Matheson Center for
HEALTH CARE STUDIES

2026

An Analysis of Social and Economic Impact of the Huntsman Mental Health Institute

Elise V. Bailey, PhD, MPP[1]
Evan V. Goldstein, MPP, PhD[1]
Papungkorn Kitcharoenkarnkul, PhD[3]
Erik J. Hansen, B.S.[1, 2]
Fernando A. Wilson, PhD[1, 4, 5]

1. Department of Population Health Sciences, School of Medicine
2. School of Social and Behavioral Sciences
3. Research Division, Nebraska Department of Economic Development
4. Department of Economics, School of Social and Behavioral Sciences
5. Matheson Center for Health Care Studies

THE UNIVERSITY of UTAH
Matheson Center for Health Care Studies
Health Economics Core, Clinical and Translational Sciences Institute
in collaboration with
The Sorenson Impact Institute

Notes

Acknowledgements

We thank HMHI program directors and UHealth staff for their efforts providing and supplementing our data. We also thank the Utah Department of Health and Human Services for the use of Utah's restricted Behavioral Risk Factor Surveillance Survey data.

Suggested Citation

Bailey EV, Goldstein EV, Kitcharoenkarnkul P, Hansen EJ, Wilson FA. An Analysis of Social and Economic Impact of the Huntsman Mental Health Institute. Matheson Center for Health Care Studies, University of Utah, Salt Lake City; 2026.

Disclaimer

The views expressed herein are those of the authors and do not necessarily reflect the views of collaborating organizations or funders, or of the University of Utah.

Contact Information

Fernando A. Wilson, PhD
Director, Matheson Center for Health Care Studies
Director, CTSI Health Economics Core
University of Utah
295 Chipeta Way
Salt Lake City, UT 84108
https://www.matheson.utah.edu

An Analysis of Social and Economic Impact of the Huntsman Mental Health Institute

Executive Summary

In 2023, the Sorenson Impact Institute and the Health Economics Core (HEC) of the Utah Clinical & Translational Science Institute embarked on a project to document the social and economic impact of Huntsman Mental Health Institute's (HMHI's) programs and activities, as well as potential high impact opportunities available to HMHI. This report is part of that project. It focuses on: 1) the geographic distribution of mental health care services, 2) public peceptions around Substance Use Disorder (SUD), 3) Emergengy Department (ED) utilzation, and 4) the local economic impact of HMHI's federally funded research.

Main Takeaway

HMHI provides high impact mental health services to Utah patients, saves money for both them and their insurers by reducing ED utilization, and contributes meaningfully to the local economy by bringing federal research dollors to Utah. The institute has opportunities to increase its impact by expanding rare services, improving perceptions of people with SUDs, and further reducing ED utilization.

Key Findings

1. **HMHI provides several high impact services that would be difficult for Utah patients to access but for the institute.** These include services for treatment resistant mood disorders and detoxification, among others. To the extent that there is unmet demand for these services, expanding them into further HMHI facilities could be critical for Utah residents with mental health conditions. In addition, HMHI should carefully consider how the organization aims to be a key part of meeting Utah's growing need for mental health care over the next four decades.

2. **Programs aiming to decrease SUD stigma should focus on Protestants, Catholics, veterans, residents of rural counties, and those without health insurance.** Most Utah residents express sympathy toward individuals with SUDs, but these groups are less likely to do so.

3. **Visits to HMHI clinics reduced patients' utilization of ED and inpatient care afterward, compared to their use before their clinic visits.** This was true for every clinic we examined. The utilization reductions resulted in very meaningful cost savings. Even earlier intervention in HMHI clinic settings could further reduce ED and inpatient visits and therefore costs to patients and their insurers.

4. **Efforts to reduce preventable ED use may benefit from both targeting high-risk patient subgroups and tailoring engagement strategies to program-specific needs.** There is large variety across HMHI programs in predicted risk for an ED visit within the 30 days following a HMHI program visit. Higher predicted ED risk was concentrated in programs serving more acute or crisis-oriented populations, such as the Receiving Center and Behavioral Health Services Clinic.

5. **Interventions that promote patient engagement may also help reduce preventable ED use.** Higher patient engagement is related to both reduced risk of near-future ED utilization and delayed time to next ED visit after a visit to an HMHI program.

6. **Between 2018 and 2023, HMHI's federally funded research activities resulted in more than $76 milion in economic output and added more than 350 jobs to the local economy.** These economic gains primarily impact the professional, scientific, and technical services industry, but all local industries are impacted to some extent.

Table of Contents

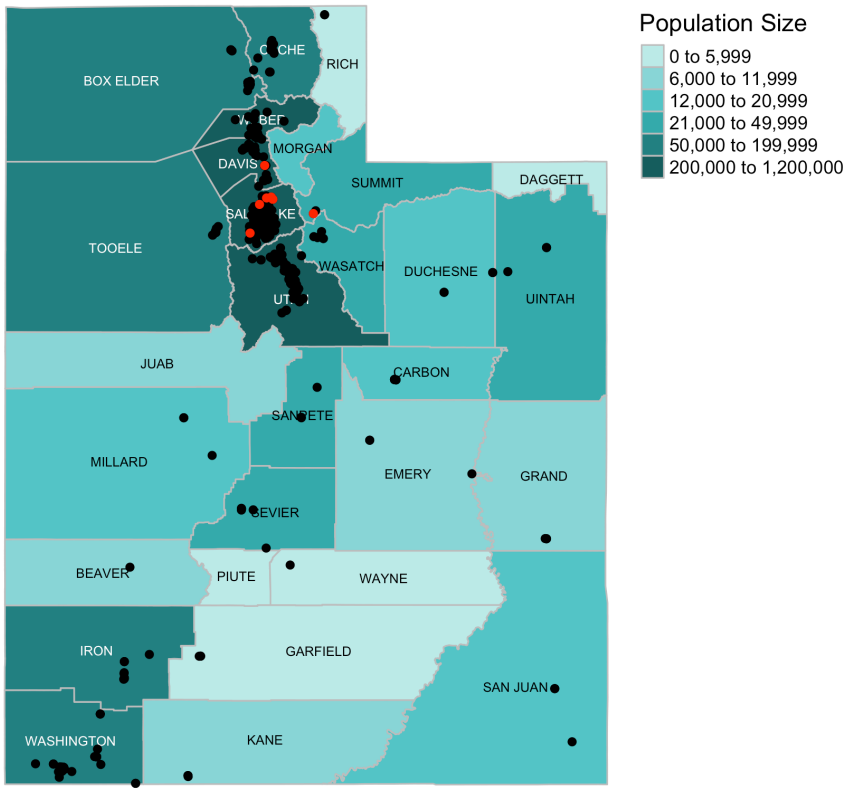
Executive Summary iii
Chapter 1: Geographic Accessibility of Huntsman Mental Health Institute Services 1
Introduction 1
Distinctive HMHI Programs 4
Uncommon in Utah and Provided at Few HMHI Locations 6
Common in Utah and Provided at Few HMHI Locations 12
Implications of Utah's Projected Population Growth 15
Conclusion 16
Chapter 2: Public Perceptions around Substance Use Disorder in Utah 17
Introduction 17
Results 17
Conclusion 19
Chapter 3: The Impact of HMHI Services on Emergency Department and Inpatient Utilization 20
Introduction 20
Results 20
Conclusion 23
Chapter 4: Estimating the Risk of Emergency Department Use After an HMHI Clinic Visit 24
Introduction 24
Results 24
Conclusion 26
Chapter 5: Patient Engagement and Emergency Department Utilization 27
Introduction 27
Results 27
Conclusion 30
Chapter 6: The Local Economic Impact of HMHI's Federally Funded Research Activities 31
Introduction 31
Results 31
Conclusion 32
References and Appendices 33
References I
Appendix A: Supplemental Tables VI
Appendix B: Description of HMHI Units and Services XIV
Appendix C: Methodology XVII
Appendix D: Common Services Both in Utah & at HMHI XXV

Chapter 1: Geographic Accessibility of Huntsman Mental Health Institute Services

Introduction

Mental illnesses are very common health problems in Utah. Estimates based on the National Survey of Drug Use and Health and the Utah Behavioral Risk Factor Surveillance System Survey (Utah BRFSS) show that approximately 26.86% of adults, or 599,000 individuals, in the state had any mental illness in 2019. This was the highest rate in the nation. Of those 599,000, an estimated 49.7% did not receive treatment and 27.9% sought care but did not receive the treatment they needed.[1] More Utahns with any mental illness have private insurance than the national average (78.8% vs. 59.6%). Fewer are covered through Medicaid (7.0% vs. 21.6%), and the proportion of adults with any mental illness who are uninsured is similar to the national average (11.3% vs. 11.1%).[2,3] In national research, uninsurance and cost of care are frequently related to unmet need for care. Other characteristics related to unmet need for care are structural barriers, perceived stigma, individuals' minimization of their own symptoms, and individuals' perceptions of low treatment effectiveness. Structural barriers can include not knowing where to go for mental health treatment, not having time to receive treatment, or finding it inconvenient to attend treatment.[4]

Figure 1.1 Population Size and Distribution of Mental Health Care Facilities in Utah



Data from 2020 N-MHSS and U.S. Census Bureau

This chapter explores one potential facet of structural barriers to mental health care in Utah—the geographic distribution of mental health care facilities and services in the state. We focus on 1) the role Huntsman Mental Health Institute (HMHI) plays in this snapshot of facility distribution, and 2) potential opportunities HMHI might have to expand the distribution of impactful services and programs. **Figure 1.1** shows the locations of mental health care facilities in Utah, the names and locations of each county, and the population size in each county. See **Table A.1 in Appendix A** for more information describing mental health care facility distribution by county.

