Psychiatric Bed Need Methodology Overview

Paul L Delamater
Department of Geography
University of North Carolina at Chapel Hill
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pld@email.unc.edu

Psychiatric Bed Need Methodology

- First bed need methodology, 9/29/1993
- Current bed need methodology, 11/26/1995
  - Addition of Low Occupancy in methodology, 2/25/2008
- Found in Sec.3.(1-3) in Review Standards
  - Pediatric (age 0-17) Bed Need, Sec.3.(1-2)
  - Adult (age 18+) Bed Need, Sec.3.(3)

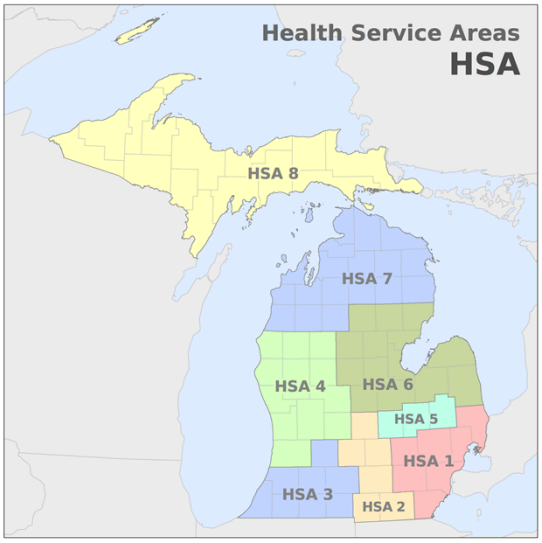
Terminology

- Base Year: the most recent year with available data
  - Generally is 1-2 years prior to "current" year
- Planning Year: the (future) year of the predictions
  - Generally is 5 years from Base Year

- For example, in the last calculation
  - Current Year was 2014
  - Base Year was 2012
  - Planning Year was 2017

Terminology

- Planning Areas: the geographic units for which the pediatric and adult psychiatric bed need predictions
  - Same as Michigan's Health Service Areas (HSAs)



Terminology

- Patient Day: One night spent in the hospital by one person
- Bed: one physical bed in a hospital, but also a unit of measurement
  - One bed can accommodate 365 patient days in a calendar year – one bed equals 365 bed days
- Average Daily Census (ADC): Total patient days in a year divided by 365
- Occupancy Percent: Total patient days in a year divided by potential bed days in a year (beds * 365)

Terminology

- Pediatric: For psychiatric hospitals, dealing with beds specifically for patients age 0-17 (and population age 0-17)
- Adult: For psychiatric hospitals, dealing with beds specifically for patients age 18+ (and population age 18+)

Pediatric Bed Need Methodology

- Step #1, Sec.3.(1), Get statewide use rate for the population age 0-17 from Appendix B
  - This is the average number of patient days used by people age 0-17 in Michigan
    - Reported as per 1,000 people
  - How is it calculated?
    - Sum all patient days used by people age 0-17 in a psychiatric facility in one calendar year for the entire state
    - Sum the total number of residents age 0-17 in the corresponding year in the state
    - Divide summed patient days by summed population
      - Multiply by 1,000 to convert to per 1,000 people

Pediatric Bed Need Methodology

- Example calculation of Appendix B using data from 2012
  - Patient days (age 0-17) from CON Annual Survey: 58,242
  - Population (age 0-17) from US Census Bureau: 2,269,365

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58,242 / 2,207,304 = 0.02566445 (per person)

0.02566445 * 1000 = 25.664 patient days(per 1,000 people)
                                          (per year)
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Pediatric Bed Need Methodology

- Step #2, Sec.3.(2)(a), Get planning area age 0-17 population for planning year from MI State Demographer
- Step #3, Sec.3.(2)(b), For each planning area, multiply age 0-17 population in planning year by patient day use rate
  - Calculates number of **Patient Days** for each planning area in the planning year
    - *Assumption: All people age 0-17 will use the "average" number of patient days (throughout the state)*
    - *Assumption: Patient day use rates in the planning year will be the same as the base year*

Pediatric Bed Need Methodology

- Example calculation of Step #3 using data from 2012 and planning year of 2017
  - For each planning area, multiply age 0-17 population in planning year by patient day use rate

PL AREA	Pop 2017	Use Rate	Patient Days 2017
1	1039259	* 25.664	26672.01
2	168179	* 25.664	4316.22
3	198234	* 25.664	5087.57
4	370540	* 25.664	9509.71
5	132167	* 25.664	3391.99
6	161442	* 25.664	4143.32
7	94310	* 25.664	2420.41
8	63895	* 25.664	1639.83

Pediatric Bed Need Methodology

- Step #4, Sec.3.(2)(c), For each planning area, divide 0-17 patient days in planning year by 365
  - Calculates the **Average Daily Census (ADC)** for each planning area in the planning year
    - Patient days per day (for the year)
- Step #5, Sec.3.(2)(d), For each planning area, divide the ADC in planning year by 0.75
  - Calculates the **number of Beds** needed to provide care for the ADC (number of patients per day) for each planning area in the planning year
    - *Assumption: Psychiatric facilities will not be able to operate at 100% capacity. Using 0.75 assumes a 75% average occupancy rate over the year.*

Pediatric Bed Need Methodology

- Example calculation of Step #4 using data from 2012 and planning year of 2017
  - For each planning area, divide age 0-17 patient days in planning year by 365

PL AREA	Pop 2017	Patient Days 2017	Days	ADC 2017
1	1039259	26672.01	/ 365	73.07
2	168179	4316.22	/ 365	11.83
3	198234	5087.57	/ 365	13.94
4	370540	9509.71	/ 365	26.05
5	132167	3391.993	/ 365	9.29
6	161442	4143.32	/ 365	11.35
7	94310	2420.41	/ 365	6.63
8	63895	1639.83	/ 365	4.49

Pediatric Bed Need Methodology

- Example calculation of Step #5 using data from 2012 and planning year of 2017
  - For each planning area, divide the ADC in planning year by 0.75

PL AREA	Pop 2017	Patient Days 2017	ADC 2017		BEDS 2017
1	1039259	26672.01	73.07	/ 0.75	97.43
2	168179	4316.22	11.83	/ 0.75	15.77
3	198234	5087.57	13.94	/ 0.75	18.58
4	370540	9509.71	26.05	/ 0.75	34.74
5	132167	3391.993	9.29	/ 0.75	12.39
6	161442	4143.32	11.35	/ 0.75	15.14
7	94310	2420.41	6.63	/ 0.75	8.84
8	63895	1639.83	4.49	/ 0.75	5.99

