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

Prevalence of mental illness – United States 2017

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.

- <u>Serious psychological distress</u>: in adults during past 12 months. From National Survey on Drug Use and Health, (2-year R-DAS 2016-2017) https://rdas.samhsa.gov (link active as of 6/17/19). 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 2016-2017 Das Analysis weight.

- <u>Bipolar Disorder</u>: 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)

- <u>Major Depressive Disorder</u>: 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)

- <u>Schizophrenia</u>: 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)

- <u>Post-Traumatic Stress Disorder</u>: 12-month prevalence of 3.6% of U.S. adult population. See bipolar disorder section above for original source.

- <u>Generalized Anxiety Disorder</u>: 12-month prevalence of 2.7% of U.S. adult population. See bipolar disorder section above for original source.

- <u>Panic Disorder</u>: 12-month prevalence of 2.7% of U.S. adult population. See bipolar disorder section above for original source.

- <u>Obsessive Compulsive Disorder</u>: 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 – Minnesota and United States 2017

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 2016-2017) https://rdas.samhsa.gov link active as of 06/17/19). 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 2016-2017 Das Analysis weight.

Estimated number of people living with mental illness – Minnesota 2017

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.

Serious psychological distress during the past year is derived from National Survey on Drug Use and Health (2-year R-DAS 2016-2017) https://rdas.samhsa.gov link active as of 03/19/19). 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 2016-2017 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 2017 (Adult Population in Minnesota, Comparative Demographics Estimates, American Community Survey 1-Year Estimates: 4,278,824 (link active as of 07/16/19).

	100%	4,278,824
SPD	10.1%	432,161
MDD	6.0%	256,729
BD	2.8%	119,807
Schizophrenia	0.3%	12,836

Substance abuse in people with serious psychological distress – Minnesota 2017

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 (2-year R-DAS 2016-2017) https://rdas.samhsa.gov link active as of 03/19/19). Variables:

- o Row: State (filter for specific state, otherwise cell size is too small to display results for some state x SPD categories).
- o Column: Past year serious psychological distress indicator (spdyr=1)
- o 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
    - Cell size too small to display for Minnesota
- Weight applied: DASWT_1

- Missing data values are not included in the total percentages.
- Used weighted counts to determine the percentages.

Increased mortality in people with serious mental illness – Minnesota 2007

This chart shows the difference in age at death between the total population at large and individuals experiencing serious mental illness for Minnesota Healthcare Program Covered Population of 18 years and older.

- Original source: Trangle, M., G. Mager, P. Goering, and R. Christensen (2010). Minnesota 10 by 10: Reducing Morbidity and Mortality in People with Serious Mental Illnesses. Minnesota Medicine. June 2010: 38-41. https://www.ncbi.nlm.nih.gov/pubmed/20827954
- Data are also available here: Advancing Health Equity in Minnesota 2014 (Minnesota Department of Health) Table 17 http://www.astho.org/Programs/Health-Equity/Minnesota-Health-Equity-Report/, link active as of 11/14/2018).
- MHCP is a basic health care coverage for low-income Minnesotans including fee-for-service Medical Assistance, the Prepaid Medical Assistance Program, General Assistance Medical Care, and MinnesotaCare.
- The population that is included in this comparison consists of adults who were covered at least one month between 2003 to 2007 by the Minnesota Health Care Program during the 36-month period prior to their death.
- Serious mental illness was identified by the authors of the original paper by a paid mental health service claim through the MHCP related to a diagnosis of schizophrenia, schizoaffective disorder, or bipolar affective disorder. Thus, those with other types of serious mental illness such as major depressive disorder, and those who did not seek or receive mental health treatment are not included.

Unmet need of mental health treatment – Minnesota and United States 2017

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 2016-2017) https://rdas.samhsa.gov (link active as of 03/19/19). Variables:

- Row: State
- Column: AMHTXND2, perceived need, but did not receive mental health treatment in past year
- Control: spdyr, past year serious psychological distress
- Weight applied: DASWT_1
- Used weighted counts to determine the percentages

Unmet need of mental health treatment due to costs – Minnesota and United States 2017

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 2016-2017) https://rdas.samhsa.gov (link active as of 03/19/19). 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
- 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 because of costs differs by insurance coverage – United States 2017

Similar to the last chart, this chart also shows the number of people who did not receive mental health care because of 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 because of a maximum specification of three variables in the NSDUH R-DAS system.