In November 2019, the University of Utah announced a historic commitment of $150 million from the Huntsman Foundation to establish HMHI, an expansion of the previously existing University Neuropsychiatric Institute. The institute's mission is to "advance mental health knowledge, hope, and healing for all." It is part of an academic health system working to transform mental health care through community, research, clinical, and education initiatives. Through these initiatives, HMHI aims to reduce stigma and promote healing across Utah and the nation. See **Appendix B** for more information about HMHI and its programs.

In 2023, the Sorenson Impact Institute and the Health Economics Core (HEC) of the Utah Clinical & Translational Science Institute embarked on a project to document and value the social and economic impact of HMHI's programs and activities.[5] Through this

work, the Sorenson Impact Institute and HEC conducted background research and qualitative interviews with HMHI stakeholders to identify over 20 HMHI programs as Tier 1 activities having "high impact and potential for monetization." They are Safe UT, neurobehavior HOME program, maternal mental health services, treatment resistant mood disorder (TRMD) services, mobile crisis outreach teams (MCOT), substance use and recovery services, 988 suicide crisis line, physical and mental health integration, trauma clinic, youth residential treatment services, and day treatment services, same-day psychiatry, autism spectrum disorder services, anti-stigma campaign, and Comprehensive Assessment & Treatment (CAT) programs.

The National Mental Health Services Survey (N-MHSS) is a source of national- and state-level data on the mental health services delivery system reported by both publicly and privately operated specialty mental health treatment facilities.[6] The 2020 N-MHSS was used as the primary data source in analyses for this report (refer to **Appendix C** for additional information). N-MHSS data for HMHI facilities were updated and supplemented with information from HMHI program managers. Summary analyses describe the current status of mental health care facility distribution in Utah. In black colored dots, **Figure 1.1** shows there are 522 of these mental health care facilities in Utah, nearly half of which are in Salt Lake County. Of Utah's facilities, eight are Huntsman Mental Health Institute and University of Utah Health (HMHI facilities), shown in red dots. There are six HMHI facilities in Salt Lake County, one in Davis County, and one in Summit County. Four Utah counties—Daggett, Juab, Morgan, and Piute counties— have no known mental health care facilities of any kind, as reported in the 2020 N-MHSS. With the exception of Morgan County, these are among the least populous counties in the state.

According to the U.S. Health Resources and Services Administration, there are mental health provider shortages in every county in the state. This problem is worse in rural and frontier areas than in urban areas.[7] This may suggest that there are also too few facilities in rural and frontier areas. It is worth noting that HMHI has no facilities in such counties.

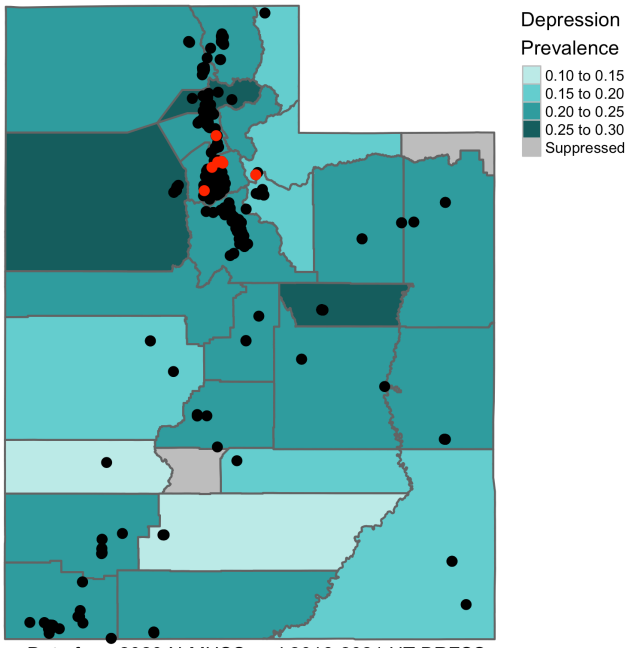
In many parts of the state, residents may have long driving travel times to mental health care. Our geospatial analysis shows the travel time from the population center of Daggett County to the nearest mental health care facility is approximately 135 minutes (see **Table A.1 in Appendix A**). The average travel time from Garfield County's population center to its mental health care facilities is 79 minutes. That figure in Millard County is 77 minutes. Access to mental health care may be easier in other counties. Millard, Garfield, and Wayne counties have the highest number of facilities per 10,000 population—despite Millard County's status as an area where drive times to care are high. Six counties in Utah have average drive times to care from their population centers of less than 10 minutes.

In our analyses between the number of facilities in a county and county characteristics— including population size, socioeconomic status, mental health care provider shortage level, the percentage of the population that is uninsured, the percentage of the population that is non-white or LGBTQ+, and disease prevalence—population size was the only statistically significant predictor of the number of facilities in a county. Counties with higher populations tend to have more facilities across a range of services than less populated counties. In the event that HMHI plans to expand its services through addition or expansion of facilities, it may be useful to consider other factors beyond population size in order to maximize the facility's positive impact on the mental health of Utah residents. See **Table A2 in Appendix A** for summary data describing each county, including the variables used in this regression and the results of our geospatial analysis for drive time to care.

Data describing Utah's geographic distribution of need for mental health care is scarce. However, some information describing the county-level prevalence of depression and suicidal thoughts is available through Utah BRFSS data[8,9]. More information can be found about our use of this data in **Appendix C**. Figures 1.2 and 1.3 show this information. In **Figure 1.2** and throughout this report, each mental health care facility is represented by a dot. Red dots are those associated with HMHI, and black dots represent all other facilities. The proportion of individuals who have ever been told they had depression in each county is shown via the blue-green coloration—dark colors represent high proportions and lighters colors represent low proportions. **Figure 1.3** is similar, but the blue-green coloration instead denotes the proportion of the population who considered suicide in the past year. These figures

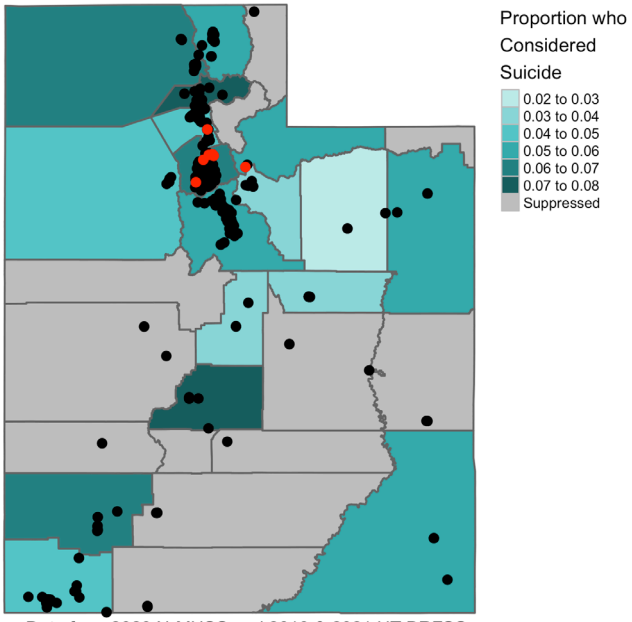
suggest that the prevalence of mental health issues may be highest in some of the counties with the fewest mental health care facilities. Regression analysis shows that a county's prevalence of depression or suicidal thoughts is not predictive of its number of mental health care facilities in the same time period. See **Appendix C** for more information about the limitations of these data, particularly in less populous counties.

Figure 1.2 Mental Health Care Facilities and Depression Prevalence in Utah



Data from 2020 N-MHSS and 2016-2021 UT BRFSS

Figure 1.3 Mental Health Care Facilities and Suicidality Prevalence in Utah



Data from 2020 N-MHSS and 2019 & 2021 UT BRFSS

In the rest of this chapter, we describe the distribution of individual mental health services across Utah: the total number of facilities providing a service, the number of HMHI facilities providing that services, and the geographic location of these facilities. Our results are organized into sections which group the services based on how common they are within Utah and HMHI. The analyses in this chapter consider services as being common in Utah if they are provided at more than 100 locations and as being common at HMHI if they are provided at half or more HMHI locations. Otherwise, they are considered to be provided at few locations (see **Appendix C** for additional methodological information). These sections are presented based on how impactful we believe an opportunity to expand the group of services might be, from highest to lowest potential impact: 1) distinctive HMHI services, 2) uncommon in Utah and provided at few HMHI locations, and 3) common in Utah but provided at few HMHI. Services that are common in Utah and commonly provided at HMHI can be found in **Appendix D**. The chapter closes with a brief discussion of what population growth projections might mean for HMHI's strategic growth.

