Appendix: Data sources & methodology
The cost of mental illness: Massachusetts facts and figures

Prevalence of mental illness – United States 2016

This chart presents the past-year prevalence of serious psychological distress and several mental health conditions in the U.S. population, as determined by a variety of nationally-representative surveys. Prevalence statistics are retrieved from https://www.nimh.nih.gov/health/statistics/index.shtml, except for serious psychological distress and major depressive disorder. The original sources are listed below.

- Serious psychological distress: in adults during past 12 months. From National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov (link active as of 06/20/18). Variable: spdyr = 1 (adults only) Past year serious psychological distress indicator, recoded from K6SCMAX>=13 (based on past month and worst month in past year K6 score). Weight applied: DASWT_1: Combined 2015-2016 Das Analysis weight.
- Bipolar Disorder: 12-month prevalence of 2.8% of U.S. adult population. Harvard Medical School, 2007. National Comorbidity Survey (NSC). (2017, August 21). Retrieved from https://www.hcp.med.harvard.edu/ncs/index.php Data Table 2: 12-month prevalence DSM-IV/WMH-CIDI disorders by sex and cohort https://www.hcp.med.harvard.edu/ncs/ftpdir/table_ncsr_12monthprevgenderxage.pdf (links active as of 03/21/18)
- Major Depressive Disorder: 12-month prevalence of 6.0% of U.S. adults aged >18yrs. From: Past Year Mental Disorders among Adults in the United States: Results from the 2008-2012 Mental Health Surveillance Study, available at: http://www.samhsa.gov/data/sites/default/files/NSDUH-DR-N2MentalDis-2014-1/Web/NSDUH-DR-N2MentalDis-2014.htm (link active as of 12/9/16)
- Schizophrenia: 12-month prevalence of 0.3% of U.S. adult population. Original sources: McGrath J, Saha S, Chant D, Welham J. Schizophrenia: a concise overview of incidence, prevalence, and mortality. Epidemiol Rev. 2008;30:67-76. PMID: 18480098 https://academic.oup.com/epirev/article/30/1/67/621138, and Kessler RC, Birnbaum H, Demler O, Falloon IR, Gagnon E, Guyer M, Howes MJ, Kendler KS, Shi L, Walters E, Wu EQ. The prevalence and correlates of nonaffective psychosis in the National Comorbidity Survey Replication (NCS-R). Biol Psychiatry. 2005 Oct 15;58(8):668-76. PMID: 16023620 https://www.sciencedirect.com/science/article/pii/S0006322305004956?via%3Dihub (links active as of 03/21/18)
- Post-Traumatic Stress Disorder: 12-month prevalence of 3.6% of U.S. adult population. See bipolar disorder section above for original source.
- Generalized Anxiety Disorder: 12-month prevalence of 2.7% of U.S. adult population. See bipolar disorder section above for original source.
- Panic Disorder: 12-month prevalence of 2.7% of U.S. adult population. See bipolar disorder section above for original source.
- Obsessive Compulsive Disorder: 12-month prevalence of 1.2% of U.S. adult population. See bipolar disorder section above for original source.

State variation in prevalence of serious psychological distress – Massachusetts and United States 2015-2016

This chart presents the past-year prevalence of serious psychological distress in U.S. states.

From National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov link active as of 06/20/18). Variables: state, and spdyr = 1 (adults only) Past year serious psychological distress indicator, recoded from K6SCMAX>=13 (based on past month and worst month in past year K6 score). Weight applied: DASWT_1: Combined 2015-2016 Das Analysis weight.

Estimated number of people living with mental illness – Massachusetts 2016

The estimated number of people in the state are provided based on past-year prevalence percentages from the previous charts. Since some people receive multiple diagnoses of a serious mental illness, they could be represented multiple times in this chart.

Serious psychological distress during the past year is derived from National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov link active as of 06/20/18). Variables: state, and spdyr = 1 (adults only) Past year serious psychological distress indicator, recoded from K6SCMAX>=13 (based on past month and worst month in past year K6 score). Weight applied: DASWT_1: Combined 2015-2016 Das Analysis weight.

To estimate the prevalence of schizophrenia, bipolar disorder and major depressive disorder, we are applying percentages from Prevalence of Mental Illness – United States section, to Census Bureau statistics from 2016 (Adult Population in Massachusetts, Comparative Demographics Estimates, American Community Survey 1-Year Estimates: 5,432,832 (link active as of 1/8/19).

SPD	11.2%	608,477
MDD	6.0%	325,970
BD	2.8%	152,119
Schizophrenia	0.3%	16,298

Unmet need of mental health treatment – Massachusetts and United States 2016

This chart shows the percentage of adults who indicated an unmet need of mental health treatment.

National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov (link active as of 06/20/18). Variables:

- Row: State
- Column: AMHTXND2=1, perceived need, but did not receive mental health treatment in past year
- Control: spdyr=1, past year serious psychological distress
- Weight applied: DASWT_1
- Missing data values for AMHTXND2 are not included in total percentages
- Used weighted counts to determine the percentages

Unmet need of mental health treatment due to costs –Massachusetts and United States 2016

This chart shows the percentage of adults who indicated they could not afford mental health care despite an indication of need.

National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov (link active as of 06/20/18). Variables:

- Row: State
- Column: MHRCOST2=1, no mental health treatment in past year because could not afford cost
- Control: spdyr=1, past year serious psychological distress
- Weight applied: DASWT_1
- Missing data values for AMHTXND2 and MHRCOST2 are not included in total percentages
- Used weighted counts to determine the percentages

A respondent must have reported not receiving mental health treatment that was needed in the past year (AMHTXND2=1) in order to be asked the questions on the reason for not receiving treatment (i.e. costs).

Unmet need of mental health treatment due to costs differs by insurance coverage – United States 2016

Similar to the last chart, this chart also shows the number of people who did not receive mental health care due to costs in the past year, but in this case, the outcomes are determined for each type of insurance coverage, and on the national level only. State statistics could not be determined for this measure due to a maximum specification of three variables in the NSDUH R-DAS system.

From National Survey on Drug Use and Health, 2016 data (Stata) (http://datafiles.samhsa.gov/study-dataset/national-survey-drug-use-and-health-2016-nsduh-2016-ds0001-nid17185, link active as of 03/21/18). Variables:

- spdyr=1, past year serious psychological distress
- AMHTXND2=1, perceived need, but did not receive mental health treatment in past year
- MHRCOST2=1, no mental health treatment in past year because could not afford cost. A respondent must have reported not receiving mental health treatment that was needed in the past year (AMHTXND2=1) in order to be asked the questions on the reason for not receiving treatment.
- Covered by private insurance (irprvhlt=1)
- Covered by Medicare (irmedicr=1)
- Covered by Medicaid/CHIPCOV (irmcdchp=1)
- Covered by Tricare, Champus, ChampVA, VA, or Military health (irchmpus=1)
- Not covered by any health insurance (IRINSUR4=2)
- Missing data values for MHRCOST2 are included in total percentages
- Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C).

