphy, BS; Jiaquan Xu, MD; and Kenneth D. Kochanek, MA, Division of Vital Statistics, "Deaths: Final Data for 2010," (Atlanta, GA: Centers for Disease Control), Vol. 61, Number 4, May 8, 2013, pp. 17-18.

http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf

25.

(Homicides 2010) The US Centers for Disease Control reports that in 2010, there were a total of 16,259 deaths by homicide in the US.

Source:

Sherry L. Murphy, BS; Jiaquan Xu, MD; and Kenneth D. Kochanek, MA, Division of Vital Statistics, "Deaths: Final Data for 2010," (Atlanta, GA: Centers for Disease Control), Vol. 61, Number 4, May 8, 2013, Table 10.

http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf

26.

(Global Estimated Drug-Related Mortality, 2011) "UNODC estimates that there were between 102,000 and 247,000 drug-related deaths in 2011, corresponding to a mortality rate of between 22.3 and 54.0 deaths per million population aged 15-64. This represents between 0.54 per cent and 1.3 per cent of mortality from all causes globally among those aged 15-64.²⁰ The extent of drug-related deaths has essentially remained unchanged globally and within regions."

Source:

UNODC, World Drug Report 2013 (United Nations publication, Sales No. E.13.XI.6), p. 10.

https://www.unodc.org/unodc/secured/wdr/wdr2013/World_Drug_Report_2013.p...

27.

(Alcohol Poisoning Deaths in the US, 2010-2012) "On average, 6 people died every day from alcohol poisoning in the US from 2010 to 2012. Alcohol poisoning is caused by drinking large quantities of alcohol in a short period of time. Very high levels of alcohol in the body can shutdown critical areas of the brain that control breathing, heart rate, and body temperature,

resulting in death. Alcohol poisoning deaths affect people of all ages but are most common among middle-aged adults and men."

Source:

"Alcohol Poisoning Deaths: A deadly consequence of binge drinking," CDC Vital Signs, January 2015, p. 1.

<http://www.cdc.gov/vitalsigns/alcohol-poisoning-deaths/>

<http://www.cdc.gov/vitalsigns/pdf/2015-01-vitalsigns.pdf>

28.

(Leading Causes of Death by Race/Ethnicity, 2008) The Centers for Disease Control reported that in 2008, HIV disease was the 25th leading cause of death in the US for non-Hispanic whites, the 10th leading cause of death for non-Hispanic blacks, and the 17th leading cause of death for Hispanics.

Source:

Heron, Melonie P., PhD, "Deaths: Leading Causes for 2008," National Vital Statistics Reports, Vol. 60, No. 6 (Hyattsville, MD: National Center for Health Statistics, June 6, 2012), p. 12, Table E.

http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_06.pdf

29.

(Deaths and Serious Patient Outcomes from FDA-Approved Drugs) "These data describe the outcome of the patient as defined in U.S. reporting regulations (21 CFR 310.305, 314.80, 314.98, 600.80) and Forms FDA 3500 and 3500A (the MedWatch forms). *Serious* means that one or more of the following outcomes were documented in the report: death, hospitalization, life-threatening, disability, congenital anomaly and/or other serious outcome. Documenting one or more of these outcomes in a report does not necessarily mean that the suspect product(s) named in the report was the cause of these outcomes."

AERS

1

Patient Outcomes by Year

Year
Death
Serious

2000
19,445
153,818

2001
23,988
166,384

2002
28,181
159,000

2003
35,173
177,008

2004
34,928
199,510

2005
40,238
257,604

2006

37,465
265,130

2007
36,834
273,276

2008
49,958
319,741

2009
63,846
373,535

2010
82,724
471,291

Total 2000-2010
452,780
2,816,297

Total 2001-2005
162,508

959,506

Total 2006-2010

270,827

1,702,973

% Chg

+66.7%

+77.5%

1 AERS = Adverse Events Reporting System. This system managed by the US Food and Drug Administration (FDA) contains over four million reports of adverse events and reflects data from 1969 to the present. Data from AERS are presented as summary statistics. These summary statistics cover data received over the last ten years. These data are presented at the individual report level; some of the numbers may reflect duplicate reporting due to factors such as follow-up reports received on a case or different persons reporting on the same patient case.

Source:

"AERS Patient Outcomes by Year," Food and Drug Administration (Washington, DC: U.S. Department of Health and Human Services, March 31, 2010).