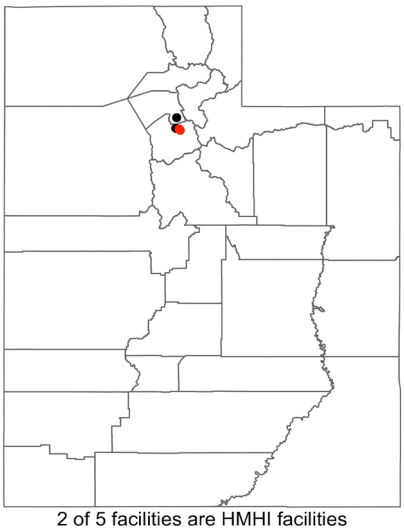
Distinctive HMHI Programs

HMHI's Treatment Resistant Mood Disorders program—a Tier 1 program—is unique in the state. This program is designed to provide treatments for those with diagnosed mood disorders such as depression, bipolar disorder, and schizoaffective disorders whose conditions have been resistant to medication-based treatments. Specifically, the program provides electroconvulsive therapy, transcranial magnetic stimulation, and ketamine infusion therapy. These treatments are so uncommon in Utah as to represent particularly distinctive services offered by HMHI. As a result, expansion of these services to additional locations in the state could represent a very meaningful opportunity for HMHI, given likely future demand for these service.

Electroconvulsive Therapy

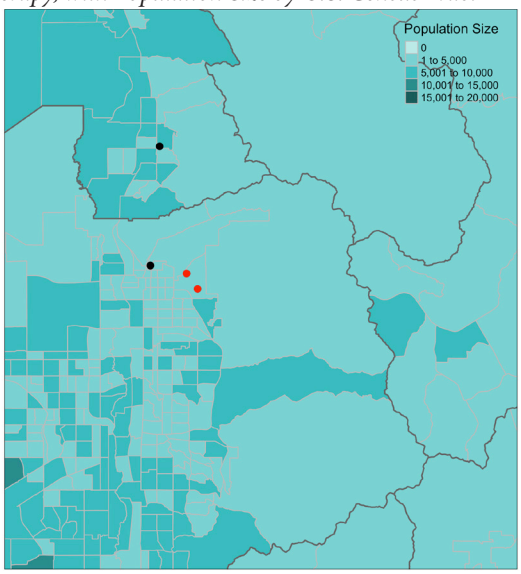
The N-MHSS data defines electroconvulsive therapy (ECT) as a treatment using low-voltage stimulation of the brain to intentionally triggering a brief seizure of the brain and thereby treat some forms of major depression, acute mania, and schizophrenia. This potentially life-saving intervention is typically considered when other therapies have failed, when a person is seriously medically ill and/or unable to take medication, or when a person is very likely to die by suicide. Substantial improvements in the equipment, dosing guidelines, and anesthesia have significantly reduced the side effects. Five facilities in Utah provide ECT services, two of which are HMHI facilities (see **Figure 1.4**).

Figure 1.4 Mental Health Care Facilities with Electroconvulsive Therapy



Both of these HMHI facilities are located in Salt Lake County. As shown in **Figure 1.5**, no facility (including HMHI facilties) providing ECT is located in a densely populated Census Tract area relative to other nearby Census Tracts. Research has not examined whether a relationship exists between population density and treatment resistant mood disorders. However, some studies suggest that individuals living in areas with high population density are at higher risk of developing depressive disorders.[10] This could potentially suggest that people with treatment resistant mood disorders disproportionately reside in census tracts with high population density. If that is true, the opportunity to expand ECT services into high population density areas could be impactful.

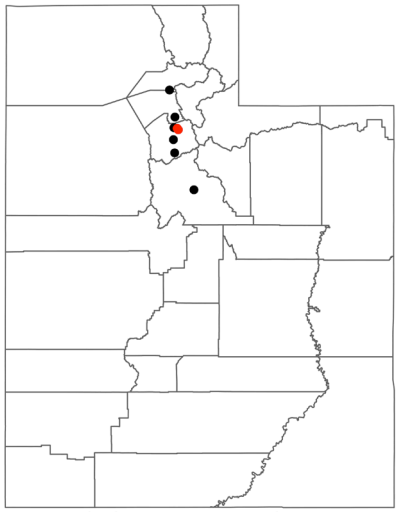
Figure 1.5 HMHI Facilities with Electroconvulsive Therapy, with Population Size by U.S. Census Tract



Transcranial Magnetic Stimulation

The N-MHSS defines transcranial magnetic stimulation (TMS) as a noninvasive procedure that uses magnetic fields to stimulate nerve cells in the brain to improve symptoms of depression. TMS creates a magnetic field to induce a small electric current in a specific part of the brain; the current comes from the magnetic field created by an electromagnetic coil that delivers pulses through the scalp. TMS is typically used when other depression treatments have not been effective, and there is ongoing research on the use of TMS to treat post-traumatic stress disorder (PTSD) and other mental health conditions. Only nine facilities in Utah provide TMS services, two of which are HMHI facilities (see **Figure 1.6**). While these facilities

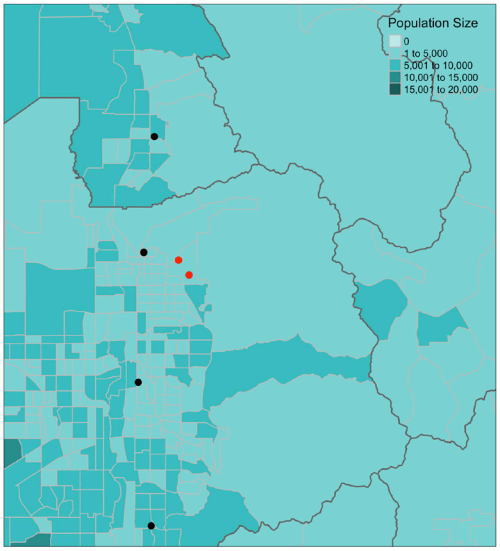
Figure 1.6 Mental Health Care Facilities with Transcranial Magnetic Stimulation



2 of 9 facilities are HMHI facilities

are distributed across a broader area of the state than those providing ECT, they remain concentrated entirely on the Wasatch Front. As with ECT, most of the facilities providing TMS are not in highly populated Census Tract areas (see **Figure 1.7**). That carries similar implications as in the case of ECT.

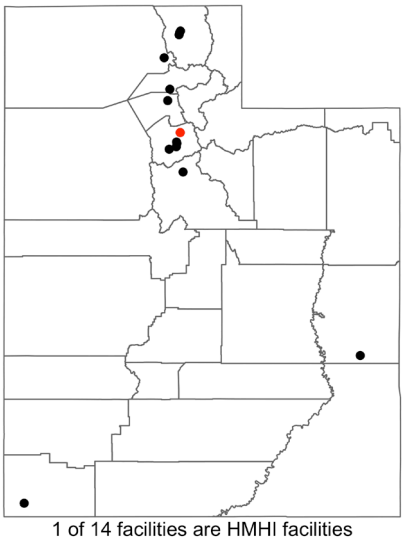
Figure 1.7 HMHI Facilities with Transcranial Magnetic Stimulation



Ketamine Infusion Therapy

Ketamine infusion therapy involves the administration of a single infusion or a series of ketamine infusions for the management of psychiatric disorders (e.g., major depressive disorder, post-traumatic stress disorder, acute suicidality). There are 14 facilities in Utah providing this service, one of which is an HMHI facility. These facilities are less centralized than those providing ECT and TMS—two are located in rural Utah (see **Figure 1.8**).

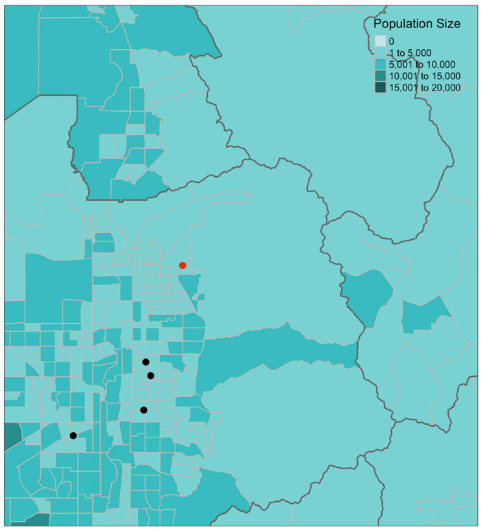
Figure 1.8 Mental Health Care Facilities with Ketamine Infusion Therapy



1 of 14 facilities are HMHI facilities

As with the other two services provided to patients with treatment resistant mood disorders, facilities providing ketamine infusion therapy tend not to be located in highly populated areas, including the HMHI facilities that provide this service (see **Figure 1.9**).

Figure 1.9 HMHI Facilities with Ketamine Infusion Therapy



Again, the implications of this are that an opportunity to expand these treatment resistant mood disorder treatments into areas of high population density could be impactful.