National Survey on Drug Use and Health (2-year R-DAS 2016-2017) https://rdas.samhsa.gov (link active as of 03/19/19). Variables:

- spdyr=1, past year serious psychological distress
- 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: Weight applied: DASWT_1

There is significant unmet need for mental health care in Minnesota

This chart shows, among people who experienced serious psychological distress (which equals 10.1% of the Minnesota 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 because of costs.

National Survey on Drug Use and Health (2-year R-DAS 2016-2017) https://rdas.samhsa.gov (link active as of 03/19/19). 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:
  - o   Row: State
  - o   Column: MHRCOST2=1, no mental health treatment in past year because could not afford cost
  - o   Control: spdyr=1, past year serious psychological distress
- Weight applied: DASWT_1
- 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 – Minnesota 2017

This chart shows the percentage of people in each insurance category who experienced serious psychological distress in the past year.

National Survey on Drug Use and Health (2-year R-DAS 2016-2017) https://rdas.samhsa.gov (link active as of 03/19/19). Variables:

- Row: State (filter for specific state, otherwise cell size is too small to display results for some state x insurance categories)
- Column: spdyr=1 – past year serious psychological distress
- Control:
  - o   Covered by private insurance (irprvhlt=1)
  - o   Covered by Medicare (irmedicr=1)
  - o   Covered by Medicaid/CHIPCOV (irmcdchp=1)
  - o   Not covered by any health insurance (IRINSUR4=2)
  - o   Covered by Tricare, Champus, ChampVA, VA, or Military health (irchmpus=1)
    - ▪   Not included – cell size too small to display
- Weight applied: DASWT_1
- Used weighted counts to determine the percentages

Medicaid reimbursement rates to physicians are low – Minnesota 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 - Minnesota 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. Because of 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 3/21/18). 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 Minnesota 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 Minnesota in 2014, retrieved from the Census Bureau statistics (link active as of 3/21/18)

Minnesota adult population (18 years and over), Comparative Demographic Estimates, 2014 American Community Survey 1-Year Estimates: 4,174,065

- Major depressive disorder: 6.0% = 250,444
- Bipolar disorder: 2.8% = 116,874
- Schizophrenia: 0.3% = 12,522

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

- 735,839 adults with schizophrenia (0.3%)
- 6,867,830 adults with bipolar disorder (2.8%)
- 14,716,778 adults with major depressive disorder (6.0%)

The percentage of hospitalizations of adults with a primary diagnosis of SMI in Minnesota in 2014 is calculated by dividing the total number of SMI hospitalizations (schizophrenia + MDD + BD) by the total number of hospitalizations (586,926).

Length of stay for mental illness hospitalizations - Minnesota 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. Because of 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), 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 elderly patients with serious mental illness - Minnesota 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. Because of 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 - Minnesota, 2001-2014

Here we provide the trend in average hospital stay duration from 2001 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 2000 to 2014, retrieved from HCUPnet. http://hcupnet.ahrq.gov/ (link active as of 03/21/18). 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 2000 and 2014.

- Schizophrenia: ICD-9-CM principal diagnosis codes 295.00-295.95
- Total hip replacement: ICD-9-CM principle procedure code 81.51
- Kidney Transplant: ICD-9-CM principle procedure code 55.61-55.69

Average hospital costs for mental illness hospitalizations - Minnesota 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 2/14/18). We tabulated the number of discharges, and average costs, for each mental illness below (principal diagnosis).

Costs were converted from 2014 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 - Minnesota 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 2/14/18). 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 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 by insurance type - Minnesota 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 2/14/18). 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 were 0.4% for serious mental illness, and 0.5% for all hospitalizations (responsible for 0.3% and 0.6% of total costs, respectively).

- 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

State mental health agency spending – Minnesota 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 2018 U.S.$ with conversion factor 1.06765 (http://www.calculator.net/inflation-calculator.html).