Pediatric Bed Need Methodology

- Step #6, Sec.3.(2)(e), For each planning area, adjust for low occupancy
  - Identify all hospitals with average occupancy of 60% or less over previous two years
  - For each hospital
    - Calculate ADC (for previous two years), Multiply ADC by 1.7, Subtract result from current number of licensed beds
  - Add results for hospitals in Planning Area and add to Planning Area Beds
  - Calculates an additional buffer of **Beds** by accounting for low occupancy facilities
    - *Assumption: Not completely sure… potentially may be a buffer to account for daily variations in beds needed*

Pediatric Bed Need Methodology

- Example calculation of Step #6 using data from 2012 and planning year of 2017
  - For Planning Area #1

Hosp	OCC 11-12	ADC 11-12		ADJ ADC	BEDS Current	BEDS ADJ
1	87.41%	14.01				
2 ⇨	57.20%	17.18	* 1.7	29.21	30	0.79
3	76.53%	42.03				
4 ⇨	31.49%	10.09	* 1.7	17.15	32	14.85
5	64.74%	10.37				
						= **15.63**

Pediatric Bed Need Methodology

- Example for hospital with 30 beds

Occ %	ADC		ADJ ADC	BEDS Current	BEDS ADJ
59.9	17.97	* 1.7	30.6	30	0
50	15	* 1.7	25.5	30	4.5
40	12	* 1.7	20.4	30	9.6
30	9	* 1.7	15.3	30	14.7
20	6	* 1.7	10.2	30	19.8
10	3	* 1.7	5.1	30	24.9

Pediatric Bed Need Methodology

- Step #7, Sec.3.(2)(f), For each planning area, add low occupancy adjustment to Beds and round up to nearest whole number
  - Calculates the **Bed Need** for the planning year

Pediatric Bed Need Methodology

- Example calculation of Step #7 using data from 2012 and planning year of 2017
  - For each planning area, add low occupancy adjustment and round up

PL AREA	Pop 2017	Patient Days 2017	ADC 2017	BEDS 2017	BEDS LOW	BEDNEED 17
1	1039259	26672.01	73.07	97.43	15.63	114
2	168179	4316.22	11.83	15.77		16
3	198234	5087.57	13.94	18.58	0.33	19
4	370540	9509.71	26.05	34.74		35
5	132167	3391.993	9.29	12.39		13
6	161442	4143.32	11.35	15.14		16
7	94310	2420.41	6.63	8.84		9
8	63895	1639.83	4.49	5.99	0.29	7

Pediatric Bed Need Methodology

- To determine whether there is an overage or a need for additional beds, compare bed need results to current inventory

PL AREA	BEDNEED 17	Current Beds	Difference
1	114	149	35
2	16	0	-16
3	19	6	-13
4	35	58	23
5	13	0	-13
6	16	14	-2
7	9	0	-9
8	7	6	-1

Pediatric Bed Need Methodology

- Summary
  - Determine utilization rate
  - Multiply utilization rate by predicted population
  - Adjust for occupancy
  - Adjust for low occupancy (when necessary)

Adult Bed Need Methodology

- Step #1, Get planning area age 18+ population for planning year
- Step #2, Get planning area and statewide adult Beds per 10,000 ratios from Appendix A
  - This is the average number of adult beds per people age 18+ in Michigan
    - Reported as Beds per 10,000 people
  - How is it calculated?
    - Sum base year adult beds by planning area and for the entire state
    - Sum the total number of residents age 18+ in the corresponding year in each planning area and the state
    - Divide summed beds by summed population
      - Multiply by 10,000 to convert to per 10,000 people

Adult Bed Need Methodology

- Example calculation of Step #2 using 2012 data
  - For each planning area, divide Beds by Population, then multiply by 10000

PL AREA	BEDS 2012	POP 2012	BEDS RATIO
1	1117	3613218	3.091
2	145	602655	2.406
3	157	642231	2.445
4	265	1107979	2.392
5	135	438437	3.079
6	107	611246	1.751
7	29	345903	0.838
8	57	251485	2.267
STATE	2012	7613154	2.643

Adult Bed Need Methodology

- Step #3, Sec.3.(3)(a-b), For each planning area, multiply the population age 18+ in planning year by (whichever is lower):
  a) The Beds per 10,000 people ratio for the planning area, or
  b) The statewide Beds per 10,000 people ratio
  - Calculates the **number of Beds** needed for each planning area in the planning year
    - *Assumption: Assumes that statewide ratio is correct (if lower than planning area ratio)*
    - *Assumption: Current bed ratio will be sufficient to meet future demand, given changes in the population age 18+*

Adult Bed Need Methodology

- Example calculation of Step #3 using data from 2012 and planning year of 2017
  - For each planning area, multiply the population age 18+ in planning year by Ratio

PL AREA	POP 2017	BEDS RATIO	RATIO (Step #3)	BEDS 17
1	3628271	3.091	* 2.643	958.88
2	606924	2.406	* 2.406	146.03
3	649592	2.445	* 2.445	158.80
4	1130224	2.392	* 2.392	270.32
5	435780	3.079	* 2.643	115.17
6	606179	1.751	* 1.751	106.11
7	352000	0.838	* 0.838	29.51
8	253925	2.267	* 2.267	57.55
STATE		2.643		

Adult Bed Need Methodology

- Step #4, Sec.3.(3)(c), For each planning area, adjust for low occupancy
  - Identify all hospitals with average occupancy of 60% or less over previous two years
  - For each hospital
    - Calculate ADC (for previous two years), Multiply ADC by 1.5, Subtract result from current number of licensed beds
  - Add results for hospitals in Planning Area and add to Planning Area Beds
  - Calculates an additional buffer of **Beds** by accounting for low occupancy facilities
    - *Assumption: Not completely sure… potentially may be a buffer to account for daily variations in beds needed*

Adult Bed Need Methodology

- Example calculation of Step #4 using data from 2012 and planning year of 2017
  - For each planning area, add low occupancy adjustment and round up

PL AREA	POP 2017	BEDS RATIO	RATIO (S#3)	BEDS 17	BEDS LOW	BEDNEED 17
1	3628271	3.091	2.643	958.88	84.54	1044
2	606924	2.406	2.406	146.03	16.95	163
3	649592	2.445	2.445	158.80	19.45	179
4	1130224	2.392	2.392	270.32	17.76	289
5	435780	3.079	2.643	115.17	28.73	144
6	606179	1.751	1.751	106.11	3.5	110
7	352000	0.838	0.838	29.51		30
8	253925	2.267	2.267	57.55	4.44	62

Adult Bed Need Methodology

- To determine whether there is an overage or a need for additional beds, compare bed need results to current inventory

PL AREA	BEDNEED 17	Current Beds	Difference
1	1044	1110	66
2	163	145	-18
3	179	157	-22
4	289	251	-38
5	144	135	-9
6	110	107	-3
7	30	29	-1
8	62	57	-5