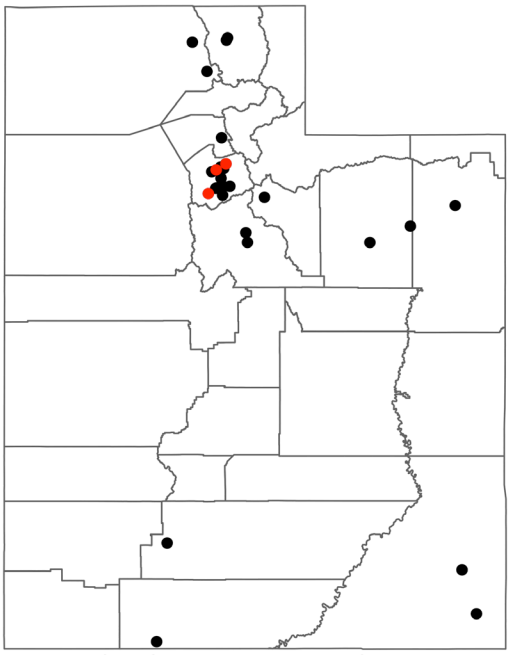
Uncommon in Utah and Provided at Few HMHI Locations

Some mental health and substance use services are subjectively uncommon at the state level—located at fewer than 100 facilities—and provided at few HMHI facilities—less than half of HMHI's eight facilities. Opportunities to expand these services to other facilities may still be high impact for Utah.

Chronic Disease Management

Chronic disease management is a systematic approach to improving health care for people with chronic disease. A facility is considered to provide such services in N-MHSS data if it provides services such as case management, continuous quality improvement, disease management, patient self-management, physician education, organizational support, and a chronic care model. These services may be provided as part of HMHI's NeuroBehavior HOME program, which is a Tier 1 program at HMHI. Chronic disease management services are quite uncommon among mental health care facilities in Utah—provided at only 31 facilities in the state (**Figure 1.10**). It is also provided at relatively few HMHI locations—three of the system's facilities, all in Salt Lake County—which may represent an opportunity for high-impact growth via provision at more of HMHI's locations outside that county.

Figure 1.10 Mental Health Care Facilities with Chronic Disease Management

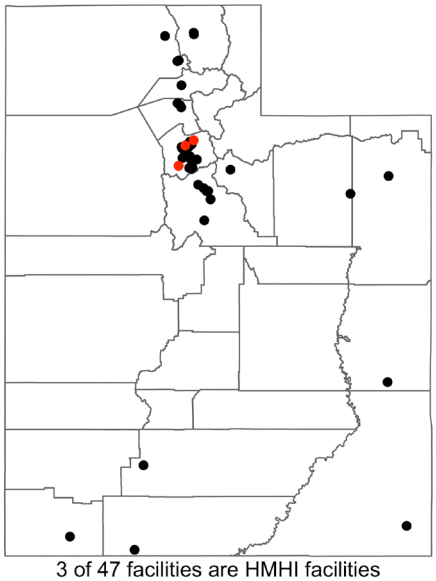


3 of 31 facilities are HMHI facilities

Intensive Case Management

The geographic distribution of intensive case management (ICM) services is similar to that of chronic disease management. Intensive case management is defined in the N-MHSS as a key part of the continuum of mental health care for persons with serious mental illness. It involves building a caring, trusting relationship with the consumer, promoting consumer independence through the coordination of appropriate services, and providing ongoing, long-term support as needed by the consumer to function in the least restrictive, most natural environment and achieve an improved quality of life. Intensive case managers fulfill a vital function for consumers by working with them to realize personal recovery goals and providing the support and resources that consumers need to achieve goals, stabilize their lives, and improve their quality of life. Such services may be provided across several Tier 1 programs at HMHI for individuals experiencing serious mental illness, e.g., the Treatment Resistant Mood Disorders Program. Only 47 facilities in the state provide this service and, again, it is provided at three HMHI facilities in Salt Lake County (**Figure 1.11**). As with chronic disease management, this service also represents an area for potential expansion of high-impact services outside Salt Lake County.

Figure 1.11 Mental Health Care Facilities with Intensive Case Management



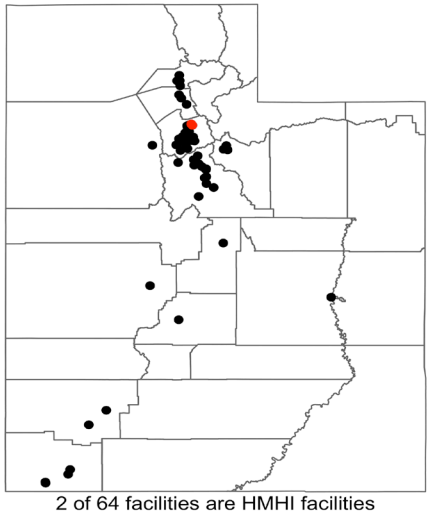
3 of 47 facilities are HMHI facilities

Detoxification Services

Another high-impact Tier 1 program at HMHI is its Substance Use and Recovery program. As part of that program, several HMHI facilities provide detoxification services. Such services are relatively uncommon,

both statewide and across HMHI locations. Detoxification services of any kind are provided at only 64 facilities in the state, two of which are Salt Lake County HMHI facilities (**Figure 1.12**). The Utah Behavioral Health Master Plan published by the Kem C. Gardner Policy Institute at the University of Utah specifically notes that there are meaningful inconsistencies in access to detoxification services in the state and recommends that systems expand to include substance use disorder treatment more comprehensively across their organizations.[11]

Figure 1.12 Mental Health Care Facilities with Detoxification Services



The number and geographic distribution of detoxification services for specific substances vary. All are uncommon in Utah and provided at the same two Salt Lake County HMHI locations (**Figures 1.13 through 1.17**). Opioid detoxification is provided at the greatest number of locations in the state (62 facilities), and benzodiazepine detoxification services are provided at the fewest (49 facilities). It is particularly important to note that no detoxification facilities of any kind appear to be present in Summit County, as reported through the N-MHSS. HMHI does have a facility located in Summit County, which is not currently providing detoxification services. Depending on factors including the geographic distribution of demand for such services, travel distances to detoxification care from Summit County to the nearest facility, and other logistical considerations, the expansion of detoxification services to HMHI's Summit County location may represent a high-impact opportunity.