There is significant unmet need for mental health care in Massachusetts – Massachusetts 2016

This chart shows, among people who experienced serious psychological distress (which equals 11.2% of the Massachusetts adult population), the percentage of people who did not receive mental health care despite an indication of need. Among the latter group, we determined the percentage of people who did not receive mental health care due to costs.

National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov (link active as of 06/20/18). Variables:

- 1st step:
  - Row: State
  - Column: AMHTXND2=1, perceived need, but did not receive mental health treatment in past year
  - Control: spdyr=1, past year serious psychological distress
- 2nd step:
  - Row: State
  - Column: MHRCOST2=1, no mental health treatment in past year because could not afford cost
  - Control: spdyr=1, past year serious psychological distress
- Weight applied: DASWT_1
- Missing data values for AMHTXND2 and MHRCOST2 are not included in total percentages
- Used weighted counts to determine the percentages

A respondent must have reported not receiving mental health treatment that was needed in the past year (AMHTXND2=1) in order to be asked the questions on the reason for not receiving treatment.

People with mental illness have greater reliance on the safety net – Massachusetts 2015

This chart shows the percentage of people in each insurance category who experienced Serious Psychological Distress in the past year. The sample size for VA/military health insurance coverage was too small for Massachusetts.

From National Survey on Drug Use and Health, 2015 data (Stata) (http://datafiles.samhsa.gov/study-dataset/national-survey-drug-use-and-health-2015-nsduh-2015-ds0001-nid16894 link active as of 12/16/16).

- spdyr=1 – past year Serious Psychological Distress
- Covered by private insurance (irprvhlt=1)
- Covered by Medicare (irmedicr=1)
- Covered by Medicaid/CHIPCOV (irmcdchp=1)
- Covered by Tricare, Champus, ChampVA, VA, or Military health (irchmpus=1)
- Not covered by any health insurance (IRINSUR4=2)
- Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C)

Medicaid reimbursement rates to physicians are low – Massachusetts and United States 2016

The ratios of Medicaid-to-Medicare reimbursements to physicians for several services are provided showing that physicians receive a lower amount for treating a patient with Medicaid coverage compared to a patient with Medicare coverage. The chart also includes a comparison of this ratio between states in the U.S.

Data were retrieved from http://kff.org/medicaid/state-indicator/medicaid-to-medicare-fee-index (link active as of 10/26/16), timeframe 2016. Column variable: "All services"

"The Medicaid-to-Medicare fee index measures each state's physician fees relative to Medicare fees in each state. The Medicaid data are based on surveys sent by the Urban Institute to the forty-nine states and the District of Columbia that have a fee-for-service (FFS) component in their Medicaid programs (only Tennessee does not). These fees represent only those payments made under FFS Medicaid. The Medicare-to-Medicaid fee index is a computed ratio of the Medicaid fee for each service in each state to the Medicare fee for the same services. Comparable Medicare fees are calculated using relative value units, geographic adjusters, and conversion factor."

"The ACA included a mandatory two-year increase in fees for primary care services to Medicare levels for both Medicaid FFS and managed care in 2013 and 2014, known as the "fee bump". Federal funding for the fee bump ended in 2014; however, a number of states continued to fully or partially fund the fee increase."

Original source: Stephen Zuckerman, Laura Skopec, and Marni Epstein, "Medicaid Physician Fees after the ACA Primary Care Fee Bump," Urban Institute, March 2017.

Hospitalizations for mental illness - Massachusetts and United States 2014

Data are provided on the total number of hospitalization discharges, as well as the rate of hospitalizations per 100 patients (18 years and over), for hospital stays with a primary diagnosis code of schizophrenia, bipolar disorder, or major depressive disorder. Due to the presence of only one primary diagnosis code per hospital stay, the categories are mutually exclusive, despite a high degree of symptom overlap for these three diagnoses.

State and national data from 2014, retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 3/20/16). We tabulated the total number of discharges for each mental illness (principal diagnosis) in 2014, by age.

- Bipolar Disorder: ICD-9-CM principal diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principal diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95

The hospitalization rate per SMI patient is calculated by dividing the total number of discharges by the estimated number of adults (18+) in the U.S. and Massachusetts with SMI in 2014. The latter number is calculated by applying percentages from Prevalence of Mental Illness – United States to the number of adults in the U.S. and Massachusetts in 2014, retrieved from the Census Bureau statistics (link active as of 3/17/17)

Massachusetts adult population (18 years and over), Comparative Demographic Estimates, 2014 American Community Survey 1-Year Estimates: 5,354,723, equals:

- 58,902 adults with Schizophrenia (1.1%)
- 139,223 adults with Bipolar disorder: (2.6%)
- 321,283 adults with MDD (6.0%)

U.S. adult population (18 years and over), Comparative Demographic Estimates, 2014 American Community Survey 1-Year Estimates: 245,279,633=

- 2,698,076 adults with Schizophrenia (1.1%)
- 6,377,270 adults with Bipolar Disorder (2.6%)
- 14,716,778 adults with MDD (6.0%)

The percentage of hospitalizations of adults due to SMI in Massachusetts in 2014 is calculated by dividing the total number of SMI hospitalizations (schizophrenia + MDD + BD) by the total number of hospitalizations (672,510).

Length of stay for mental illness hospitalizations - Massachusetts and United States 2014

Data are provided on the average duration, as well as the total number of days for hospital stays for adults with a primary diagnosis code of schizophrenia, bipolar disorder, or major depressive disorder. Additionally, the average duration per hospital stay for all hospitalizations (which includes schizophrenia/bipolar disorder/major depressive disorder) is presented. Due to the presence of only one primary diagnosis code per hospital stay, the categories are mutually exclusive, despite a high degree of symptom overlap for these three diagnoses.

State and national data from 2014, retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 3/20/17). We tabulated the LOS (length of stay) in days (mean) for each mental illness with ICD-9 codes below (principal diagnosis), and for all hospital stays in 2014. Total days in hospital are calculated by multiplying the average LOS with the number of discharges.

- Bipolar Disorder: ICD-9-CM principal diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principal diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95
- SMI total: combined number of hospital days for schizophrenia, major depressive disorder, and bipolar disorder

Hospitalizations of young patients with psychosis - Massachusetts 2014

Data are provided on the ratio of hospitalizations for psychotic disorder NOS to schizophrenia, and average duration for youth and adults with a primary diagnosis code of psychotic disorder NOS and schizophrenia. Due to the presence of only one primary diagnosis code per hospital stay, the categories are mutually exclusive, despite a high degree of symptom overlap for these diagnoses.