Availability of behavioral health care professionals – Minnesota and United States 2018

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 02/27/19), 2018 County Health Rankings National Data (CSV Analytic Data, and documentation).
    - 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.
    - Mental Health Providers is measure number 62 (see documentation), originally retrieved from the CMS National Provider Identification file.
    - To calculate the number of providers per 10,000 residents, "measure_62_value" in the CSV file is multiplied by 10,000. The same exact value can be calculated by dividing "measure_62_numerator" by "measure_62_denominator" and multiplying by 10,000.
    - The average ratio is determined for all states by selecting all FIPS State Codes (including "0" for the US as a whole), and filtering for "0" in the FIPS County Code column.

Availability of behavioral health care professionals and hospital beds – Minnesota and United States 2014

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 2/19/18)
- All variables are divided by the overall population for an estimate per 10,000 residents

Providers:

- MD's, NF, Psychiatry, Total Pat Care, 2013 (in 'Health Professionals' tab)
- Phys, NF, Prim Care Pat Care Excl Hsp Rsdnts, 2013 (in 'Health Professionals' tab)
- 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 Table 1 (US) and 3 (state): http://www.apa.org/workforce/publications/13-demographics/appendix-b.pdf (links active as of 11/08/2016).

Hospital beds:

- STG Psychiatric Care, Beds Set Up, 2013 (in 'Health Facilities', 'Inpatient Service Unit Beds' tabs)

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.

Regional availability of behavioral health care professionals – Minnesota 2014-2017

This chart contains data on the number of psychologists, social workers, alcohol and drug counselors per 10,000 residents on a regional level in the state.

Sources:

- Minnesota Department of Health - Minnesota Health Professions Data - Health Care Professions by County Data, 2017 (Excel) https://www.health.state.mn.us/data/workforce/database/index.html (link active as of 11/15/18)
- Geographical divisions and map image: https://www.mncompass.org/profiles (link active as of 11/15/18)

Variables used:

- Total population, 2017
- Number of Alcohol and drug counselors 2016
- Number of Psychologists 2016
- Number of Social Workers 2014-2015

Calculations:

- Replaced number of providers with fewer than 5 ("<5") with the value 2 (Average of the values 0 to 4)
    - Number of Alcohol and drug counselors 2016 (39 counties out of 87 with <5)
    - Number of Psychologists 2016 (44 counties out of 87 with <5)

- o   Number of Social Workers 2014-2015 (5 counties out of 87 with <5)

- Calculated relative number of providers per 10,000 residents by region:
  - o   Relative number of alcohol and drug counselors = (Sum of number of alcohol and drug counselors by region/Total population of the region) * 10,000
  - o   Relative current psychologists = (Sum of number of psychologists by region/Total population of the region) * 10,000
  - o   Relative current social workers = (Sum of number of social workers by region/Total population of the region) * 10,000

Adult psychiatric bed capacity is low in most Minnesota counties – Minnesota 2012

This chart provides data on the population with psychiatric bed capacity by county.

Sources:

- Adult Psychiatric Bed Capacity & City:
  - o   Report on the Utilization of Community Behavioral Health Hospitals 2012 (Minnesota Department of Human Services), Table 1 Hospitals with Adult In-Patient Psychiatric Units https://www.leg.state.mn.us/docs/2012/mandated/120412.pdf (link active as of 11/14/2018).
- Total population 2017
  - o   Retrieved from Minnesota Department of Health - Minnesota Health Professions Data - Health Care Professions by County Data, 2017 (Excel) http://www.health.state.mn.us/divs/orhpc/workforce/database/index.html (link active as of 11/15/18)

Calculations:

- City names from source data were linked to Minnesota counties.
- For cities that span multiple counties, only one county with the largest or main part of the city was chosen. These cities are: Staples (Todd County), Mankato (Blue Earth), St. Cloud (Stearns), and Hastings (Dakota).
- Two hospitals in Fargo, North Dakota (53 beds) and Sioux Falls, South Dakota (110 beds) that serve a small part of Minnesota residents were omitted.
- Psychiatric bed capacity for cities within the same county were added to provide a county-level psychiatric bed capacity total.
- Counties with fewer than 60.000 residents *with psychiatric beds* were added together. These counties are: Pennington, Meeker, Todd, Brown, Lyon, Mille Lacs, McLeod, Steele, Isanti, Mower, Kandiyohi, Winnona, and Otter Tail.
- County-level psychiatric bed capacity was divided by total population in county, and multiplied by 10,000 for an estimate of the psychiatric bed capacity per 10,000 residents in a county
- The sum of the total population of all counties with no psychiatric beds provides an estimate of the size of the population (1,902,960 people, which equals 34%) without access to psychiatric beds.
- 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 – Minnesota 2019

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 Minnesota (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://data.hrsa.gov/data/download - Shortage areas, HPSA – Mental Health. Link active as of 06/10/19. Data as of 06/10/19.

File: HPSA - Mental Health, file name: BCD_HPSA_FCT_DET_MH

- Filter data by:
    - Only select unique HPSA Source Identification Numbers (In excel: Data > Advanced > Unique values only. Copy to new sheet)
    - Discipline Class Description: Mental Health
    - HPSA Status Description: "designated"
    - HPSA State Abbreviation: MN
    - HPSA Type Description: All, or Correctional Facilities separately
- Sum column totals of remaining rows (in excel: use subtotal formula with function nr 9):
    - HPSA Total Full-Time Equivalent Clinicians = 38
    - HPSA Shortage = 75
        - For Correctional Facilities, HPSA Shortage = 5

State population in behavioral health care professional shortage areas – Minnesota and United States 2019

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://data.hrsa.gov/data/download - Shortage areas, HPSA – Mental Health. Link active as of 06/10/19. Data as of 06/10/19.

File: HPSA - Mental Health, file name: BCD_HPSA_FCT_DET_MH

- Filter data by:
    - Only select unique HPSA Source Identification Numbers (In excel: Data > Advanced > Unique values only. Copy to new sheet)
    - Discipline Class Description: Mental Health
    - HPSA Status Description: "designated"
    - HPSA Designation Population: exclude value 1
- Sum column totals of remaining rows by state:
    - HPSA Designation Population in MN = 1,992,941 (36% of 5,576,606, Annual Estimates of the Resident Population: 2017 for each state and the US, found at Census Bureau statistics (link active as of 3/21/18))

Limited access to behavioral health services – Minnesota 2015
This chart provides data on the availability of different behavioral health treatment services.

Sources:

- Behavioral health treatment services availability (service not available, service available but limited) retrieved from Mental & Behavioral Health Options & Opportunities Minnesota Hospital Association 2015 https://www.mnhospitals.org/Portals/0/Documents/policy-advocacy/mental-health/Public%20mental%20health%20white%20paper.pdf, Table on page 25. (link active as of 11/14/2018)
- List of divisions and counties: AMHI Region Map https://edocs.dhs.state.mn.us/lfserver/Public/DHS-7655-ENG
    - Total population of each region = Sum of population of counties within the region
- Total population of counties, retrieved from Minnesota Department of Health - Minnesota Health Professions Data - Health Care   Professions by County Data, 2017 (Excel) http://www.health.state.mn.us/divs/orhpc/workforce/database/index.html (link active as of 11/15/18)

- Service availability by population:
    - Each service:
        - Service not available = (Total population of each region with no service availability/Total population of Minnesota) *100%
        - Service available but limited = (Total population of each region with limited service availability/Total population of Minnesota) *100%
        - Service meets demand for the remaining population (not present in the chart; represents 100% minus the percentages from the other two categories)

Contact with criminal justice system – United States 2017
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.

National Survey on Drug Use and Health (2-year R-DAS 2016-2017) https://rdas.samhsa.gov (link active as of 03/19/19). Variables:

- Column: Past year serious psychological distress indicator (spdyr=1)
- Control: Catag18 = 1 (18 or older)
- Row:
    - 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).
- Weight applied: DASWT_1
- Used weighted counts to determine the percentages.