Figure 1.13 Mental Health Care Facilities with Alcohol Detoxification

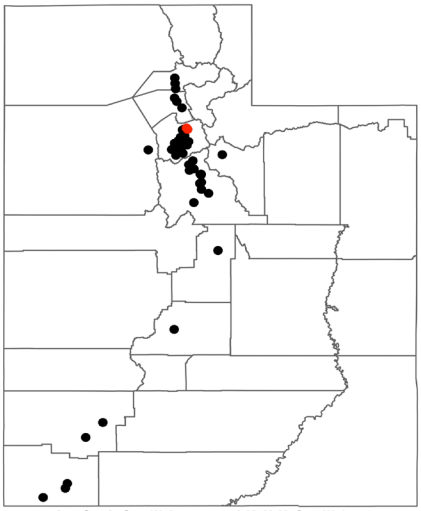


Figure 1.14 Mental Health Care Facilities with Benzodiazephine Detoxification

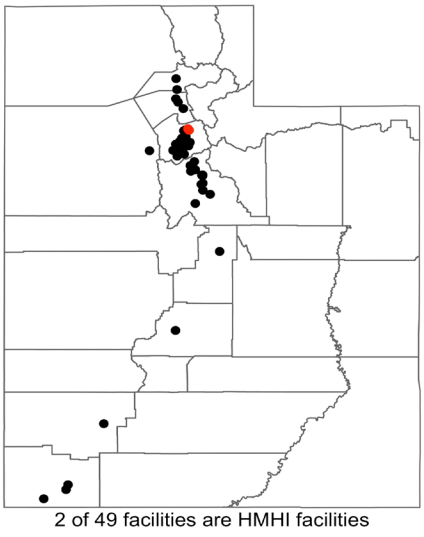


Figure 1.15 Mental Health Care Facilities with Cocaine Detoxification

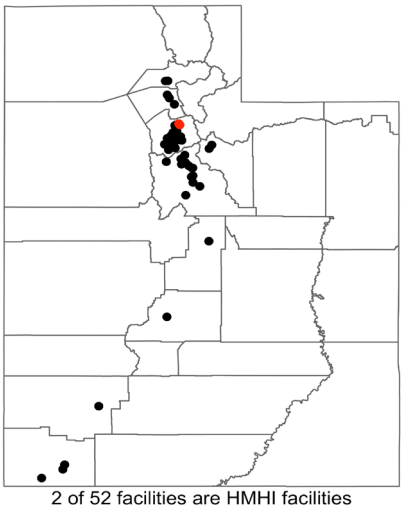
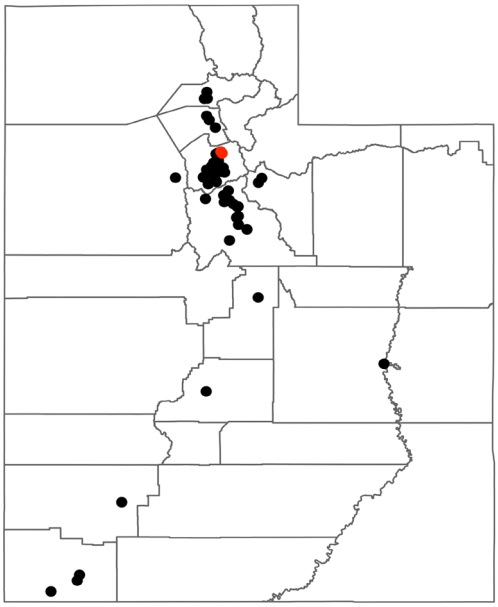
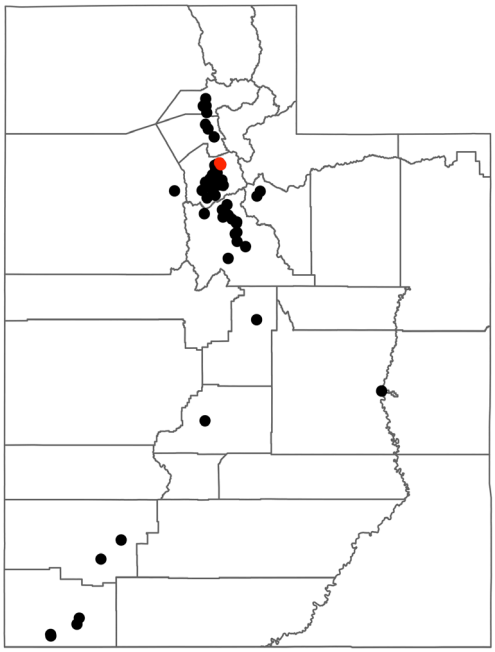


Figure 1.16 Mental Health Care Facilities with Methamphetamine Detoxification



2 of 55 facilities are HMHI facilities

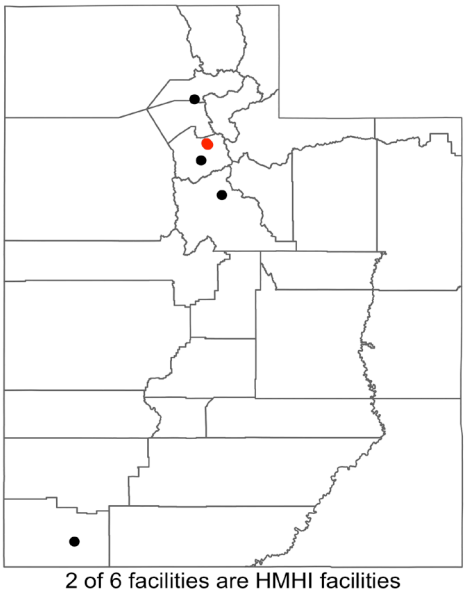
Figure 1.17 Mental Health Care Facilities with Opioid Detoxification



2 of 62 facilities are HMHI facilities

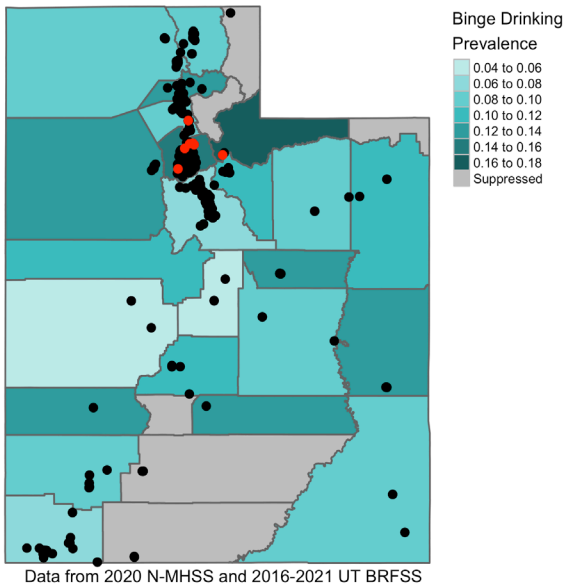
It is also worth noting that few mental health care facilities—six—in the state provide detoxification in an inpatient setting, two of which are HMHI facilities (**Figure 1.18**). Most such services are provided in outpatient or other care settings. This may make the expansion of HMHI's inpatient detoxification services to other HMHI locations particularly impactful. There is very little information about the geographic distribution of individuals with the potential need for services

Figure 1.18 Mental Health Care Facilities with Inpatient Detoxification



2 of 6 facilities are HMHI facilities

Figure 1.19 Mental Health Care Facilities and Binge Drinking Prevalence, by County



Data from 2020 N-MHSS and 2016-2021 UT BRFSS

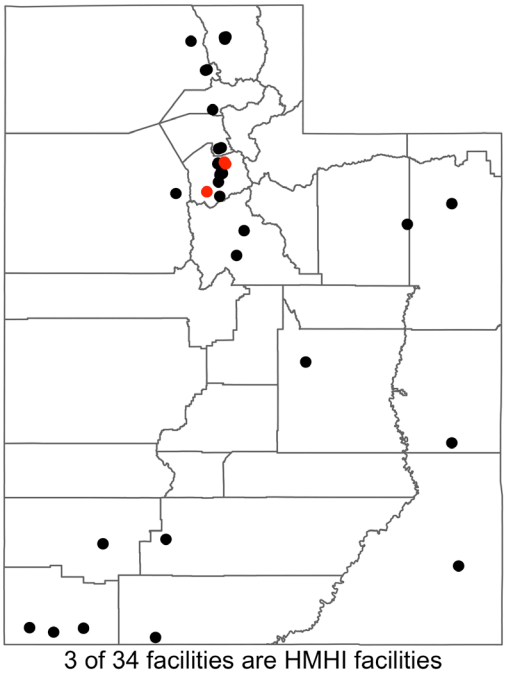
to treat Substance Use Disorder; however, some information is available that describes the potential number of adult Utahns who are currently binge drinking in each county—one potential indication of Alcohol Use Disorder (AUD).[12] **Figure 1.19** shows all facilities in Utah mapped against the prevalence of binge drinking in the state. As with previous figures using Utah BRFSS data, light blue-green coloration indicates a low proportion of residents have engaged in binge drinking and dark blue-green coloration indicates a high proportion of the same. Summit County has the highest proportion of residents who have engaged in binge drinking. Salt Lake County has the second highest (see **Table A2 in Appendix A**).

Many mental health care facilities are located in Salt Lake County, but far fewer are located in Summit County—only two, one of which is an HMHI facility that provides treatment for SUD and other related issues but does not provide detoxification services, to our knowledge. AUD frequently co-occurs with other substance use disorders.[13,14] That may suggest a similar pattern of prevalence for all SUDs and could therefore imply there is an opportunity for high-impact service expansion in Summit County. However, given that information describing the potential treatment need for SUD and other related issues is so limited, more information should first be obtained to understand the potential demand for these services in Sumit County

Onsite Psychiatric Emergency Services

Another service that is uncommon statewide and provided at few HMHI facilities is onsite psychiatric emergency services. Three of the state's 34 facilities providing this service are HMHI facilities. All three of those facilities are in Salt Lake County (**Figure 1.20**).

Figure 1.20 Mental Health Care Facilities with Onsite Psychiatric Services

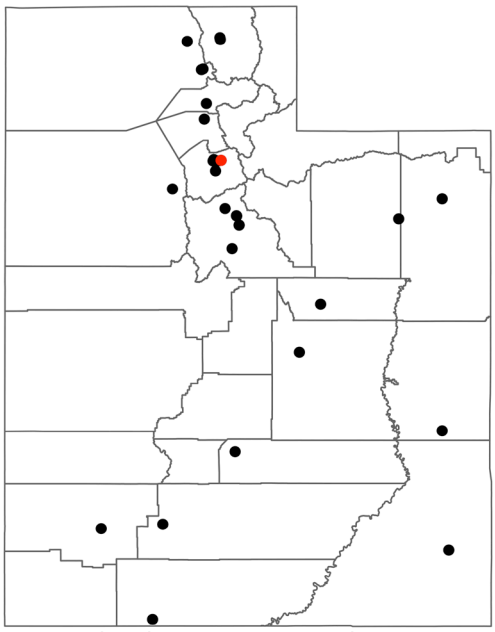


3 of 34 facilities are HMHI facilities

Mobile Crisis Outreach Teams (MCOT)

HMHI provides offsite crisis services, largely for individuals living in Salt Lake County, through which indidivuals in urgent need of mental health services can receive fast, free mental health care from certified peer support specialists or licensed clinicians. SAMHSA's N-MHSS data examines similar services--offsite psychiatric services. These are defined in the data as crisis intervension teams that provide care for acute mental health issues offsite. These services may be provided in support of local law enforcement agencies called to respond to mental-health related incidents. They are quite uncommon in Utah and currently provided at one of HMHI's eight facilities (**Figure 1.21**)

Figure 1.21 Mental Health Care Facilities with Offsite Psychatric Services

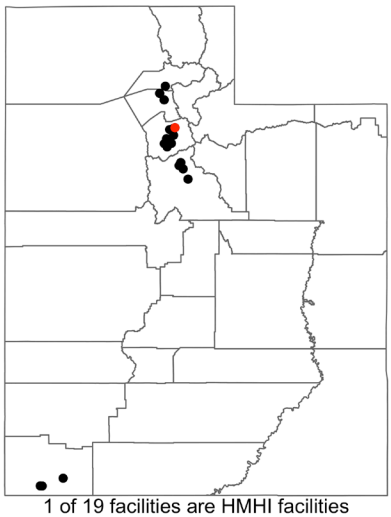


1 of 29 facilities are HMHI facilities

Day Treatment

HMHI's Day Treatment program provides eight hours of mental health care and support to individuals each day. This could include group, individual, and family therapy. The program is targeted mainly to children and adolescents. N-MHSS data examines similar services, which they describe as comprehensive, coordinated, and structured clinical services in a time-limited series of structured, face-to-face therapeutic sessions organized at various levels of intensity/frequency. Services are provided for diagnostic evaluation, active treatment of a condition, or to prevent relapse, hospitalization, or incarceration. They further define day treatment or partial hospitalization as less than 24-hour care available at least 5 days per week which may be offered on a half-day, weekend, or evening hours basis. One of 19 Utah facilities providing these services is an HMHI facility (**Figure 1.22**).