National data from 2014, retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 12/14/16). We tabulated the total number of discharges, and the LOS (length of stay) in days (mean) for each mental illness with ICD-9 codes below (principal diagnosis) by age category in 2014. The ratio in chart 1 is calculated by dividing the number of hospitalizations for psychotic disorder NOS by the number of hospitalizations for schizophrenia for each respective age category.

- Psychotic Disorder, Not Otherwise Specified: ICD-9-CM principal diagnosis codes 298.9
- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95

Hospitalizations of elderly patients with serious mental illness - Massachusetts 2014

Data are provided on the average duration of hospital stays for adults aged 65+ and 18-64 yr with a primary diagnosis code of schizophrenia, bipolar disorder, or major depressive disorder. Due to the presence of only one primary diagnosis code per hospital stay, the categories are mutually exclusive, despite a high degree of symptom overlap for these three diagnoses.

State and national data from 2014, retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 03/21/18). We tabulated the LOS (length of stay) in days (mean) for each mental illness with ICD-9 codes below (principal diagnosis) in 2014, by age. The total number of days for each age group was divided by the total number of hospitalizations to calculate the average length of stay.

- Bipolar Disorder: ICD-9-CM principal diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principal diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95

Trends in length of stay for schizophrenia hospitalizations - Massachusetts, 1997-2014

Here we provide the trend in average hospital stay duration from 1997 until 2014 of hospital stays with schizophrenia as primary diagnosis, compared to hospital stays with three other, non-mental health care related hospital stays.

A previous version of this chartbook showed incorrect data for kidney transplants, and did not show the hip replacement data.

State statistics from 1997 to 2014, retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 12/12/16). We tabulated LOS (length of stay) in days (mean) for each year and each mental illness using the "Trends" option. Percentages are a direct comparison between values for 1997 and 2014.

- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95
- Heart Attack (Acute Myocardial Infarction): ICD-9-CM principal diagnosis codes 410.00-410.92
- Kidney Transplant: ICD-9-CM principal procedure code 55.61-55.69
- Total hip replacement: ICD-9-CM principal procedure code 81.51

Average hospital costs for mental illness hospitalizations - Massachusetts and United States 2014

This chart shows the average hospital costs per stay for hospitalizations with primary diagnosis code for schizophrenia, bipolar disorder, or major depressive disorder.

State statistics from 2014, retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 12/12//16). We tabulated the number of discharges, and average costs, for each mental illness below (principal diagnosis).

Costs were converted from 2014 U.S.$ to 2018 U.S.$ with conversion factor 1.05218 (http://www.calculator.net/inflation-calculator.html).

- Bipolar Disorder: ICD-9-CM principal diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principal diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95

Total hospital costs for mental illness hospitalizations - Massachusetts 2014

The data presented in this chart shows the total hospital costs for 2014 discharges with primary diagnosis code for schizophrenia, bipolar disorder, or major depressive disorder.

State statistics from 2014 were retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 12/12/16). We tabulated the number of discharges, and average costs, for each mental illness below (principal diagnosis). Total hospital costs for each mental illness are calculated by multiplying the mean costs with the number of discharges.

Costs were converted from 2014 U.S.$ to 2018 U.S.$ with conversion factor 1.05218 (http://www.calculator.net/inflation-calculator.html).

- Bipolar Disorder: ICD-9-CM principal diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principal diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95
- SMI total: combined costs for schizophrenia, major depressive disorder, and bipolar disorder

Total hospital costs for mental illness hospitalizations by insurance type – Massachusetts 2014

The data presented in this chart shows the total hospital costs for 2014 discharges with primary diagnosis code for schizophrenia, bipolar disorder, or major depressive disorder by insurance type

State statistics from 2014 were retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 1/8/19). We tabulated the number of discharges, and average costs, for each mental illness below (principal diagnosis), by insurance type. Total hospital costs for each mental illness for each payer are calculated by multiplying the mean costs with the number of discharges, then divided by the total costs (Medicare + Medicaid + Private insurance + Other + Uninsured) to obtain a percentage.

Hospitalizations for which the primary payer is 'missing' were excluded. The percentage of missing values for primary payer was 0.2% for all hospitalizations (responsible for 0.2% of total costs) and 0 for serious mental illness.

- Bipolar Disorder: ICD-9-CM principal diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principal diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95

Costs were converted from 2014 U.S.$ to 2018 U.S.$ with conversion factor 1.05218 (http://www.calculator.net/inflation-calculator.html).

State mental health agency spending – Massachusetts and United States 2013

This chart provides data on state mental health agency expenditures per capita of each state. The expenditures are split up between spending on community-based mental health programs, mental health services in state psychiatric hospitals, and additional costs related to administration, training, research, and evaluation.

From: State Mental Health Agency-Controlled Expenditures for Mental Health Services (link active as of 12/9/16) State Fiscal Year 2013, NASMHPD Research Institute, Inc. Table 2: SMHA-Controlled expenditures by type of program (in Millions), FY'13. The specific SMHA Expenditures were divided by

the number of people in each respective state and total U.S. in 2013, retrieved from the Census Bureau statistics (Total Population, 2013 American Community Survey 1-Year Estimates, link active as of 12/9/16)

Costs were converted from 2013 U.S.$ to 2018 U.S.$ with conversion factor 1.06765 (http://www.calculator.net/inflation-calculator.html).

Availability of behavioral health care professionals– Massachusetts and United States 2017

This chart shows the ratio of behavioral health care professionals to the general population on a state- and national level.

- Data on number of behavioral health care professionals (including: psychiatrists, psychologists, licensed clinical social workers, counselors, marriage and family therapists and advanced practice nurses specializing in behavioral health care) were retrieved from County Health Rankings & Roadmaps (link active as of 2/19/18), via 2017, 'Measures', 'Health Factors', 'Clinical Care, and 'Mental health providers'. In the left column, a measure 'overall in Minnesota' indicates the average number of people per provider. This number is converted to the number of providers per 10,000 people for each state.
    - Note: data comes from the National Provider Identification data file - as participation is required for providers who transmit electronic health records, very small providers may not be included. In contrast, some professionals may have stopped practicing or are not accepting patients, but are still active in the registration system.