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. National Survey on Drug Use and Health (2-year R-DAS 2016-2017) https://rdas.samhsa.gov (link active as of 03/19/19). Variable: spdmon=1 – Past month serious psychological distress indicator, recoded from K6SCMAX>=13 (based on past month and worst month K6 score). Weight applied: DASWT_1

State prison population with serious mental illness – Minnesota

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). As a result of 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 2/19/18). Dataset DS2: State Numeric. ASCII+SAS setup files, converted to Stata files using StatTransfer. Variables used:
  - State: V1056: S5Q15A_FIPS: AT ARREST - RESIDENCE (STATE) = 27
  - 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:

- o Weight: V2264 FINALWT - 2002 SILJ FINAL WEIGHT
- o 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
- o 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:
  - o Weight: V2927 FINALWT: FINAL WEIGHT
  - o 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
  - o 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
  - o Including missing-data values in percentages

Costs of Minnesota State prison population with SMI

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

- Total general expenditures for corrections in Minnesota in 2017: $635,229,000. 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 07/16/19).

- Minnesota Department of Corrections Adult Inmate Profile as of 07/01/2017. Page 2, section 1. Total Population: 10,111 https://mn.gov/doc/assets/Minnesota%20Department%20of%20Corrections%20Adult%20 Prison%20Population%20Summary%207-1-2017_tcm1089-303705.pdf#false (link active as of 07/16/19). Section 1 on page 1: The adult prison population as of 07/01/2017 was 10,111. Thus, the average cost per inmate was $31,537
- Used percentage of 36.9% from Survey of Inmates in State and Federal Correctional Facilities, 2004 (see State prison population with serious mental illness) to calculate the number of Minnesota state prison inmates with previous diagnosis of serious mental illness (36.9% of 10,111 = 3,731) and the costs for this group of people = 36.9% of $635,229,000 = $234,400,501)
- Conversion factor of 1.02130 to convert from 2017 to 2018 U.S. $ (http://www.calculator.net/inflation-calculator.html).

Economic burden of serious mental illness – Minnesota 2018

This chart shows an estimate of the total state economic burden of schizophrenia, bipolar disorder, and major depressive disorder. Because of 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/BD patient
        - $14,100/MDD patient
    - Prevalence numbers of mental illnesses from Estimated number of people living with mental illness – Minnesota 2017
    - Conversion factor of 1.05218 to obtain estimate economic burden for each mental illness from 2014 U.S.$ to 2018 U.S.$ (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. Because of 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. Using:
    - "Burden Per Patient" amount from table 1:
        - $46,537/Schizophrenia patient
        - $20,571/BD patient
        - $14,100/MDD patient
    - Prevalence numbers of mental illnesses from Prevalence of Mental Illness – United States
    - Adult population (18 and over) in 2017 of 252,070,495, retrieved from the Census Bureau statistics website (Comparative Demographic Estimates, 2017 American Community Survey 1-Year Estimates, link active as of 07/16/19)

- Conversion factor of 1.05218 to obtain estimate economic burden for each mental illness from 2014 U.S.$ to 2018 U.S.$ (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. Because of 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.
  - <u>Medical costs</u> consist of "Excess direct health care costs" (Drugs, Outpatient, Inpatient, Emergency room, Long-term care, and Other medical services).
  - <u>Lost productivity</u> consists of "Excess indirect costs" (Unemployment, Productivity loss, Premature mortality (suicide), and Caregiving)
  - <u>Other</u> 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.
  - <u>Medical costs</u> consist of "Treatment-related" (Total inpatient costs, Total outpatient costs, Total nursing home, intermediate, domiciliary care costs, Medication, Substance abuse)
  - <u>Lost productivity</u> consists of "Indirect costs" (Lost productivity homemakers, Lost productivity institutions, Lost productivity suicide, Lost family productivity, Los compensation).
  - <u>Other</u> 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):**

- o 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.
- o <u>Medical costs</u> consist of "Direct costs" (Medical services, Outpatient, Inpatient, Emergency Department, Other medical services, Pharmaceutical services)
- o <u>Lost productivity</u> consists of "Suicide-related costs" and "Workplace costs (Absenteeism, Presenteeism).