Figure 1.22 Mental Health Care Facilities with Partial Hospitalization or Day Treatment

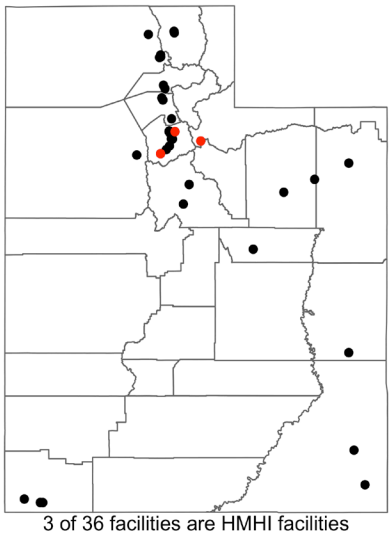


1 of 19 facilities are HMHI facilities

Same-Day Psychiatry Clinic

HMHI's Same-Day Psychiatry Clinic provides mental health services to adults in urgent need of care on weekdays. All visits are virtual, and first-come first-served. Individuals must already have a primary care physician and be able to provide health insurance information or payment in full at the close of their appointments. This program is designed primarily to provide psychiatric assessments and medication management.

Figure 1.23 Mental Health Care Facilities with Pyschiatric Emergency Walk-in Services

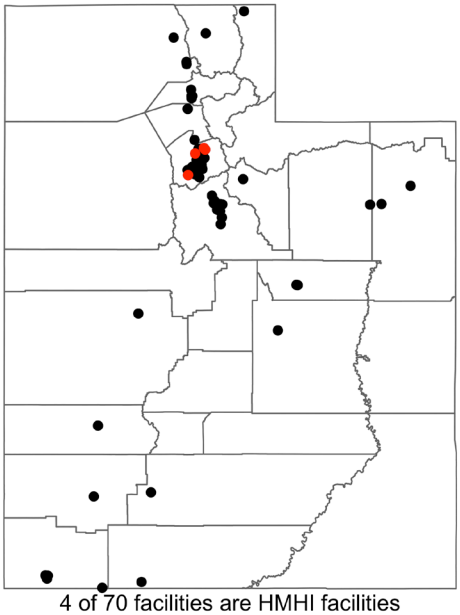


3 of 36 facilities are HMHI facilities

The N-MHSS data provides information about psychiatric emergency walk-in services, which are similar to the Same Day Psychiatric Clinic. Under the definition in the data, these services are designed to provide services to individuals in psychiatric crisis. The goal of these services should be to stabilize individuals on site and avoid psychiatric hospitalization whenever possible. They should also be accessible, professional, and cost-effective. Three of Utah's 36 facilities providing these services are HMHI facilities (**Figure 1.23**).

Comprehensive Assessment & Treatment

Figure 1.24 Mental Health Care Facilities with Specialized Adolescent Programs



4 of 70 facilities are HMHI facilities

HMHI's Comprehensive Assessment & Treatment (CAT) program is meant to provide four to six weeks of inpatient care to individuals with complex mental health issues that have been unsuccessfully treated in the past. The goal is to gain an understanding of a person's mental health issues, begin treatment, and design a plan for the future. This program is primarily targeted to people aged 4 - 30 years old. Through the CAT program, HMHI facilities represent four of Utah's 70 facilities that provide specialized care to adolescents (**Figure 1.24**), and four of Utah's 217 facilities with specialized care for young adults (**Figure 1.25**)

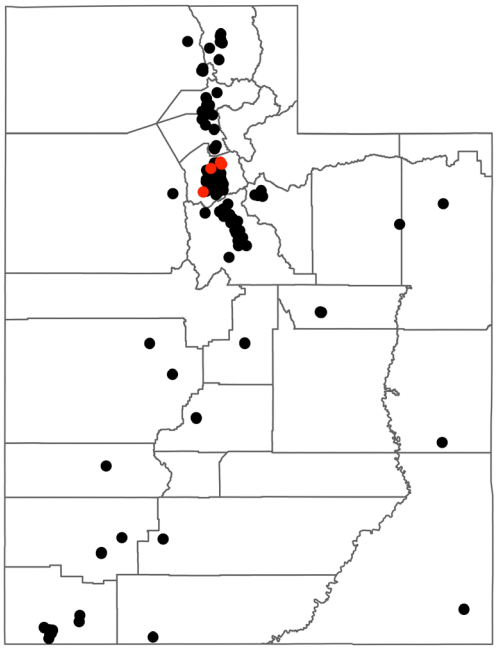
Legal Advocacy & Vocational or Educational Services

Additional services that are uncommon in Utah and not currently provided at any HMHI location are legal advocacy services and educational or vocational services. Vocational and educational services include the provision of support with, for example, high school coursework or GED preparation. Under the definition used in N-MHSS, legal advocacy services aim to help protect and maintain patients' legal rights during their care. The newly opened Kem and Carolyn Gardner

Mental Health Crisis Care Center helps coordinate legal advocacy services with community partners.

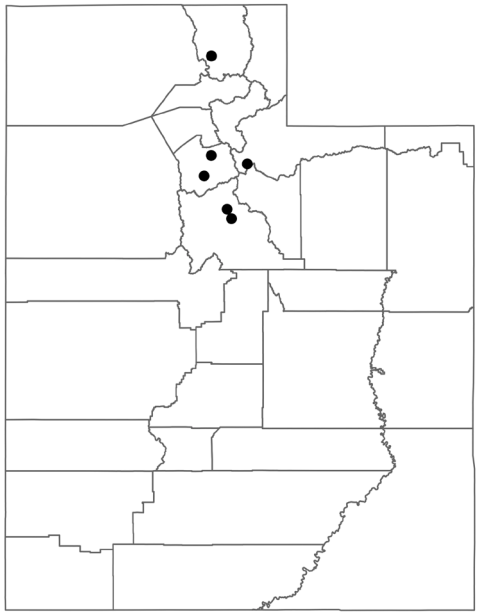
Both of these services are exceptionally uncommon in Utah, and their provision in the Crisis Care Center represents a meaningful expansion of services in the state (**Figures 1.26 and 1.27**).

Figure 1.25 Mental Health Care Facilities with Specialized Young Adult Programs



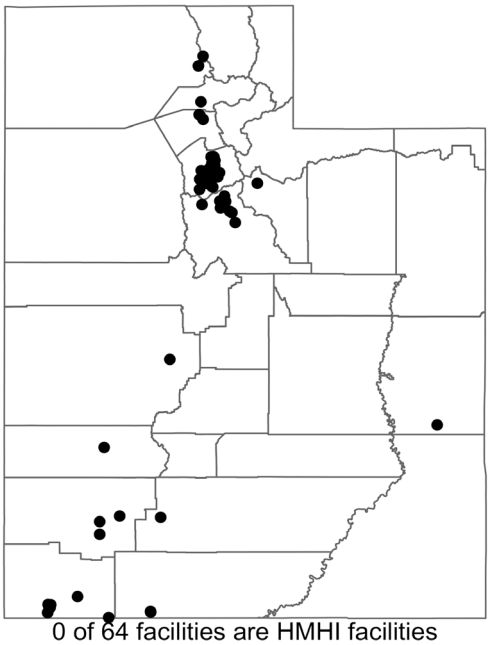
4 of 217 facilities are HMHI facilities

Figure 1.26 Mental Health Care Facilities with Legal Advocacy Services



0 of 6 facilities are HMHI facilities

Figure 1.27 Mental Health Care Facilities with Vocational Training and Educational Support