To determine the average number of providers per 10,000 people in the United States, we utilized Population Estimates for 2017, retrieved from the Census Bureau statistics (Annual estimates of the resident population 2017, link active as of 2/19/18). The number of providers were calculated for each state (state population divided by the average number of people per provider), and added together to determine the total number of providers in the US. This number was divided by the total population in the US (sum of population of all states), and multiplied by 10,000 to determine the number of providers per 10,000 people in the US.

Availability of behavioral health care professionals and hospital beds – Massachusetts and United States 2013

This chart contains data on the number of psychiatrists, psychologists, primary care physicians, as well as the number of psychiatric care beds per 10,000 residents on a state-level compared to the U.S. as a whole.

Source: Area Health Resource Files 2013, MS Access Database (except Psychologists, see below). Variables used:

- Population Estimate 2013, retrieved from the Census Bureau statistics (Total Population, American Community Survey 1-Year Estimate, link active as of 3/20/17)
- All variables are divided by the overall population for an estimate per 10,000 residents

Providers:

- MD's, NF, Psychiatry, Total Pat Care, 2013
- Phys, NF, Prim Care Pat Care Excl Hsp Rsdnts, 2013
- Active Psychologists (with Ph.D. or professional degree), 2013

  - Source: American Psychological Association, 2005-2013 Demographics of the U.S. Psychology Workforce, July 2015. Report: http://www.apa.org/workforce/publications/13-demographics/index.aspx?tab=1 Data retrieved from: http://www.apa.org/workforce/publications/13-demographics/appendix-b.pdf (links active as of 12/9/2016).

Hospitals beds:

- STG Psychiatric Care, Beds Set Up, 2013

Estimates of minimally required number of psychiatric beds is derived from "The Shortage of Public Hospital Beds for Mentally Ill Persons" by the Treatment Advocacy Center, page 8.

Shortage of behavioral health care professionals – Massachusetts 2018

This infographic represents the number of full-time equivalent behavioral health care professionals who are in the current workforce in designated shortage areas and facilities in Massachusetts (as determined by the Health Resources and Services Administration) and the number of providers necessary to reach an optimal provider-to-patient ratio.

Source: Health Resources and Services Administration, Health Professional Shortage Area (HPSA), Mental Health. Retrieved from: https://datawarehouse.hrsa.gov/data/datadownload.aspx Link active as of 01/14/19. Data as of 01/13/19

File: HPSA - Mental Health, file name: BCD_HPSA_FCT_DET_MH

- Filter data by:
  - Discipline Class Description: Mental Health
  - HPSA Status Description: "designated"
  - HPSA State Abbreviation: MA
  - Only select unique HPSA Source Identification Numbers
  - HPSA Type Description: All, or Correctional Facilities separately
- Sum column totals of remaining rows:
  - HPSA Total Full-Time Equivalent Clinicians = 9
  - HPSA Shortage = 15
    - For Correctional Facilities, HPSA Shortage = 2

State population in behavioral health care professional shortage areas

This chart shows the percentage of each state's population that resides in a designated behavioral health care professional shortage area and/or is served by a facility that has indicated a shortage of behavioral health care professionals, as determined by the Health Resources and Services Administration.

Source: Health Resources and Services Administration, Health Professional Shortage Area (HPSA), Mental Health. Retrieved from: https://datawarehouse.hrsa.gov/data/datadownload.aspx Link active as of 01/13/2019. Data as of 01/13/19

File: HPSA - Mental Health, file name: BCD_HPSA_FCT_DET_MH

- Filter data by:
  - Discipline Class Description: Mental Health

  - HPSA Status Description: “designated”
  - HPSA State Abbreviation: every state separately
  - Only select unique HPSA Source Identification Numbers
  - HPSA Designation Population: exclude value 1
- Sum column totals of remaining rows:
  - HPSA Designation Population in MA = 3% (224,121) of 6,859,819, Annual Estimates of the Resident Population: 2017 for each state and the US, found at Census Bureau statistics (link active as of 01/13/19))

Contact with Criminal Justice System – Massachusetts 2016

Using data from the National Survey on Drug Use and Health, we determined the percentage of people who have been arrested (1, 2 or 3 or more times) or have been on parole/supervised release, or were on probation in the past year (when data are available), split up by serious psychological distress status.

National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov (link active as of 06/20/18). Variables:

- 1st step: Determine overall adult population in each state (total survey populations)
  - Row: State
  - Column: Past year serious psychological distress indicator (spdyr=1)
  - Control: Catag18 = 1 (18 or older)
- 2nd step:
  - Row: State (filter for specific state, otherwise cell size is too small to display results for some state x insurance categories)
  - Column: Past year serious psychological distress indicator (spdyr=1)
  - Control:
    - On parole/supervised release past 12 months (parolrel=1)
    - On probation at any time past 12 months (probaton=1)
    - Number of times arrested & booked in the past 12 months (NOBOOKY2=1). Multiple arrest and On Parole categories are too small to show.
- Weight applied: DASWT_1
- Missing data values are included, due to using total survey population.
- Used weighted counts to determine the percentages.
- For U.S. average, using SPD variable as row, and incarceration variables as columns, after determining the overall adult population with and without SPD.

Mental health issues in prison and jail populations – United States

This chart contains data from both the National Inmate Survey (state and jail inmates) and the National Survey of Drug Use and Health (non-institutionalized population) to compare the percentage of people with Serious Psychological Distress in the past month.

- Current Serious Psychological Distress status of inmates in prisons/jails:
  From Bureau of Justice report: Sexual Victimization in Prisons and Jails Reported by Inmates, 2011-12 (table 14, page 24), based on data from the National Inmate Survey, 2011–12 https://www.bjs.gov/content/pub/pdf/svpjri1112.pdf (link active as of 12/9/16)
- In non-institutionalized adult population. From National Survey on Drug Use and Health, (http://datafiles.samhsa.gov/study-dataset/national-survey-drug-use-and-health-2016-nsduh-2016-ds0001-nid17185, link active as of 03/21/18). Variable: spdmon=1 – Past

month serious psychological distress indicator, recoded from K6SCMAX>=13 (based on past month and worst month K6 score). Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C).

State Prison Population with Serious Mental Illness – Massachusetts

This chart shows the percentage of state prisoners previously diagnosed with Serious Mental Illnesses, and the overlap in diagnoses. The Venn diagram shows percentages in each category with one, two or three diagnoses of depressive disorder, bipolar disorder (or manic depression, or mania), and schizophrenia (or other psychotic disorder). Due to rounding, percentages in Venn diagram may not add up to the total percentage of state prisoners with any Serious Mental Illness (bar chart).