<http://www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Surveil...>

(Illicit Drug Use) "Illicit drug use is associated with suicide, homicide, motor-vehicle injury, HIV infection, pneumonia, violence, mental illness, and hepatitis. An estimated 3 million individuals in the United States have serious drug problems. Several studies have reported an undercount of the number of deaths attributed to drugs by vital statistics; however, improved medical treatments have reduced mortality from many diseases associated with illicit drug use. In keeping with the report by McGinnis and Foege, we included deaths caused indirectly by illicit drug use in this category. We used attributable fractions to compute the number of deaths due to illicit drug use. Overall, we estimate that illicit drug use resulted in approximately 17000 deaths in 2000, a reduction of 3000 deaths from the 1990 report."

Source:

Mokdad, Ali H., PhD, James S. Marks, MD, MPH, Donna F. Stroup, PhD, MSc, Julie L. Gerberding, MD, MPH, "Actual Causes of Death in the United States, 2000," *Journal of the American Medical Association*, (March 10, 2004), G225 Vol. 291, No. 10, 1242.

<http://www.csdp.org/research/1238.pdf>

31.

(Homicide Rates - Basic International Comparisons, 2012) "The global average homicide rate stands at 6.2 per 100,000 population, but Southern Africa and Central America have rates over four times higher than that (above 24 victims per 100,000 population), making them the sub-regions with the highest homicide rates on record, followed by South America, Middle Africa and the Caribbean (between 16 and 23 homicides per 100,000 population). Meanwhile, with rates some five times lower than the global average, Eastern Asia, Southern Europe and Western Europe are the sub-regions with the lowest homicide levels.

"Almost three billion people live in an expanding group of countries with relatively low homicide rates, many of which, particularly in Europe and Oceania, have continued to experience a decrease in their homicide rates since 1990. At the opposite end of the scale, almost 750 million people live in countries with high homicide levels, meaning that almost half of all homicides occur in countries that make up just 11 per cent of the global population and that personal security is still a major concern for more than 1 in 10 people on the planet."

Source:

UNODC Global Study on Homicide 2013 (United Nations publication, Sales No. 14.IV.1), p. 12.

http://www.unodc.org/documents/gsh/pdfs/2014_GLOBAL_HOMICIDE_BOOK_web.pdf...

32.

(Leading Causes of Death 2000) "The leading causes of death in 2000 were tobacco (435,000 deaths; 18.1% of total US deaths), poor diet and physical inactivity (400,000 deaths; 16.6%), and alcohol consumption (85,000 deaths; 3.5%). Other actual causes of death were microbial agents (75,000), toxic agents (55,000), motor vehicle crashes (43,000), incidents involving firearms (29,000), sexual behaviors (20,000), and illicit use of drugs (17,000)."

Note: According to a correction published by the *Journal* on January 19, 2005, "On page 1240, in Table 2, '400,000 (16.6)' deaths for 'poor diet and physical inactivity' in 2000 should be '365,000 (15.2).' A dagger symbol should be added to 'alcohol consumption' in the body of the table and a dagger footnote should be added with 'in 1990 data, deaths from alcohol-related crashes are included in alcohol consumption deaths, but not in motor vehicle deaths. In 2000 data, 16,653 deaths from alcohol-related crashes are included in both alcohol consumption and motor vehicle death categories."

Source:

Mokdad, Ali H., PhD, James S. Marks, MD, MPH, Donna F. Stroup, PhD, MSc, Julie L. Gerberding, MD, MPH, "Actual Causes of Death in the United States, 2000," *Journal of the American Medical Association*, (March 10, 2004), G225 Vol. 291, No. 10, p. 1238, 1240.

<http://proxy.baremetal.com/csdp.org/research/1238.pdf>

Source for Correction: *Journal of the American Medical Association*, Jan. 19, 2005, Vol. 293, No. 3, p. 298.

33.

(Adverse Drug Reactions) "Adverse drug reactions are a significant public health problem in our health care system. For the 12,261,737 Medicare patients admitted to U.S. hospitals, ADRs were projected to cause the following increases: 2976 deaths, 118,200 patient-days, \$516,034,829 in total charges, \$37,611,868 in drug charges, and \$9,456,698 in laboratory charges. If all Medicare patients were considered, these figures would be 3 times greater."

Source:

C. A. Bond, PharmD, FASHP, FCCP, and Cynthia L. Raehl, PharmD, FASHP, FCCP, Department of Pharmacy Practice, School of Pharmacy, Texas Tech University Health Sciences Center, Amarillo, Texas, "Adverse Drug Reactions in United States Hospitals" *Pharmacotherapy*, 2006;26(5):601-608.

<http://www.ncbi.nlm.nih.gov/pubmed/16637789>

34.