Adult Bed Need Methodology

- Summary
  - Determine bed/person ratio
  - Multiply bed/person ratio by predicted population
  - Adjust for low occupancy (when necessary)

Some Areas of Concern…

- Pediatric Bed Need
  - Temporal instability (one year of utilization data)
  - Geographic variation in utilization (statewide rate)
  - Low occupancy provision
  - Population projections and changing utilization
- Adult Bed Need
  - Bed-based methodology (no utilization data)
    - Assumes meets current population need
  - Planning area vs statewide bed rate (why choose lower?)
  - Low occupancy provision
  - Population projections

Other States' Approaches

- North Carolina
  - Pediatric and Adult
    - By planning area (8), utilization rate x projected population, occupancy adjustment (75%)
  - NC State Medical Facilities Plan
- Alabama
  - High occupancy-based (occupancy percent)
- Florida
  - Pediatric and Adult
    - By district (11), utilization rate x projected population, occupancy adjustment (75%)
  - FL Administrative code

Access to and Utilization of Psychiatric Beds in Michigan, 2012-17

Paul L. Delamater[1], Jonnell C. Sanciangco[2], and Ashton M. Shortridge[3]
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[1] Department of Geography, University of North Carolina at Chapel Hill, pld@email.unc.edu
[2] Department of Geography, Environment, and Spatial Sciences, Michigan State University, sancian1@msu.edu
[3] Department of Geography, Environment, and Spatial Sciences, Michigan State University, ashton@msu.edu

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1. Statewide access to psychiatric beds

Figure 1.1: Statewide adult and pediatric psychiatric beds and beds per 10,000 people 2012-2017. Data from CON Annual Survey (beds) and US Census (population). Bed rates were calculated by dividing adult beds by population aged 18+ and pediatric beds by population aged 0-17.

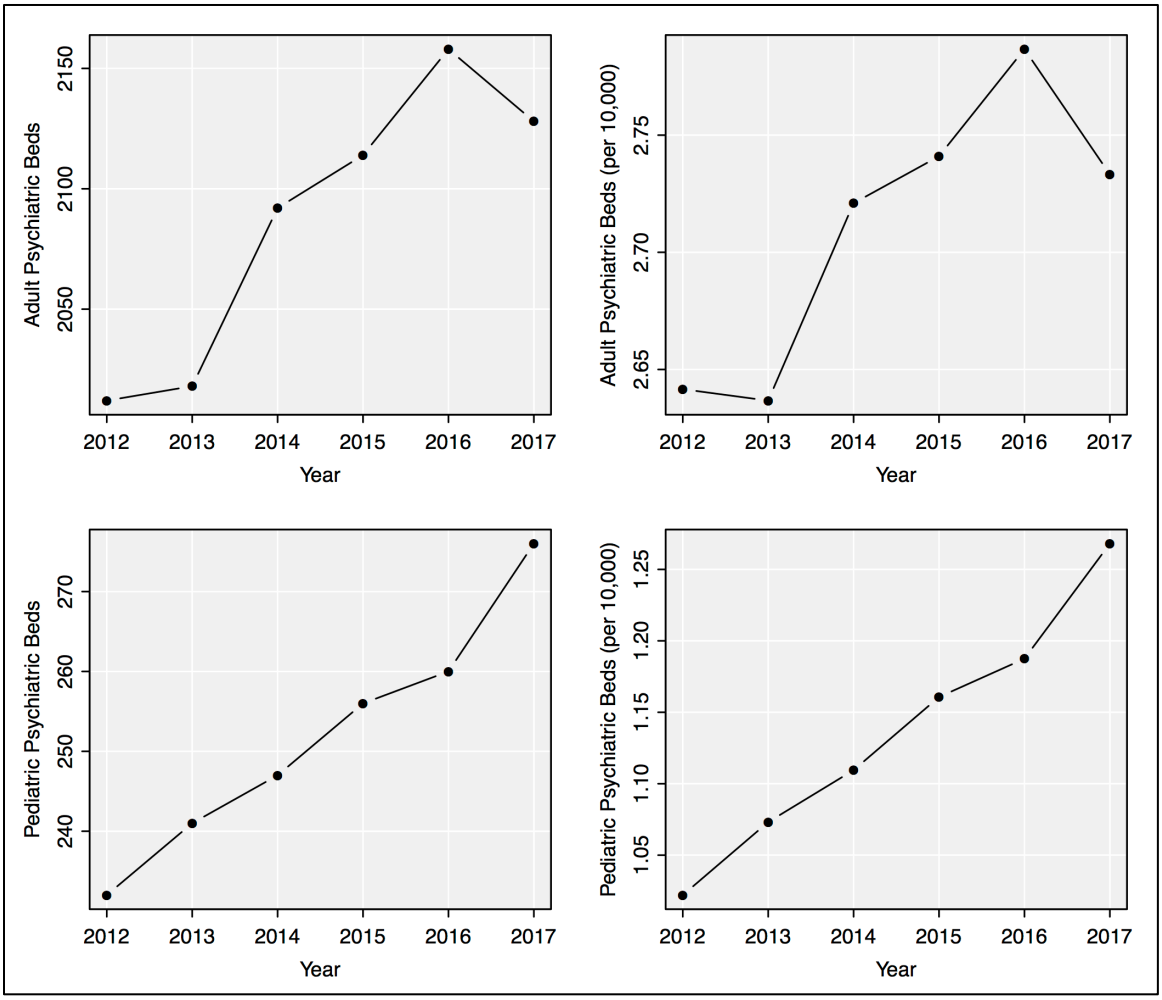


Figure 1.2: Travel time to adult and pediatric psychiatric facilities 2017. Data from CON Annual Survey (facilities) and State of Michigan (roads).