- Lifetime diagnosis of specific SMI among state prison inmates:
  Survey of Inmates in State and Federal Correctional Facilities, 2004 (ICPSR 4572). At http://www.icpsr.umich.edu/icpsrweb/NACJD/studies/4572 (link active as of 12/15/16).
  Dataset DS2: State Numeric. ASCII+SAS setup files, converted to Stata files using StatTransfer. Variables used:
  - State: V1056: S5Q15A_FIPS: AT ARREST - RESIDENCE (STATE) = 29
  - Mental illnesses:
    - Major Depressive Disorder: V2401: S9Q9A_1: EVER DIAGNOSED - A DEPRESSIVE DISORDER
    - Bipolar Disorder: V2402: S9Q9A_2: EVER DIAGNOSED - MANIC-DEPRESSION, BIPOLAR DISORDER, OR MANIA
    - Schizophrenia: V2403: S9Q9A_3: EVER DIAGNOSED - SCHIZOPHRENIA OR ANOTHER PSYCHOTIC DISORDER
  - Weight: V2927 – FINALWT: FINAL WEIGHT
  - Missing data values are included in total percentage
  - Proportional Venn diagram created with Euler*APE*

Change in treatment before and during incarceration in prison and jails – United States

Using survey data from jail, state and federal prisons, we calculated the percentage of current inmates who have received medication or counseling in the year before arrest, and since admission. The group representing 100% consists of inmates who have been previously diagnosed with depressive disorder, bipolar disorder and/or schizophrenia, and who have ever received medication (in the "Medication" graph on the left) or counseling (in the "Counseling" graph on the right) in the past.

- Survey of Inmates in Local Jails, 2002 (ICPSR 4359).
  http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/4359 (link active as of 12/9/16).
  Dataset DS1: Numeric Data. ASCII+SAS setup files, converted to Stata files using StatTransfer. Variables used:
  - Weight: V2264 FINALWT - 2002 SILJ FINAL WEIGHT
  - Mental illness: Have you ever been told by a mental health professional, such as a psychiatrist or psychologist, that you had:
    - Major Depressive Disorder: V2022 S9Q10A_1 – A depressive disorder
    - Bipolar Disorder: V2023 S9Q10A_2 – Manic-depression, bipolar disorder, or mania
    - Schizophrenia: V2024 S9Q10A_3 – Schizophrenia or another psychotic disorder
  - Treatment variables:
    - V2030 S9Q11A - EVER BEEN MEDICATED FOR MENTAL PROBLEM

        - V2031 S9Q11B_1 - TAKING SUCH MED IN YEAR PRIOR TO ARREST
        - V2033 S9Q11C - TAKEN SUCH MED SINCE ADMISSION
        - V2038 S9Q13A – EVER RECEIVED COUNSELING FOR MENTAL HEALTH PROBLEMS
        - V2039 S9Q13B - RECEIVED SUCH COUNSELING IN PRIOR YEAR OF ARREST
        - V2040 S9Q13C - RECEIVED SUCH COUNSELING SINCE ADMISSION
- Survey of Inmates in State and Federal Correctional Facilities, 2004 (ICPSR 4572) http://www.icpsr.umich.edu/icpsrweb/NACJD/studies/4572 (link active as of 12/9/16). Dataset DS1 (Federal) & DS2 (State) Numeric Data. ASCII+SAS setup files, converted to Stata files using StatTransfer. Variables used:
    - Weight: V2927 FINALWT: FINAL WEIGHT
    - Mental illness: Have you ever been told by a mental health professional, such as a psychiatrist or psychologist, that you had:
        - Major Depressive Disorder: V2401 - S9Q9A_1: EVER DIAGNOSED - A DEPRESSIVE DISORDER
        - Bipolar Disorder: V2402 - S9Q9A_2: EVER DIAGNOSED - MANIC-DEPRESSION, BIPOLAR DISORDER, OR MANIA
        - Schizophrenia: V2403 - S9Q9A_3: EVER DIAGNOSED - SCHIZOPHRENIA OR ANOTHER PSYCHOTIC DISORDER
    - Treatment variables:
        - V2409 - S9Q10A: EVER TAKEN A MEDICATION FOR MENTAL CONDITIONS
        - V2410 - S9Q10B_1: IN YEAR PRIOR TO ADMISSION, TAKEN MEDICATION FOR MENTAL CONDITION
        - V2412 - S9Q10C: TAKEN MEDICATION FOR A MENTAL CONDITION SINCE ADMISSION
        - V2417 - S9Q12A: EVER RECEIVED COUNSELING FROM TRAINED PROFESSIONAL (because of mental or emotional problem)
        - V2418 - S9Q12B: RECEIVED COUNSELING DURING THE 12 MONTHS BEFORE ARREST
        - V2419 - S9Q12C: RECEIVED COUNSELING SINCE ADMISSION
    - Including missing-data values in percentages

Costs of Massachusetts State Prison Population with SMI

This chart provides an estimate on the number of state prisoners previously diagnose with serious mental illness, and an estimate of the overall annual costs of incarceration of these prisoners.

- Total general expenditures for corrections in Massachusetts in 2017: $954,978,000. From the Annual Survey of State Government Finances (General Expenditure – by function: Corrections) https://www.census.gov/programs-surveys/state.html (link active as of 1/14/19).
- Massachusetts Department of Correction – Prison Population Trends 2017 https://www.mass.gov/files/documents/2018/09/28/PrisonPopTrends_2017_Final.pdf (link active as of 1/14/19). Page 13: The total custody population in 2017 was 9,038. Thus, the average cost per inmate was $105,663.
- Used percentage of 26.6% from Survey of Inmates in State and Federal Correctional Facilities, 2004 (see State Prison Population with Serious Mental Illness) to calculate the number of Massachusetts state prison inmates with previous diagnosis of Serious Mental Illness = 26.6% of 9,038 = 2,404 and the costs for this group of people = 26.6% of $954,978,000 = $254,024,148

- Costs were converted from 2017 U.S.$ to 2018 U.S.$ with conversion factor 1.02130 (http://www.calculator.net/inflation-calculator.html).

Economic burden of serious mental illness – Massachusetts 2018

This chart shows an estimate of the total state economic burden of schizophrenia, bipolar disorder, and major depressive disorder. Due to symptom overlap, diagnoses of mental illnesses are not mutually exclusive, therefore, patients with two or more diagnoses may be represented in multiple categories.

- From: MacEwan JP, Seabury S, et al. Pharmaceutical innovation in the treatment of schizophrenia and mental disorders compared with other diseases. Innov Clin Neurosci. 2016 Aug 1;13(7-8):17-25. Using:
  - "Burden Per Patient" amount from table 1:
    - $46,537/Schizophrenia patient
    - $20,571/BP patient
    - $14,100/MDD patient
  - Prevalence numbers of mental illnesses from Estimated number of people living with mental illness – Massachusetts 2016
  - Amounts were converted from 2014 U.S.$ to 2018 U.S.$ with conversion factor 1.05218 (http://www.calculator.net/inflation-calculator.html).