(Adverse Drug Reaction Deaths in US Hospitals) "Our study revealed that experiencing an ADR [Adverse Drug Reaction] while hospitalized substantially increased the risk of death (1971 excess deaths, OR 1.208, 95% CI 1.184-1.234). This finding reflects about a 20% increase in mortality associated with an ADR in hospitalized patients. Extrapolating this finding to all patients suggests that 2976 Medicare patients/year and 8336 total patients/year die in U.S. hospitals as a direct result of ADRs; this translates to approximately 1.5 patients/hospital/year."

Source:

C. A. Bond, PharmD, FASHP, FCCP and Cynthia L. Raehl, PharmD, FASHP, FCCP, "Adverse Drug Reactions in United States Hospitals," *Pharmacotherapy*, 2006;26(5):601-608.

<http://www.medscape.com/viewarticle/531809>

<http://www.ncbi.nlm.nih.gov/pubmed/16637789>

35.

(Marijuana Safety - DEA Administrative Law Judge's Ruling)

"3. The most obvious concern when dealing with drug safety is the possibility of lethal effects. Can the drug cause death?

"4. Nearly all medicines have toxic, potentially lethal effects. But marijuana is not such a substance. There is no record in the extensive medical literature describing a proven, documented cannabis-induced fatality.

"5. This is a remarkable statement. First, the record on marijuana encompasses 5,000 years of human experience. Second, marijuana is now used daily by enormous numbers of people throughout the world. Estimates suggest that from twenty million to fifty million Americans routinely, albeit illegally, smoke marijuana without the benefit of direct medical supervision. Yet, despite this long history of use and the extraordinarily high numbers of social smokers, there are simply no credible medical reports to suggest that consuming marijuana has caused a single death.

"6. By contrast aspirin, a commonly used, over-the-counter medicine, causes hundreds of deaths each year.

"7. Drugs used in medicine are routinely given what is called an LD-50. The LD-50 rating indicates at what dosage fifty percent of test animals receiving a drug will die as a result of drug induced toxicity. A number of researchers have attempted to determine marijuana's LD-50 rating in test animals, without success. Simply stated, researchers have been unable to give animals enough marijuana to induce death.

"8. At present it is estimated that marijuana's LD-50 is around 1:20,000 or 1:40,000. In layman terms this means that in order to induce death a marijuana smoker would have to consume 20,000 to 40,000 times as much marijuana as is contained in one marijuana cigarette. NIDA-supplied marijuana cigarettes weigh approximately .9 grams. A smoker would theoretically have to consume nearly 1,500 pounds of marijuana within about fifteen minutes to induce a lethal response.

"9. In practical terms, marijuana cannot induce a lethal response as a result of drug-related toxicity."

Source:

US Department of Justice, Drug Enforcement Administration, "In the Matter of Marijuana Rescheduling Petition" (Docket #86-22), September 6, 1988, p. 56-57.

<http://druglibrary.net/olsen/MEDICAL/YOUNG/young4.html>

36.

(Dangers of New Prescription Drugs) "Each year offers new examples of injuries and deaths caused by untoward dangers in prescription drugs. Prominent illustrations from recent years include Vioxx, a popular arthritis painkiller that more than doubled the risk of heart attacks and strokes,⁶ a risk that lingered long after users stopped taking the drug;⁷ 'Phen-fen,' a diet drug that caused heart damage;⁸ and Propulsid, a drug that reduced gastric acid but also threatened patients' hearts.⁹ Once information on these side-effects became known to the public, the manufacturers of each of these drugs stopped selling them and, eventually, paid millions or billions of dollars to settle claims for resulting injuries.¹⁰ Merck, for example, having withdrawn the profitable Vioxx drug¹¹ from the market in 2004, settled nearly 50,000 Vioxx cases in late 2007 for \$4.85 billion.¹² In 2009, Eli Lilly agreed to plead guilty and pay \$1.415 billion in criminal and civil penalties for promoting its antipsychotic drug, Zyprexa, as suitable for uses not approved by the Food and Drug Administration ("FDA").¹³ These cases may be among the more prominent, but they represent just the tip of the iceberg of damage caused by prescription drugs."

Source:

Owen, David G., "Dangers in Prescription Drugs: Filling a Private Law Gap in the Healthcare Debate," Connecticut Law Review (Hartford, CT: University of Connecticut School of Law, February 2010) Volume 42, Number 3, p. 737.

<http://uconn.lawreviewnetwork.com/files/documents/DavidG.Owen-DangersinP...>

37.

(Acetaminophen-Related Liver Injury)

"... acetaminophen-related liver injury led to approximately

- 56,000 emergency department visits (1993–1999),
- 26,000 hospitalizations (1990–1999), and

- 458 deaths (1996–1998).

