

Appendix: Data sources & methodology

The cost of mental illness: Massachusetts facts and figures

Prevalence of Mental Illness – United States 2015

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/prevalence/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, 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). Variable: spdyr = 1 (adults only) Past year serious psychological distress indicator, recoded from K6SCMAX \geq 13 (based on past month and worst month in past year K6 score). Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C).
- **Bipolar Disorder:** 12-month prevalence of 2.6% of U.S. adult population. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry*, 2005 Jun;62(6):617-27. <http://jamanetwork.com/journals/jamapsychiatry/fullarticle/208671> (link active as of 12/9/16)
 - In same source, co-morbidity with MDD: correlation of 0.63
- **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 1.1% of U.S. adult population. Regier DA, Narrow WE, Rae DS, Manderscheid RW, Locke BZ, Goodwin FK. The de facto mental and addictive disorders service system. Epidemiologic Catchment Area prospective 1-year prevalence rates of disorders and services. *Archives of General Psychiatry*. 1993 Feb;50(2):85–94. <http://jamanetwork.com/journals/jamapsychiatry/fullarticle/496058> (link active as of 12/9/16)
- **Post-Traumatic Stress Disorder:** 12-month prevalence of 3.5% of U.S. adult population. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry*, 2005 Jun;62(6):617-27
- **Generalized Anxiety Disorder:** 12-month prevalence of 3.1% of U.S. adult population. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry*, 2005 Jun;62(6):617-27
- **Panic Disorder:** 12-month prevalence of 2.7% of U.S. adult population. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry*, 2005 Jun;62(6):617-27
- **Obsessive Compulsive Disorder:** 12-month prevalence of 1.0% of U.S. adult population. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-

month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). Archives of General Psychiatry, 2005 Jun;62(6):617-27

Estimated number of people living with mental illness – Massachusetts 2015

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

Applying percentages from [Prevalence of Mental Illness – United States](#) section, to [Census Bureau statistics](#) from 2015 (Adult Population in Massachusetts, Comparative Demographics Estimates, American Community Survey 1-Year Estimates: 5,407,228 (link active as of 3/20/17) to estimate the number of people with SMI in the past year.

- SPD: 10.4% = 562,352
- Major depressive disorder: 6.0% = 324,434
- Bipolar disorder: 2.6% = 140,588
- Schizophrenia: 1.1% = 59,480

There is significant unmet need for mental health care in the U.S. – United States 2015

This chart shows, among people who experienced Serious Psychological Distress (which equals 10.4% of the U.S. 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.

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). Variables:

- spdyr=1, past year Serious Psychological Distress
- AMHTXND2=1, perceived need, but did not receive mental health treatment in past year
- MHCOST2=1, no mental health treatment in past year because could not afford cost
- Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C)
- Missing data values for AMHTXND2 and MHCOST2 are included in total 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.

Unmet need of mental health treatment due to costs – United States 2015

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.

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). Variables:

- spdyr=1, past year Serious Psychological Distress

- AMHTXND2=1, perceived need, but did not receive mental health treatment in past year
- MHCOST2=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 (irprvht=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 MHCOST2 are included in total percentages
- Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C).

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

This chart shows the percentage of people in each insurance category who experienced Serious Psychological Distress in the past year.

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 (irprvht=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 was 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 (principle diagnosis) in 2014, by age.

- Bipolar Disorder: ICD-9-CM principle diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principle diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principle 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 (principle 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 principle diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder: ICD-9-CM principle diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principle 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 three 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 (principle 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 principle diagnosis codes 298.9
- Schizophrenia: ICD-9-CM principle 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 two other, non-mental health care related hospital stays.

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 principle diagnosis codes 295.00-295.95
- Heart Attack (Acute Myocardial Infarction): ICD-9-CM principle diagnosis codes 410.00-410.92
- Kidney Transplant: ICD-9-CM principle procedure code 55.61-55.69

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 (principle diagnosis).

Costs were converted from 2014 to 2015 U.S. dollar amounts with conversion factor 1.01620 (<http://www.calculator.net/inflation-calculator.html>).

- Bipolar Disorder: ICD-9-CM principle diagnosis codes 296.00-296.16, 296.40-296.99
- Major Depressive Disorder ICD-9-CM principle diagnosis codes 296.20-296.36
- Schizophrenia: ICD-9-CM principle 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 (principle 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 to 2015 U.S. dollar amounts with conversion factor 1.01620 (<http://www.calculator.net/inflation-calculator.html>).

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

State mental health agency spending – Massachusetts 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 to 2015 U.S. dollar amounts with conversion factor 1.03114 (<http://www.calculator.net/inflation-calculator.html>).

Availability of mental health care providers– Massachusetts and United States 2016

This chart shows the ratio of mental health providers to the general population on a state- and national level.