Economic burden of serious mental illness – United States 2018

This chart shows an estimate of the total national economic burden of schizophrenia, bipolar disorder, and major depressive disorder. Due to symptom overlap, diagnoses of mental illnesses are not mutually exclusive, therefore, patients with two or more diagnoses may be represented in multiple categories.

- From: MacEwan JP, Seabury S, et al. Pharmaceutical innovation in the treatment of schizophrenia and mental disorders compared with other diseases. Innov Clin Neurosci. 2016 Aug 1;13(7-8):17-25. Using:
  - "Burden Per Patient" amount from table 1:
    - $46,537/Schizophrenia patient
    - $20,571/BP patient
    - $14,100/MDD patient
  - Prevalence numbers of mental illnesses from Prevalence of Mental Illness – United States
  - Adult population (18 and over) in 2016 of 249,489,772, retrieved from the Census Bureau statistics website (Comparative Demographic Estimates, 2016 American Community Survey 1-Year Estimates, link active as of 03/21/18)
  - Amounts were converted from 2014 U.S.$ to 2018 U.S.$ with conversion factor 1.05218 (http://www.calculator.net/inflation-calculator.html).

Lost productivity is the largest contributor to economic burden of serious mental illness – United States

This chart shows an estimate of the economic burden of schizophrenia, bipolar disorder, and major depressive disorder split in three categories: lost productivity, medical costs, and other costs. Due to symptom overlap,

diagnoses of mental illnesses are not mutually exclusive, therefore, patients with two or more diagnoses may be represented in multiple categories.

- Based on: MacEwan JP, Seabury S, et al. Pharmaceutical innovation in the treatment of schizophrenia and mental disorders compared with other diseases. Innov Clin Neurosci. 2016 Aug 1;13(7-8):17-25.
- The amounts were converted to proportions when not already available.
- See descriptions in original papers to get more details on subcategories that are used to determine how the total economic burden is calculated.
- Schizophrenia (see Table 1 in paper):
    - Original source: Cloutier M, Aigbogun MS, Guerin A, Nitulescu R, Ramanakumar AV, Kamat SA, DeLucia M, Duffy R, Legacy SN, Henderson C, Francois C, Wu E. The Economic Burden of Schizophrenia in the United States in 2013. J Clin Psychiatry. 2016 Jun;77(6):764-71.
    - Medical costs consist of "Excess direct health care costs" (Drugs, Outpatient, Inpatient, Emergency room, Long-term care, and Other medical services).
    - Lost productivity consists of "Excess indirect costs" (Unemployment, Productivity loss, Premature mortality (suicide), and Caregiving)
    - Other consists of "Law enforcement" (Incarceration, Judicial and legal services, Police protection), "Shelters for the homeless", and "Schizophrenia-related research and training".
    - "Cost offsets" were proportionally subtracted from Inpatient, Long-term care, Law enforcement, and Shelters for the homeless subcategories before creating a sum within each main category
- BD (see Table 1 in paper):
    - Original source: Wyatt RJ, Henter I. An economic evaluation of manic-depressive illness--1991. Soc Psychiatry Psychiatr Epidemiol. 1995 Aug;30(5):213-9.
    - Medical costs consist of "Treatment-related" (Total inpatient costs, Total outpatient costs, Total nursing home, intermediate, domiciliary care costs, Medication, Substance abuse)
    - Lost productivity consists of "Indirect costs" (Lost productivity homemakers, Lost productivity institutions, Lost productivity suicide, Lost family productivity, Los compensation).
    - Other consists of "Non-treatment-related" (Total crime (includes jails/prisons), Suicide (direct medical/law enforcement portion), Research/Training)
    - "Transfer costs" were proportionally subtracted from Total inpatient costs, Total nursing home, intermediate, domiciliary care costs, Shelters, and Total crime subcategories before creating a sum within each main category above
- MDD (see Table 2, part A, in paper):
    - Original source: Greenberg PE, Fournier AA, Sisitsky T, Pike CT, Kessler RC. J Clin Psychiatry. The economic burden of adults with major depressive disorder in the United States (2005 and 2010). 2015 Feb;76(2):155-62.
    - Medical costs consist of "Direct costs" (Medical services, Outpatient, Inpatient, Emergency Department, Other medical services, Pharmaceutical services)
    - Lost productivity consists of "Suicide-related costs" and "Workplace costs (Absenteeism, Presenteeism).

Substance misuse in people with Serious Psychological Distress – Massachusetts 2016

This chart provides data on the percentage of people who experienced serious psychological distress in the past 12 months and who were dependent on, or misused alcohol or illicit drugs during the same time frame.

From National Survey on Drug Use and Health (2-year R-DAS 2015-2016) https://rdas.samhsa.gov link active as of 06/20/18). Variables:

- Row: State (filter for specific state, otherwise cell size is too small to display results for some state x SPD categories).
- Column: Past year serious psychological distress indicator (spdyr=1)
- Control:
  - udpyilal=1, illicit drug or alcohol dependence or abuse in past year
  - abodalc=1, alchol dependence or abuse in past year
  - udpyill=1, any illicit drug dependence or abuse in past year
  - udpypnr=1, prescription pain reliever dependence or abuse in past year
- Weight applied: DASWT_1
- Missing data values are not included in the total percentages.
- Used weighted counts to determine the percentages.

Substance misuse in men and women with Serious Psychological Distress – United States 2016

This chart provides data on the percentage of men and women who experienced Serious Psychological Distress in the past 12 months and who were dependent on, or misused alcohol or illicit drugs during the same time frame.

From National Survey on Drug Use and Health, 2016 data (Stata) (https://datafiles.samhsa.gov/study-dataset/national-survey-drug-use-and-health-2016-nsduh-2016-ds0001-nid17185 link active as of 1/14/19). Variables:

- spdyr=1, past year Serious Psychological Distress
- udpyilal=1, illicit drug or alcohol dependence or abuse in past year
- abodalc=1, alchol dependence or abuse in past year
- udpyill=1, any illicit drug dependence or abuse in past year
- udpypnr=1, prescription pain reliever dependence or abuse in past year
- irsex = gender
- Missing data values are included in the total percentages.
- Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C)

Age trends in substance misuse in men and women with Serious Psychological Distress – United States 2016

This chart provides data on the percentage of men and women in different age categories who experienced Serious Psychological Distress in the past 12 months and who were dependent on, or misused alcohol or illicit drugs during the same time frame.