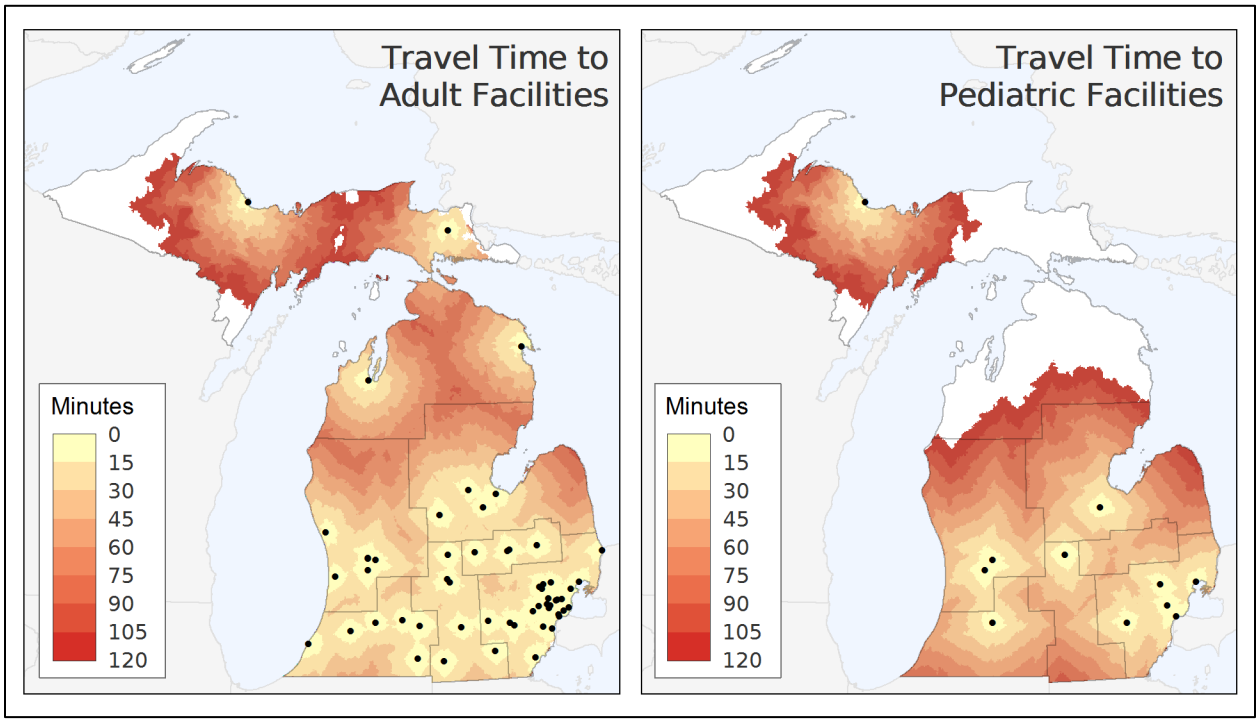


Figure 1.3. Cumulative percent of adult and pediatric population by travel time to nearest appropriate psychiatric facility 2017. For example, roughly 85% of the adult population lives within 25 minutes of an adult psychiatric facility. Population based on 2010 Census data.

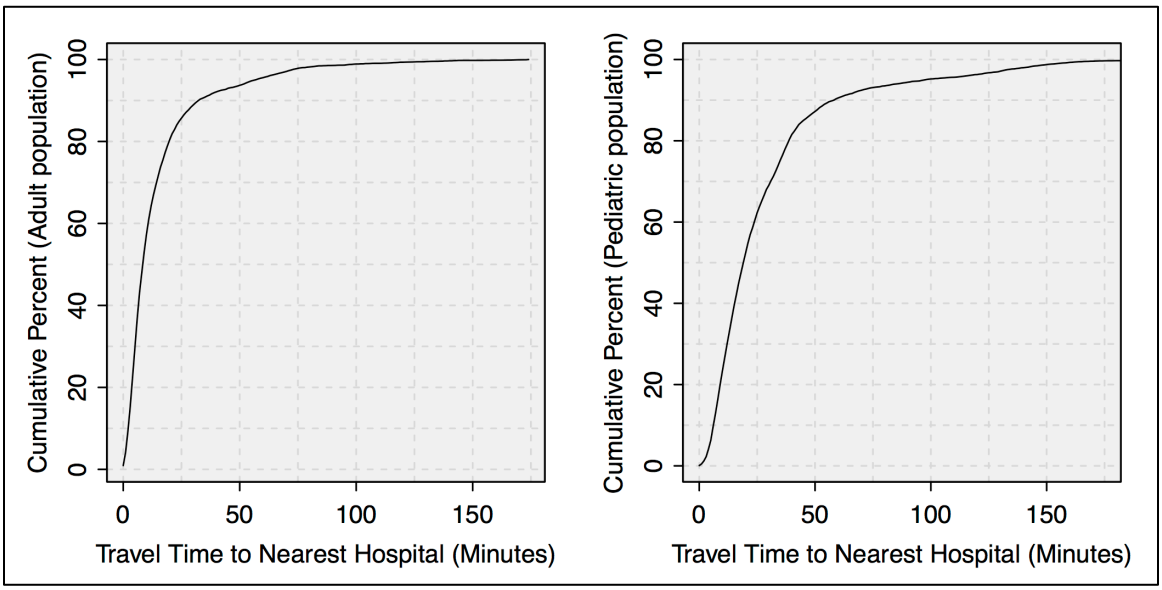


Table 1.1: Percent of adult population by travel time to nearest psychiatric facility 2017. Population based on 2010 Census data.

Travel Time	Adult Population	Adult Population (%)	Cumulative (%)
0 - 15	5,230,364	69.4%	69.4%
15 - 30	1,430,763	19.0%	88.3%
30 - 45	329,145	4.4%	92.7%
45 - 60	205,181	2.7%	95.4%
60 - 75	171,836	2.3%	97.7%
75 - 90	62,492	0.8%	98.5%
90 - 105	35,123	0.5%	99.0%
105 - 120	24,548	0.3%	99.3%
120+	50,120	0.7%	100.0%

Table 1.2: Percent of pediatric population by travel time to nearest psychiatric facility 2017. Population based on 2010 Census data.

Travel Time	Pediatric Population	Pediatric Population (%)	Cumulative (%)
0 - 15	847,901	36.2%	36.2%
15 - 30	746,787	31.9%	68.0%
30 - 45	386,575	16.5%	84.5%
45 - 60	135,355	5.8%	90.3%
60 - 75	63,645	2.7%	93.0%
75 - 90	30,262	1.3%	94.3%
90 - 105	25,662	1.1%	95.4%
105 - 120	20,606	0.9%	96.3%
120+	87,275	3.7%	100.0%

2. Access to psychiatric beds by HSA

Figure 2.1: Adult psychiatric beds and beds per 10,000 people 2017. Data from CON Annual Survey (beds) and US Census (population). Bed rates were calculated by dividing adult beds by population aged 18+.