0 of 64 facilities are HMHI facilities

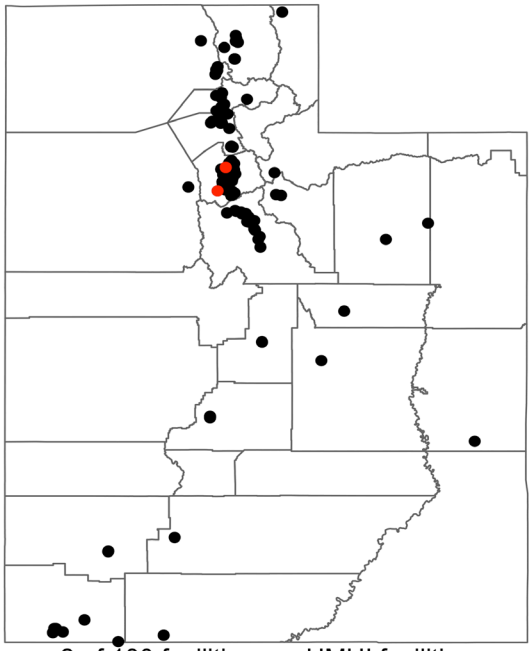
Common in Utah and Provided at Few HMHI Locations

Some services appear to be relatively common at the state level, and HMHI provides them but at relatively few locations. These are eye movement desensitization and reprocessing (EMDR) services, activity therapy, the provision of medication for alcohol use disorder, relapse prevention programs, 12-step programs, specialized services to treat co-occurring substance use disorder and pain issues, integrated primary care, and specialized LGBTQ+ services. These may or may not be areas where HMHI would want to direct attention in the future, depending on demand for these services and techniques.

EMDR Services

As part of another Tier 1 program—the Trauma Clinic—HMHI provides EMDR treatment to patients who have experienced trauma. A total of 130 facilities in Utah provide these services, two of which are HMHI facilities. Both are in Salt Lake County (**Figure 1.28**).

Figure 1.28 Mental Health Care Facilities with EMDR Treatment

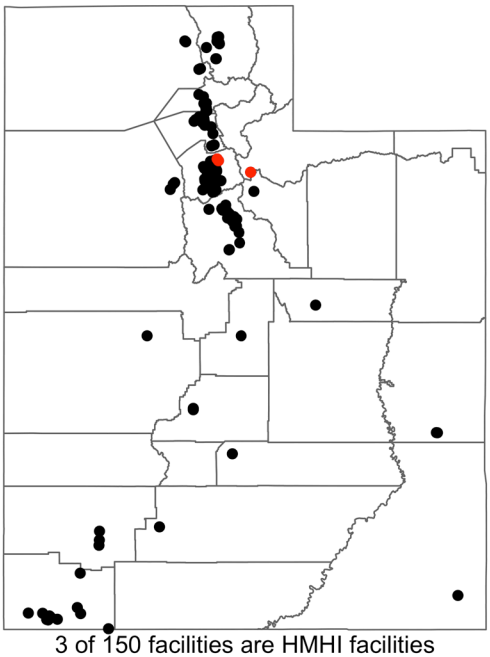


2 of 130 facilities are HMHI facilities

Activity Therapy

Activity therapy is often used in the treatment of children and teenagers, and may be used in HMHI's Tier 1 Comprehensive Assessment and Treatment (CAT) programs. Specifically, the CAT programs feature the HMHI ROPES Challenge Course, led by highly-trained, outcomes-focused facilitators. Activity therapy may also be provided through HMHI's Tier1 programing providing residential youth treatment and through HMHI's Autism Spectrum Disorder Clinic in the NeuroBehavior HOME program—another Tier 1 program at HMHI. Activity therapy is provided at 150 mental health care facilities in Utah, three of which are HMHI facilities (**Figure 1.29**).

Figure 1.29 Mental Health Care Facilities with Activity Therapy



3 of 150 facilities are HMHI facilities

Other Substance Abuse & Recovery Services

Substance Abuse and Recovery is a Tier 1 program at HMHI, as assessed by the Sorenson Impact Institute and HEC. The provision of medication for alcohol use disorder, relapse prevention services, and provision or facilitation of 12-step addiction programs could be part of that program. Two HMHI facilities prescribe medications for AUD, three provide relapse prevention services, one facilitates access to 12-step programs, and three treat co-occurring substance use and pain issues (see **Figures 1.30 through 1.33, respectively**). Under the state's Behavioral Health Master Plan, it is recommended that health care systems ensure patients with substance use disorders, including AUD, have access to services including the use of medication-based treatment options.[11]

Figure 1.30 Mental Health Care Facilities with Medications for Alcohol Use Disorder

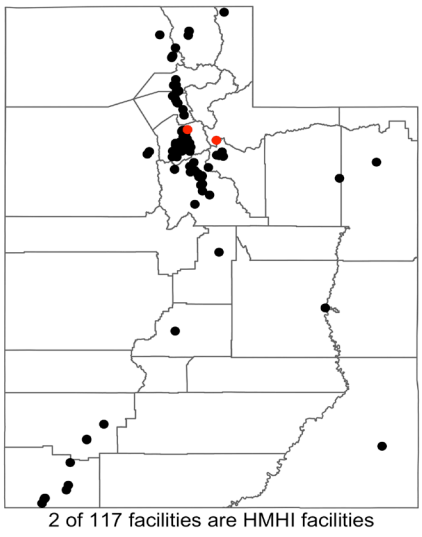


Figure 1.31 Mental Health Care Facilities with Relapse Prevention

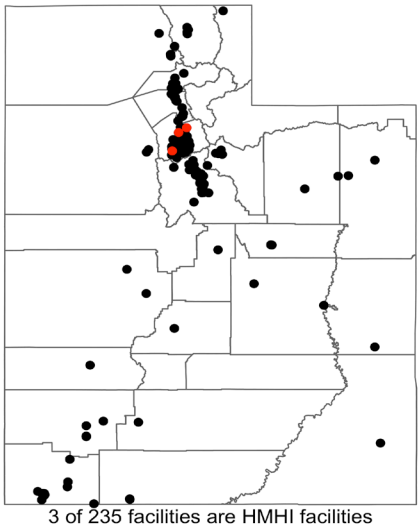


Figure 1.32 Mental Health Care Facilities with 12-Step Facilitation

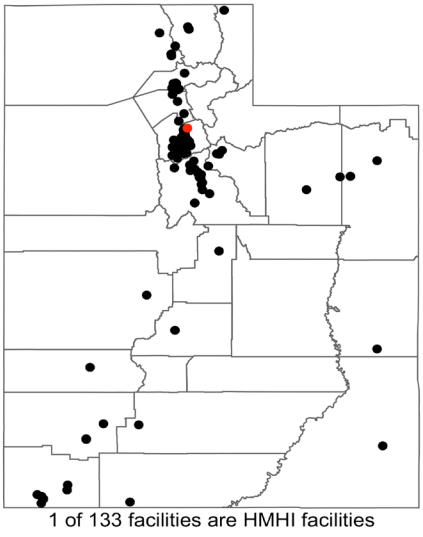
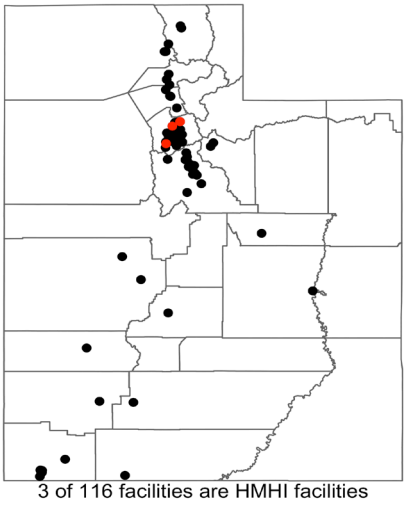


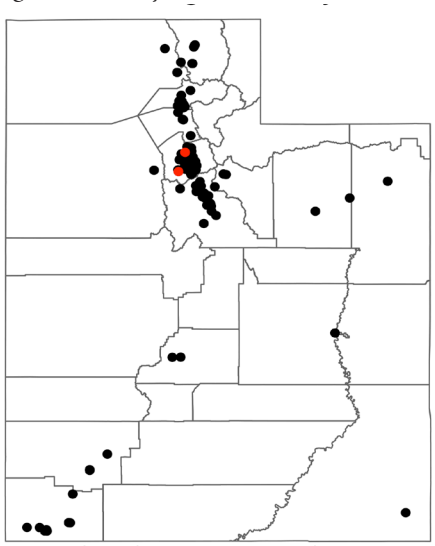
Figure 1.33 Mental Health Care Facilities with Services for Co-Occurring Substance Use and Pain Issues



Integrated Care

Integrated care, which has been categorized as a Tier 1 program at HMHI, is another service that is relatively common in Utah and available at relatively few HMHI locations—136 Utah mental health care facilities provide integrated care, including two Salt Lake County HMHI locations (**Figure 1.34**). Under the definition used in N-MHSS, these services address the medical and physical health care needs of persons with mental health and substance use disorders. These medical care needs include the prevention and treatment of chronic illnesses (e.g., hypertension, diabetes, obesity, and cardiovascular disease) that can be aggravated by poor health habits such as inadequate physical activity, poor nutrition, and smoking. Potential services include screening, care coordination with staff, and providing linkages to ensure that a range of patient needs are met in order to promote wellness and produce optimal outcomes. The Utah Behavioral Health Master Plan recommends that physical and mental health services need to become more integrated among Utah health care providers.[11] In particular, the plan recommends that some training on physical health interventions should be provided to behavioral health care providers and vice versa, and that connections should be created between primary care physicians and specialty behavioral health care providers to support referrals. To further promote integrated care at HMHI, HMHI could consider implementing the recommendations outlined in the Utah Behavioral Health Master Plan or expand integrated primary care services in HMHI facilities in which physical and behavioral health services are already co-located.[11]