From National Survey on Drug Use and Health, 2016 data (Stata) (https://datafiles.samhsa.gov/study-dataset/national-survey-drug-use-and-health-2016-nsduh-2016-ds0001-nid17185 link active as of 1/14/19). Variables:

- spdyr=1, past year Serious Psychological Distress
- udpyilal=1, illicit drug or alcohol dependence or abuse in past year

- abodalc=1, alchol dependence or abuse in past year
- udpyill=1, any illicit drug dependence or abuse in past year
- udpypnr=1, prescription pain reliever dependence or abuse in past year
- irsex = gender
- CATAG6 = age categories
- Missing data values are included in the total percentages.
- Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C)

The rate of opioid-related hospitalizations is on the rise – Massachusetts and United States 2005-2016

This chart shows the rate of inpatient hospitalizations for opioid dependency, non-dependent misuse, and opioid overdoses for the state of Massachusetts and the US from 2005-2016.

State and national data from 2005-2016, retrieved from AHRQ HCUP Fast Stats, exported data table (Annual Rates tab; Setting: IP) https://www.hcup-us.ahrq.gov/faststats/OpioidUseServlet (link active as of 1/14/19). The following opioid-related diagnostic codes (all-listed diagnoses) are included in the chart:

- 304.00 – 304.02: Opioid type dependence
- 304.70 – 304.72: Combinations of opioid type drug with any other drug dependence
- 305.50 – 305.52: Opioid abuse
- 965.00 – 965.02; 965.09: Poisoning by opium (alkaloids), unspecified; heroin; methadone; other opiates and related narcotics
- 970.1: Poisoning by opiate antagonists
- E850.0 – E850.2: Accidental poisoning by heroin; methadone; other opiates and related narcotics
- E935.0 – E935.2: Heroin, methadone, other opiates and related narcotics causing adverse effects in therapeutic use
- E940.1: Opiate antagonists causing adverse effects in therapeutic use

The unit of analysis is the number of discharges per year.

The transition between ICD-9 and ICD-10 diagnostic coding system in Q4 2015 may have caused discontinuity in results.

Opioid-related emergency department visits are on the rise – Massachusetts and United States 2005-2016

This chart shows the rate of emergency department visits (treat-and-release only) for opioid dependency, non-dependent misuse, and opioid overdoses for the state of Massachusetts and the US from 2005-2016.

State and national data from 2005-2016, retrieved from AHRQ HCUP Fast Stats, exported data table (Annual Rates tab; Setting: ED) https://www.hcup-us.ahrq.gov/faststats/OpioidUseServlet (link active as of 1/14/19). The following opioid-related diagnostic codes (all-listed diagnoses) are included in the chart:

- 304.00 – 304.02: Opioid type dependence
- 304.70 – 304.72: Combinations of opioid type drug with any other drug dependence

- 305.50 – 305.52: Opioid abuse
- 965.00 – 965.02; 965.09: Poisoning by opium (alkaloids), unspecified; heroin; methadone; other opiates and related narcotics
- 970.1: Poisoning by opiate antagonists
- E850.0 – E850.2: Accidental poisoning by heroin; methadone; other opiates and related narcotics
- E935.0 – E935.2: Heroin, methadone, other opiates and related narcotics causing adverse effects in therapeutic use
- E940.1: Opiate antagonists causing adverse effects in therapeutic use

The unit of analysis is the number of discharges per year.

The transition between ICD-9 and ICD-10 diagnostic coding system in Q4 2015 may have caused discontinuity in results.

Opioid-related emergency department visits by age – Massachusetts and United States 2005-2016

This chart shows the rate of emergency department visits (treat-and-release only) for opioid dependency, non-dependent misuse, and opioid overdoses for the state of Massachusetts and the US from 2005-2016.

State and national data from 2005-2016, retrieved from AHRQ HCUP Fast Stats, exported data table (Annual Rates tab; Setting: ED) https://www.hcup-us.ahrq.gov/faststats/OpioidUseServlet (link active as of 1/14/19). The following opioid-related diagnostic codes (all-listed diagnoses) are included in the chart:

- 304.00 – 304.02: Opioid type dependence
- 304.70 – 304.72: Combinations of opioid type drug with any other drug dependence
- 305.50 – 305.52: Opioid abuse
- 965.00 – 965.02; 965.09: Poisoning by opium (alkaloids), unspecified; heroin; methadone; other opiates and related narcotics
- 970.1: Poisoning by opiate antagonists
- E850.0 – E850.2: Accidental poisoning by heroin; methadone; other opiates and related narcotics
- E935.0 – E935.2: Heroin, methadone, other opiates and related narcotics causing adverse effects in therapeutic use
- E940.1: Opiate antagonists causing adverse effects in therapeutic use

The unit of analysis is the number of discharges per year.

The transition between ICD-9 and ICD-10 diagnostic coding system in Q4 2015 may have caused discontinuity in results.

Change in insurance coverage of people hospitalized for opioid overdoses –United States 2005 - 2016

This chart shows the percentage of opioid-related hospitalizations and emergency department visits (treat-and-release only), by insurance coverage in the US for 2005 and 2016.

U.S. data from 2005 and 2016, retrieved from AHRQ HCUP Fast Stats, exported data table (Quarterly Payer Counts tab; Setting: IP & ED) https://www.hcup-us.ahrq.gov/faststats/OpioidUseServlet (link active as of 1/14/19). The following opioid-related diagnostic codes (all-listed diagnoses) are included in the chart:

- 304.00 – 304.02: Opioid type dependence
- 304.70 – 304.72: Combinations of opioid type drug with any other drug dependence
- 305.50 – 305.52: Opioid abuse
- 965.00 – 965.02; 965.09: Poisoning by opium (alkaloids), unspecified; heroin; methadone; other opiates and related narcotics
- 970.1: Poisoning by opiate antagonists
- E850.0 – E850.2: Accidental poisoning by heroin; methadone; other opiates and related narcotics
- E935.0 – E935.2: Heroin, methadone, other opiates and related narcotics causing adverse effects in therapeutic use
- E940.1: Opiate antagonists causing adverse effects in therapeutic use

The unit of analysis is the number of discharges per year.

Counts for inpatient and ED visits for each quarter were added together for both 2005 and 2016. The percentage for each insurance category was calculated by dividing the total yearly count for each respective insurance category by the total yearly count for all insurance categories. The insurance category "Uninsured" includes expected primary payer of self-pay, charity, no charge, Indian Health Services, county indigent, migrant health programs, Ryan White Act, Hill-Burton Free Care, or other State or local programs for the indigent that are not insurance programs.

The transition between ICD-9 and ICD-10 diagnostic coding system in Q4 2015 may have caused discontinuity in results.