- For each state, Population Estimates 2016 were retrieved from the [Census Bureau statistics](#) (Total Population, American Community Survey 1-Year Estimate, link active as of 1/25/16).
- Number of mental health providers (including: psychiatrists, psychologists, licensed clinical social workers, counselors, marriage and family therapists and advanced practice nurses specializing in mental health care) in each county were added together to provide a total for each state. Source: [County Health Rankings & Roadmaps](#) (link active as of 1/25/16)
 - 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.

Availability of mental health care providers and hospital beds

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

Shortage of Mental Health Care Providers

This infographic represents the number of full-time equivalent mental health providers who are in the current workforce in designated shortage areas and facilities (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/Tools/HDWReports/Reports.aspx>. Link active as of 3/20/17.

File: Shortage Areas, Health Professional Shortage Area (HPSA) - Basic Mental Health Care - Designated HPSA Statistics. Table 5. Data as of 1/1/17.

- “Percent of need met” is 51.89% for mental health providers, and FTE needed is 20 (=48.11%). Thus, optimal FTE (100%) is 42, and current workforce is 22.

File: Shortage Areas, Health Professional Shortage Area (HPSA) - Basic Mental Health Care - Designated HPSA Detail. Data as of 1/1/17.

- The sum of “# of FTEs short” at HPSA Correctional Facilities (Designation Type) in Massachusetts is 15.3 FTE.

Contact with Criminal Justice System – United States 2015

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, split up by Serious Psychological Distress status.

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):

- Past year serious psychological distress indicator (spdyr=1)
 - On parole/supervised release past 12 months (parolrel=1)
 - On probation at any time past 12 months (prbaton=1)
 - Number of times arrested & booked in the past 12 months (NOBOOKY2=1, 2 or 3)
 - Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C)

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, , 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). 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 EulerAPE

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 2015: \$1,102,746,000. 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 11/08/17).
- Massachusetts Department of Correction – Prison Population Trends 2015 <http://www.mass.gov/eopss/docs/doc/research-reports/pop-trends/prisonpoptrends-2015-final.pdf> (link active as of 11/08/17). Page 12: The total custody population in 2015 was 10,447. Thus, the average cost per inmate in 2015 was \$105,556.
- 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 = 17% of 10,447 = 2,779 and the costs for this group of people = 17% of \$1,102,746,000 = \$293,330,436

Economic burden of serious mental illness – Massachusetts 2015

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 2015](#)
 - Conversion factor of 1.01620 to obtain estimate economic burden for each mental illness in 2015 U.S. dollar amounts (<http://www.calculator.net/inflation-calculator.html>).
- Schizophrenia: 1.1% = 59,480
 - Bipolar disorder: 2.6% = 140,588
 - Major depressive disorder: 6.0% = 324,434

Economic burden of serious mental illness – United States 2015

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 2015 of 247,789,111, retrieved from the [Census Bureau statistics](#) (Comparative Demographic Estimates, 2015 American Community Survey 1-Year Estimates, link active as of 12/9/16)
 - Conversion factor of 1.01620 to obtain estimate economic burden for each mental illness in 2015 U.S. dollar amounts (<http://www.calculator.net/inflation-calculator.html>).
- Schizophrenia: 1.1% = 2,698,076
- Bipolar disorder: 2.6% = 6,377,270
- Major depressive disorder: 6.0% = 14,716,778

Substance abuse in people with Serious Psychological Distress – United States 2015

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 abused alcohol or illicit drugs during the same time frame.

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). Variables:

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

- abodalc=1, alcohol dependence or abuse in past year
- udpyll=1, any illicit drug dependence or abuse in past year
- udpypr=1, prescription pain reliever dependence or abuse in past year
- Weight applied: FIN PRSN-LEVEL SMPLE WGHT (ANALWT_C)

The rate of opioid-related hospitalizations is on the rise – Massachusetts and United States 2005-2014

This chart shows the rate of inpatient hospitalizations for opioid dependency, non-dependent abuse, and opioid overdoses for the state of Massachusetts and the US from 2005-2014.

State and national data from 2005-2014, 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 10/24/17). 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.

Opioid-related emergency department visits are on the rise – Massachusetts and United States 2005-2014

This chart shows the rate of emergency department visits (treat-and-release only) for opioid dependency, non-dependent abuse, and opioid overdoses for the state of Massachusetts and the US from 2005-2014.

State and national data from 2005-2014, 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 10/24/17). 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.

Change in insurance coverage of people hospitalized for opioid overdoses –United States 2005 - 2014

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 2014.

U.S. data from 2005 and 2014, 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 10/24/17). 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 2014. 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.

Change in insurance coverage of people hospitalized for opioid overdoses –Massachusetts 2005 - 2014

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 2014.

Massachusetts data from 2005 and 2014, 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 10/24/17). 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 2014. 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.

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 1998-2014

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/controller/datarequest/D77>), 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 fatal heroin overdose deaths – Massachusetts and United States 1998-2014

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/controller/datarequest/D77>), 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).