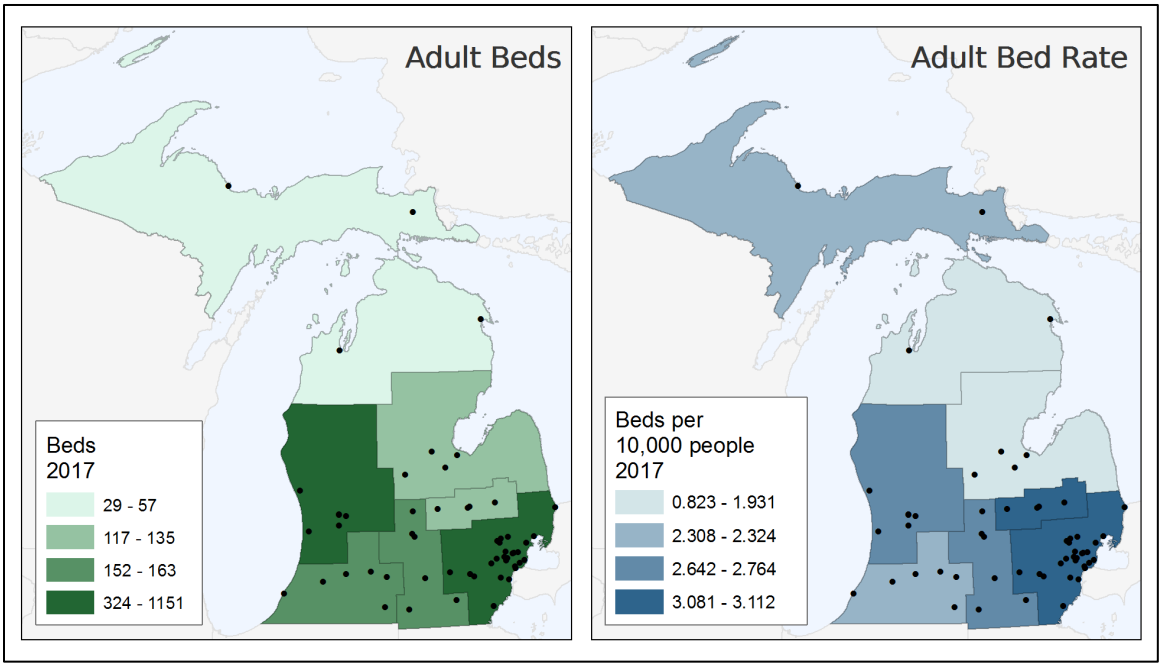
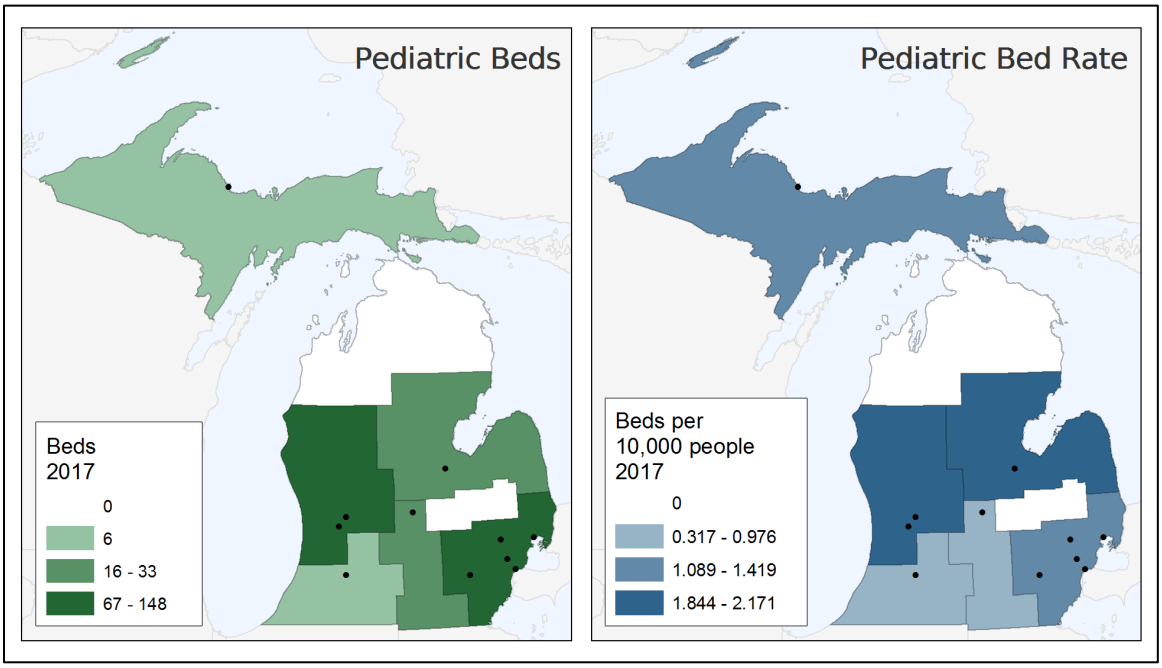


Figure 2.2: Pediatric psychiatric beds and beds per 10,000 people 2017. Data from CON Annual Survey (beds) and US Census (population). Bed rates were calculated by dividing pediatric beds by population aged 0-17.



3. Statewide utilization of psychiatric beds

Figure 3.1: Statewide adult utilization of psychiatric services 2012-2017. Data from CON Annual Survey (patient days, discharges, and beds) and US Census (population). Patient day rates were calculated by dividing adult patient days by population aged 18+. Length of stay was calculated by dividing patient days by discharges. Occupancy percent was calculated by dividing patient days by total bed days (beds multiplied by 365).