Change in insurance coverage of people hospitalized for opioid overdoses –Massachusetts 2005 - 2016

This chart shows the percentage of opioid-related hospitalizations and emergency department visits (treat-and-release only), by insurance coverage in Massachusetts for 2005 and 2016.

Massachusetts data from 2005 and 2016, retrieved from AHRQ HCUP Fast Stats, exported data table (Quarterly Payer Counts tab; Setting: IP & ED) https://www.hcup-us.ahrq.gov/faststats/OpioidUseServlet (link active as of 1/14/19). The following opioid-related diagnostic codes (all-listed diagnoses) are included in the chart:

- 304.00 – 304.02: Opioid type dependence
- 304.70 – 304.72: Combinations of opioid type drug with any other drug dependence
- 305.50 – 305.52: Opioid abuse
- 965.00 – 965.02; 965.09: Poisoning by opium (alkaloids), unspecified; heroin; methadone; other opiates and related narcotics
- 970.1: Poisoning by opiate antagonists
- E850.0 – E850.2: Accidental poisoning by heroin; methadone; other opiates and related narcotics

- E935.0 – E935.2: Heroin, methadone, other opiates and related narcotics causing adverse effects in therapeutic use
- E940.1: Opiate antagonists causing adverse effects in therapeutic use

The unit of analysis is the number of discharges per year.

Counts for inpatient and ED visits for each quarter were added together for both 2005 and 2016. The percentage for each insurance category was calculated by dividing the total yearly count for each respective insurance category by the total yearly count for all insurance categories. The insurance category "Uninsured" includes expected primary payer of self-pay, charity, no charge, Indian Health Services, county indigent, migrant health programs, Ryan White Act, Hill-Burton Free Care, or other State or local programs for the indigent that are not insurance programs.

The transition between ICD-9 and ICD-10 diagnostic coding system in Q4 2015 may have caused discontinuity in results.

Prescribing of opioids started to decrease in 2011 – Massachusetts and United States 1998-2014

This chart shows data from ARCOS (Automation of Reports and Consolidated Orders System), which is a proxy for the quantity of DEA-controlled substances that are sold and dispensed to patients.

From https://www.deadiversion.usdoj.gov/arcos/#background (link active as of 10/02/17):

"ARCOS is an automated, comprehensive drug reporting system which monitors the flow of DEA controlled substances from their point of manufacture through commercial distribution channels to point of sale or distribution at the dispensing/retail level - hospitals, retail pharmacies, practitioners, mid-level practitioners, and teaching institutions. Included in the list of controlled substance transactions tracked by ARCOS are the following: All Schedules I and II materials (manufacturers and distributors); Schedule III narcotic and gamma-hydroxybutyric acid (GHB) materials (manufacturers and distributors); and selected Schedule III and IV psychotropic drugs (manufacturers only)."

The data are presented in "Morphine milligram equivalency per capita", by dividing the Morphine milligram equivalency for Massachusetts and the U.S. by the annual estimates of the respective resident population.

Fatal overdoses by opioids are on the rise – Massachusetts and United States 1998-2015

This data chart shows the rate of fatal poisoning due to opioids over time, based on data from the Centers of Disease Control and Prevention.

Data are retrieved from CDC Wonder (https://wonder.cdc.gov), Multiple Cause of Death Data. The ICD-10 codes include in this chart are:

T40.1 Poisoning by narcotics and psychodysleptics [hallucinogens] - heroin
T40.2 Poisoning by narcotics and psychodysleptics [hallucinogens] - other opioids
T40.3 Poisoning by narcotics and psychodysleptics [hallucinogens] - methadone
T40.4 Poisoning by narcotics and psychodysleptics [hallucinogens] - Other synthetic narcotics
T40.6 Poisoning by narcotics and psychodysleptics [hallucinogens] - Other and unspecified narcotics

Deaths with multiple codes from T40 category are classified in this order: heroin, methadone, opium, other opioids, other synthetic narcotics, other and unspecified narcotics.

The number of deaths for each year for each ICD-10 subcategory are summed, and divided by the annual estimates of the resident population for the United States or Massachusetts Census Bureau statistics (link active as of 10/13/17).

Disproportionate increase in heroin overdose deaths – Massachusetts and United States 1998-2015

This data chart shows the rate of fatal poisoning due to opioids over time, split by type of opioid (heroin, or other), based on data from the Centers of Disease Control and Prevention.

Data are retrieved from CDC Wonder (https://wonder.cdc.gov), Multiple Cause of Death Data. The ICD-10 codes include in this chart are:

Heroin:
T40.1 Poisoning by narcotics and psychodysleptics [hallucinogens] – heroin

Opioids:
T40.2 Poisoning by narcotics and psychodysleptics [hallucinogens] - other opioids
T40.3 Poisoning by narcotics and psychodysleptics [hallucinogens] - methadone
T40.4 Poisoning by narcotics and psychodysleptics [hallucinogens] - Other synthetic narcotics
T40.6 Poisoning by narcotics and psychodysleptics [hallucinogens] - Other and unspecified narcotics

Deaths with multiple codes from T40 category are classified in this order: heroin, methadone, opium, other opioids, other synthetic narcotics, other and unspecified narcotics.

The number of deaths for each year for each ICD-10 subcategory are summed, and divided by the annual estimates of the resident population for the United States or Massachusetts Census Bureau statistics (link active as of 10/13/17).

Age distribution of fatal overdoses by opioids and heroin – Massachusetts and United States 2011-2015

This data chart shows the rate of fatal poisoning due to opioids from 2011 to 2015 for both the US and Massachusetts, split by type of opioid (heroin, or other) and age, based on data from the Centers of Disease Control and Prevention.

Data are retrieved from CDC Wonder (https://wonder.cdc.gov), Multiple Cause of Death Data. The ICD-10 codes include in this chart are:

Heroin:
T40.1 Poisoning by narcotics and psychodysleptics [hallucinogens] – heroin

Opioids:
T40.2 Poisoning by narcotics and psychodysleptics [hallucinogens] - other opioids
T40.3 Poisoning by narcotics and psychodysleptics [hallucinogens] - methadone
T40.4 Poisoning by narcotics and psychodysleptics [hallucinogens] - Other synthetic narcotics
T40.6 Poisoning by narcotics and psychodysleptics [hallucinogens] - Other and unspecified narcotics

Deaths with multiple codes from T40 category are classified in this order: heroin, methadone, opium, other opioids, other synthetic narcotics, other and unspecified narcotics.

The number of deaths from 2011 to 2015 are summed for each ICD-10 subcategory, and for each 5-year age bin. These numbers are then divided by the sum of annual estimates of the resident population in 2011 to 2015, in each age category (annual estimates for age bins are included in CDC data output).