"Of these cases, unintentional acetaminophen overdose was associated with

- 13,000 emergency department visits (1993–1999),
- 2189 hospitalizations (1990–1999), and
- 100 deaths (1996–1998) (71 FR 77314 at 77318)."

Source:

Federal Register, "Organ-Specific Warnings; Internal Analgesic, Antipyretic, and Antirheumatic Drug Products for Over-the-Counter Human Use; Final Monograph," Vol. 74, No. 81, Wednesday, April 29, 2009, p. 19385.

<http://www.gpo.gov/fdsys/pkg/FR-2009-04-29/pdf/E9-9684.pdf>

38.

(NSAIDS) "Each year, use of NSAIDs Non-Steroidal Anti-Inflammatory Drugs! accounts for an estimated 7,600 deaths and 76,000 hospitalizations in the United States." NSAIDs include aspirin, ibuprofen, naproxen, diclofenac, ketoprofen, and tiaprofenic acid.!

Source:

Robyn Tamblyn, PhD; Laeora Berkson, MD, MHPE, FRCPC; W. Dale Jauphinee, MD, FRCPC; David Gayton, MD, PhD, FRCPC; Roland Grad, MD, MSc; Allen Huang, MD, FRCPC; Lisa Isaac, PhD; Peter McLeod, MD, FRCPC; and Linda Snell, MD, MHPE, FRCPC, "Unnecessary Prescribing of NSAIDs and the Management of NSAID-Related Gastropathy in Medical Practice," *Annals of Internal Medicine* (Washington, DC: American College of Physicians, 1997), September 15, 1997, 127:429-438.

<http://annals.org/article.aspx?articleid=710808>

Citing: Fries, JF, "Assessing and understanding patient risk," *Scandinavian Journal of Rheumatology Supplement*, 1992;92:21-4.

39.

(Lethal Dose by Substance) "The most toxic recreational drugs, such as GHB (gamma-hydroxybutyrate) and heroin, have a

lethal dose less than 10 times their typical effective dose. The largest cluster of substances has a lethal dose that is 10 to 20 times the effective dose: These include cocaine, MDMA (methylenedioxymethamphetamine, often called 'ecstasy') and alcohol. A less toxic group of substances, requiring 20 to 80 times the effective dose to cause death, include Rohypnol (flunitrazepam or 'roofies') and mescaline (peyote cactus). The least physiologically toxic substances, those requiring 100 to 1,000 times the effective dose to cause death, include psilocybin mushrooms and marijuana, when ingested. I've found no published cases in the English language that document deaths from smoked marijuana, so the actual lethal dose is a mystery."

Source:

Gable, Robert S., "The Toxicity of Recreational Drugs," American Scientist (Research Triangle Park, NC: Sigma Xi, The Scientific Research Society, May-June 2006) Vol. 94, No. 3, p. 207.

http://www.americanscientist.org/libraries/documents/200645104835_307.pd...

40.

(Opioid Overdose Mortality Rates In States With Medical Cannabis Laws) "Although the mean annual opioid analgesic overdose mortality rate was lower in states with medical cannabis laws compared with states without such laws, the findings of our secondary analyses deserve further consideration. State-specific characteristics, such as trends in attitudes or health behaviors, may explain variation in medical cannabis laws and opioid analgesic overdose mortality, and we found some evidence that differences in these characteristics contributed to our findings. When including state-specific linear time trends in regression models, which are used to adjust for hard-to-measure confounders that change over time, the association between laws and opioid analgesic overdose mortality weakened. In contrast, we did not find evidence that states that passed medical cannabis laws had different overdose mortality rates in years prior to law passage, providing a temporal link between laws and changes in opioid analgesic overdose mortality. In addition, we did not find evidence that laws were associated with differences in mortality rates for unrelated conditions (heart disease and septicemia), suggesting that differences in opioid analgesic overdose mortality cannot be explained by broader changes in health. In summary, although we found a lower mean annual rate of opioid analgesic mortality in states with medical cannabis laws, a direct causal link cannot be established."

Source:

Bacchuber, Marcus A., MD; Saloner, Brendan, PhD; Cunningham, Chinazo O., MD, MS; and Barry, Colleen L., PhD, MPP. "Medical Cannabis Laws and Opioid Analgesic Overdose Mortality in the United States, 1999-2010." JAMA Intern Med. doi:10.1001/jamainternmed.2014.4005. Published online August 25, 2014.

<http://archinte.jamanetwork.com/article.aspx?articleid=1898878>

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