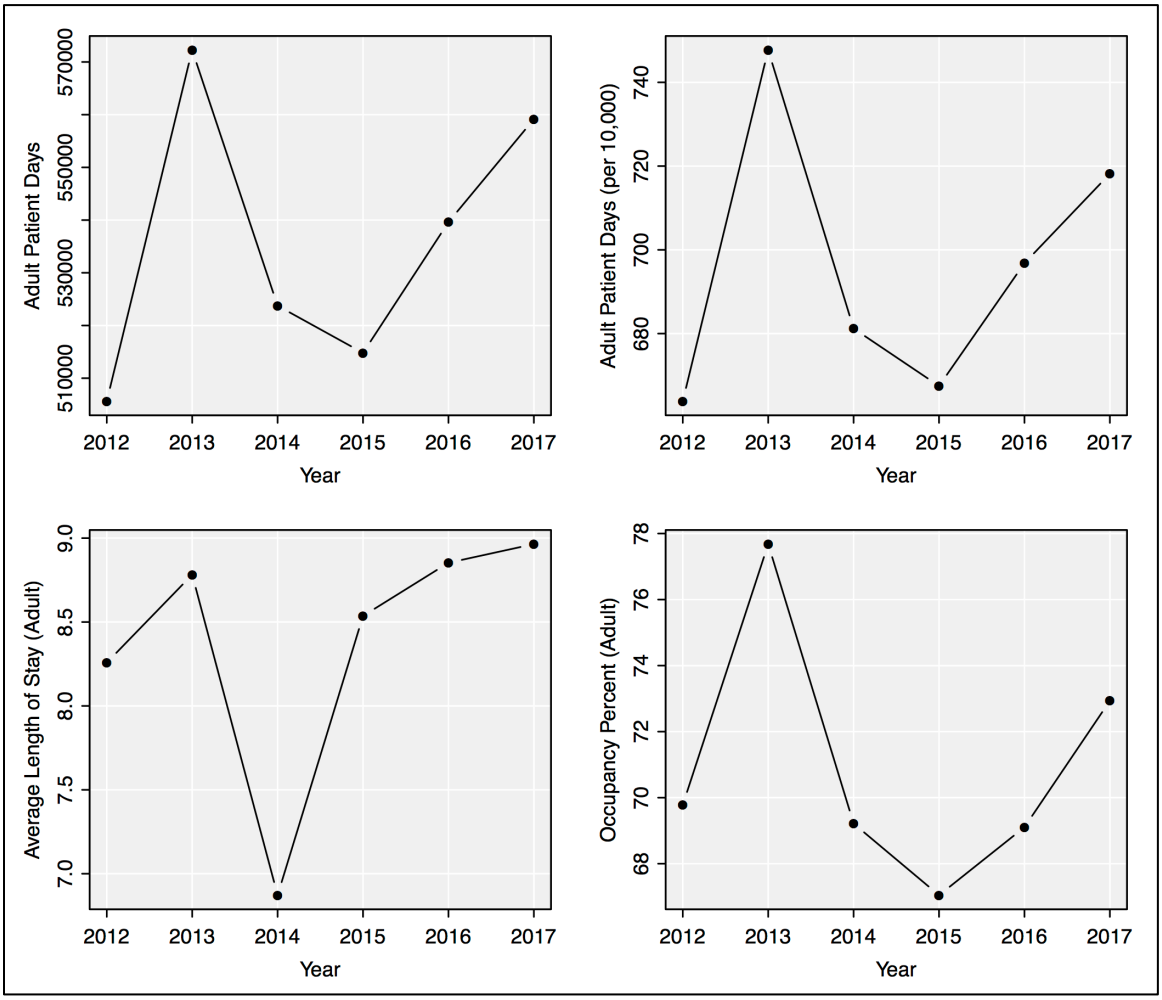
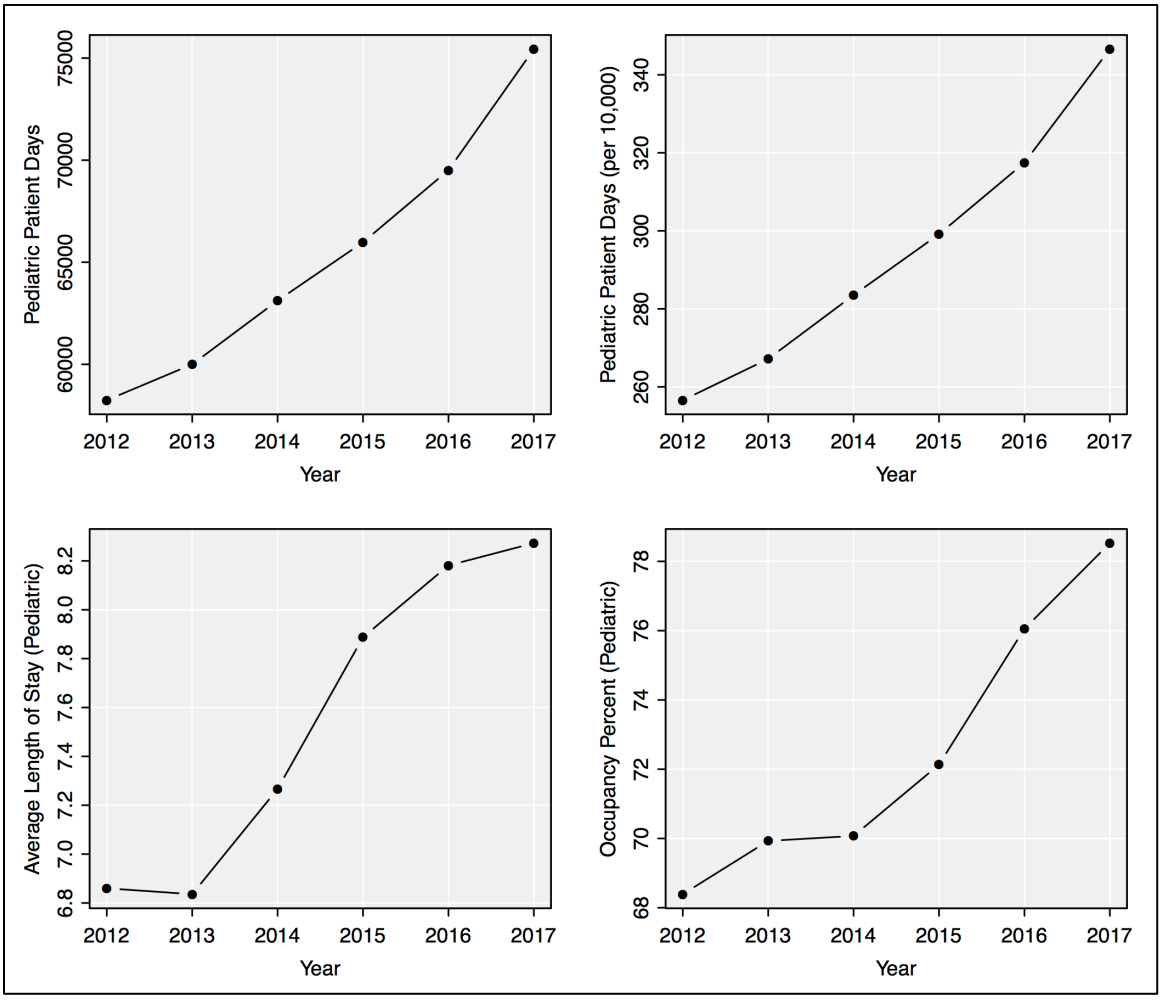


Figure 3.2: Statewide pediatric utilization of psychiatric services 2012-2017. Data from CON Annual Survey (patient days, discharges, and beds) and US Census (population). Patient day rates were calculated by dividing pediatric patient days by population aged 0-17. Length of stay was calculated by dividing patient days by discharges. Occupancy percent was calculated by dividing patient days by total bed days (beds multiplied by 365).



4. Utilization of psychiatric beds by HSA

Figure 4.1: Adult utilization of psychiatric services by HSA 2017. Data from CON Annual Survey (patient days, discharges, and beds) and US Census (population). Patient day rates were calculated by dividing adult patient days by population aged 18+. Length of stay was calculated by dividing patient days by discharges. Occupancy percent was calculated by dividing patient days by total bed days (beds multiplied by 365).

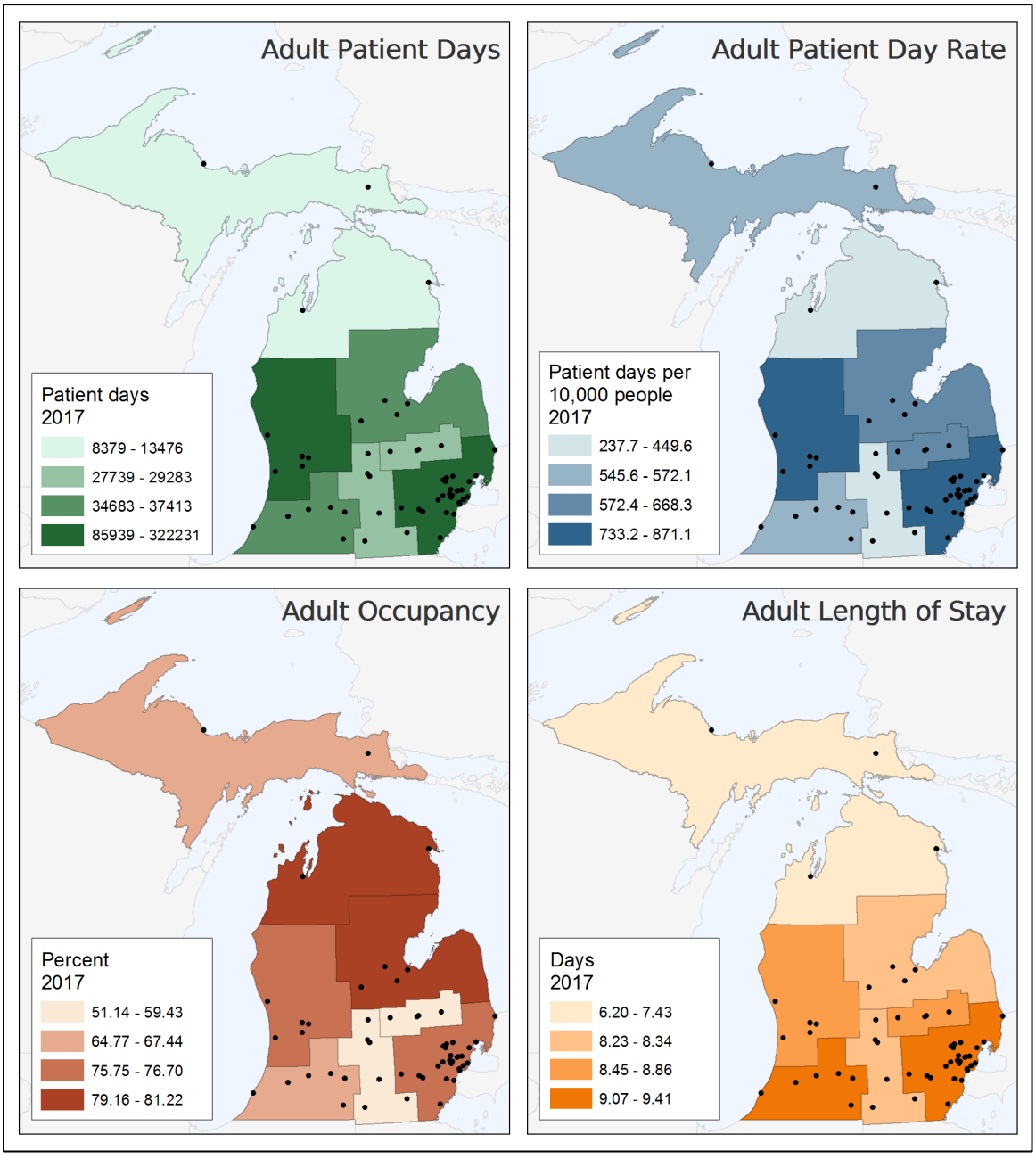
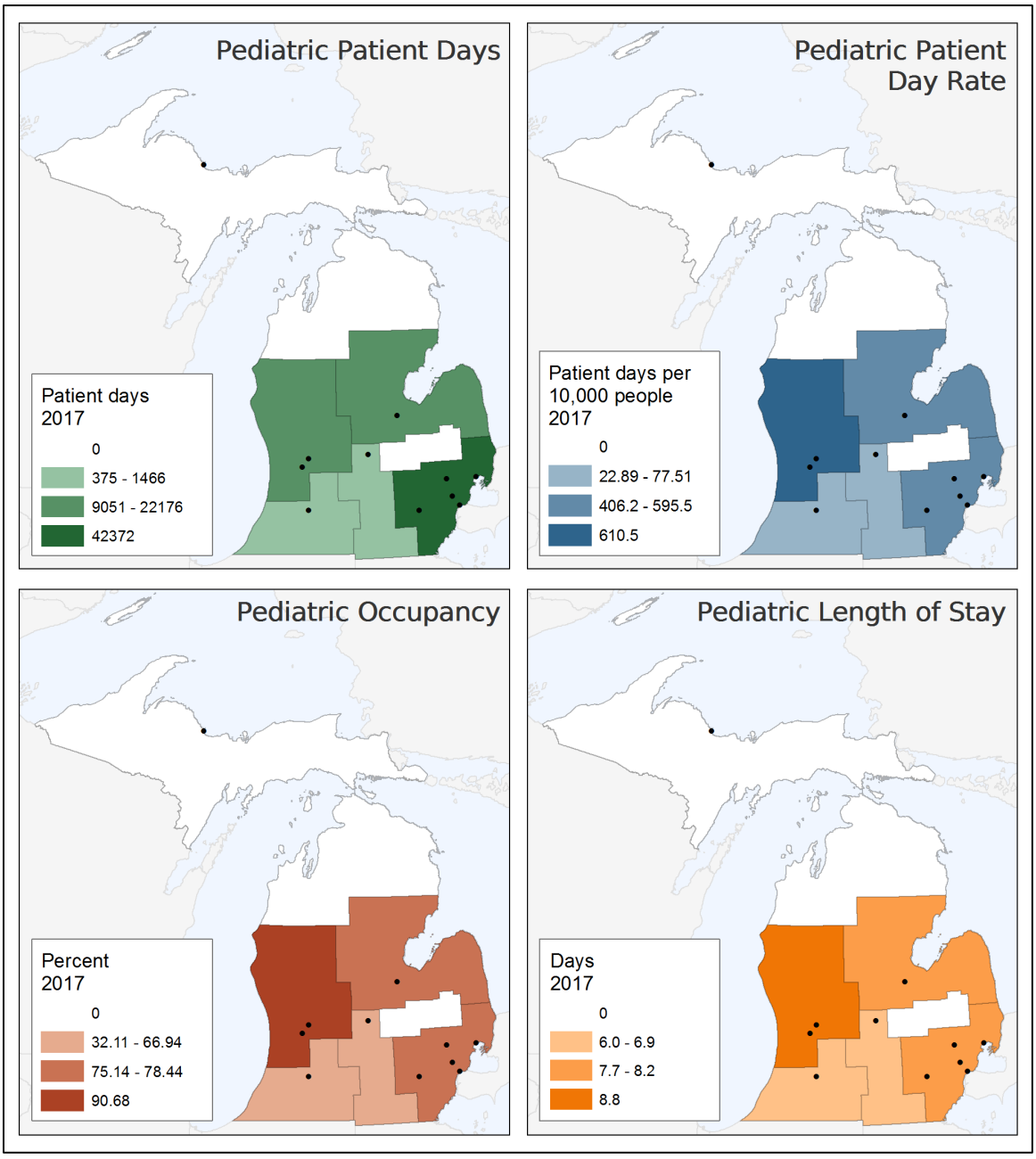


Figure 4.2: Pediatric utilization of psychiatric services by HSA 2017. Data from CON Annual Survey (patient days, discharges, and beds) and US Census (population). Patient day rates were calculated by dividing pediatric patient days by population aged 0-17. Length of stay was calculated by dividing patient days by discharges. Occupancy percent was calculated by dividing patient days by total bed days (beds multiplied by 365). *Note: UP Health System-Marquette (in Planning Area 8) reported pediatric beds in 2017, but reported 0 patient days.*



Michigan Psychiatric Admission Denial Database

Initial Findings: July to December 2017 Executive Summary

Prepared for:
Michigan Department of Health & Human Services
Bureau of Hospital, Center and Forensic Mental Health Services

Prepared by:
Michigan Public Health Institute's Center for Data Management & Translational Research

On:
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EXECUTIVE SUMMARY

INTRODUCTION

The process for accessing psychiatric hospitalization for Community Mental Health consumers can be burdensome and time-consuming for patients, CMHSP staff, and the Emergency Department staff. Sometimes CMHSP staff must contact multiple psychiatric hospitals over a period of hours or days to find an appropriate placement while the consumer may be waiting in the Emergency Department.

The Michigan Psychiatric Inpatient Denial Database (MPIDD) was developed to gather data around psychiatric hospitalizations through CMHSPs where there is at least one denial from a psychiatric hospital during the placement process. The database provides an opportunity to look for trends across Michigan related to denial reasons, consumer demographics, and diagnosis.

BACKGROUND: MPIDD was piloted from March 1, 2016 to September 30, 2016 with the CMHSPs in the Mid-State Health Network PIHP. In December 2016, MDHHS contracted with MPHI to take over management of the database and expand it statewide. MPIDD went live statewide in July 2017.

PARTICIPATION IN MPIDD: Forty-one of 46 CMHSPs entered data in the database for the first 6 months of statewide expansion. Thirty-two of them said they submitted complete data, while 9 of the 41 CMHSPs said their data was incomplete for a variety of reasons. MPIDD does not contain denials related to out of state hospitalizations or denials from state hospitals. It also does not contain information on the number of psychiatric admissions where there was no denial.

RESULTS

Overview

Information in this report is based on data submitted for the time period of July 1, 2017 through December 31, 2017.

For the purposes of this report, a denial event is defined as a single episode where an individual was assessed by a CMHSP staff, determined to need hospitalization based on a mental or behavioral health condition, and an attempt was made to place the individual but at least one denial was noted.

Between July 1 and December 31, 2017, 2,289 individuals had at least one hospital denial logged into MPIDD. These individuals accounted for 2,643 denial events, with a total of 26,873 denials.

- Average rate of denials per denial event for all persons is 10.2
- Average rate of denials per denial event by individual CMSHP ranged from 1. 0 denial to 19.8 denials.
- Children had an average of 8.6 denials per denial event while adults averaged 10.7 denials.

Demographic Characteristics

Stratifying individuals who had at least 1 hospital denial by age and gender showed that:

- The highest percentage of denial events occurred among individuals 18 to 39 years of age.
- One out of five (20.5%) individuals occurred among children 5 to 17 years of age,

- Males had 28% more denial events than females (56.1% to 43.9%, respectively).
- For children, there were slightly more females (51.1%) than males (48.9%) with a denial event.

Length of Time between Denials

To provide some perspective about the length of time a patient may have spent in the placement process, the time between the first and last denial was calculated and stratified by length of time, patient age, and individual CMHSP. Only denial events with more than one denial were included.

- 38% had less than a 1 hour duration between first denial and last denial.
- 21.4% had more than 24 hours between first and last denial.
- For children, 24.9% of their denials events lasted more than 24 hours.
- The percent of events lasting more than 24 hours varied greatly between CMHSPs, 10% to 57.3%.

Diagnosis

The average number of denials per denial event was broken down by diagnosis. Patients with Autism-Asperger's had the highest average number of denials for both adults and children, followed by Schizophrenia/ Psychotic Disorders.

Reasons for Denial

Denials were broken down into 20 different reasons. Data was analyzed for the whole state and at the PIHP level. "At capacity" was by far the most frequent reason, cited 71.5% of the time. The second most common reason was "No call back or response" (8.6%) followed by "patient does not fit milieu" (7.2%).

Location of Assessment

The majority of prescreens for hospitalization occurred at the Emergency Department (70.7%), followed by Crisis Units at 13.2%.

Final Outcome for the Individual Denial Events:

89.4% of the events were marked as complete in the database. Of those completed, the most common outcome was that a placement was found, 82.3%.

FUTURE ANALYSES

The outreach efforts and the data gathered through this project have raised many questions that merit further exploration. While the data currently being collected within MPIDD is useful for understanding the various reasons for hospital denials, the data are somewhat limited by the inability to generate information such as rates of denials by CMHSP, other geographical stratifications, or based on a person's demographic characteristics or health condition. Linking MPIDD data to other potential data sources will add several new dimensions to the data analyses opportunities and greatly improve MPIDD's usefulness.

In particular, 2 questions emerged to the forefront during the initial data analysis phase and will be pursued in future analyses. These include

- What accounts for the significant variation in the rate of hospital denial events between CMHSPs?
- Are hospital beds more difficult to access for children?

NEXT STEPS

Moving forward, MPHI plans to continue its outreach efforts and help CMHSPs improve their data entry and reporting processes. Additionally, MPHI will continue to explore the feasibility of linking MPIDD data to outside data sources. This will not only provide a method to better understand the variances in data quality between CMHSPs but lead toward more accurate, comprehensive, and meaningful information for future reporting.