Figure 1.34 Mental Health Care Facilities with Integrated Primary Care



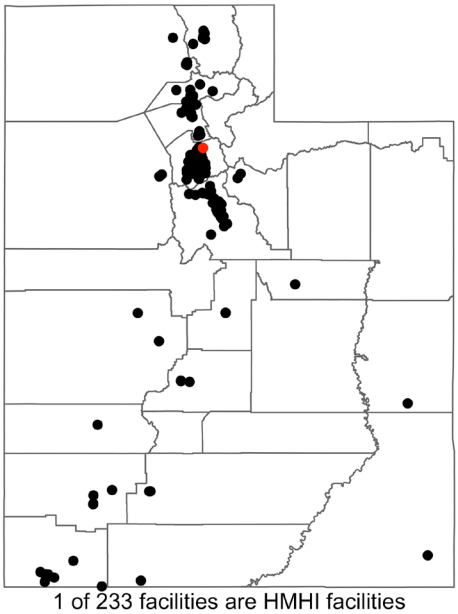
2 of 136 facilities are HMHI facilities

Specialized LGBTQ+ Program

Previous research shows that individuals who identify as lesbian, gay, or bisexual share similar health concerns as the general population; however, inadequate attention has been given to mental health problems in LGBTQ+ communities.[15] Members of LGBTQ+ communities of all ages are at elevated risk for depression and mood disorders, especially LGBTQ+ youth.[16,17] Results from the 2015 National Survey on Drug Use and Health showed that LGB adults were more than twice as likely than heterosexual adults to experience a mental health condition in a year and nearly three times as likely to experience a major depressive episode.[18] However, health insurance barriers and perceptions of provider-level stigma can encumber opportunities for LGBTQ+ individuals to access depression screening and services.[19] To date, HMHI provides some services tailored to LGBTQ+ clients at one of its locations, and 232 other Utah facilities also provide such programs (**Figure 1.35**).

Limited data from the Utah BRFSS database is available describing the geographic distribution of individuals who identify as LGBTQ+ in Utah. **Figures 1.36 and 1.37** show all mental health care facilities mapped against the proportions of residents in each county who identify as LGB or transgender. Again, light blue-green coloration indicates a low proportion of residents self-identifying as LGB or transgender and dark blue-green coloration indicates a high proportion of the same. Regression analysis shows that the proportion of a county's population that is LGBTQ+ is not predictive of the number of mental health care facilities in that county. However, because relatively few Utahns identify as sexual and gender minorities, these estimates of lesbian, gay, bisexual, and transgender populations by county are likely less reliable than other estimates provided in this report. For example, the data suggests that Grand County may have a significantly higher proportion of its residents who identify as transgender than other counties. However, this estimate may not be reliable due to limitations in the data (see **Appendix B** for more information). As a result, caution should be used in interpreting data related to the proportion of residents in Utah counties who identify as LGB or transgender.

Figure 1.35 Mental Health Care Facilities with Specialized LGBTQ+ Programs



1 of 233 facilities are HMHI facilities

Additionally, at a conceptual level, sexual orientation is comprised of three major dimensions: self-identification, sexual behavior, and sexual attraction.[20] The BRFSS data used in this report's analyses only captures the self-identification dimension. Despite these limitations, these maps show that the highest proportions of LGB and transgender individuals are in Wasatch, Weber, and Salt Lake Counties. Many mental health care facilities are located in Davis and Salt Lake Counties, but Wasatch County only has six facilities—which represents a relatively low rate of facilities per capita—and only two of them provide specialized LGBTQ+ programs. None of these six facilities are associated with HMHI. Wasatch County may have a particular need for more such services, depending on other factors such as demand for care and other logistical considerations.

Figure 1.36 Mental Health Care Facilities and Proportion of Utahns Identifying as LGB, by County

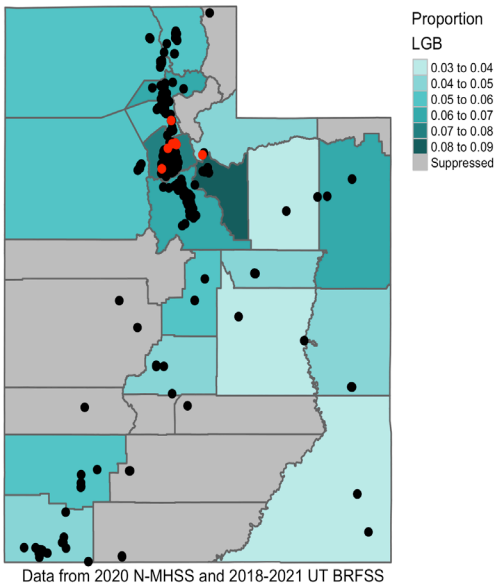
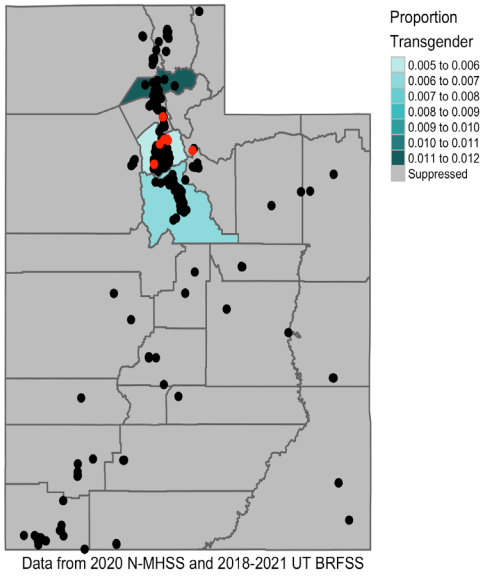


Figure 1.37 Mental Health Care Facilities and Proportion of Utahns Identifying as Transgender, by County



Implications of Utah's Projected Population Growth

Figure 1.38 Selected Utah Population Projections, 2020-2060

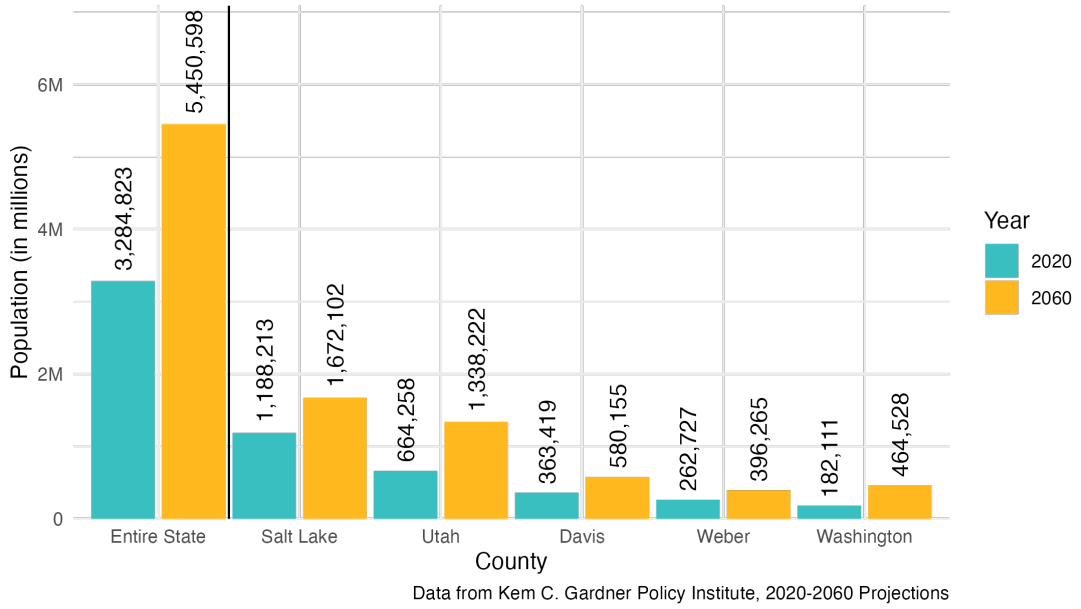


Figure 1.38 shows selected county population projections. Utah's current population is approximately 3.3 million people, as of 2020. That number is expected to grow to 5.5 million by 2060. If current trends hold, Salt Lake County will remain the most populous county in the state in 2060, adding approximately 483,000 residents for an estimated total of 1.7 million in 2060. However, significant growth will also occur in Utah and Washington Counties. Utah County is expected to add an estimated 674,000 new residents between 2020 and 2060, resulting in a 2060 population of about 1.3 million residents. Washington County is projected to grow by 282,000 residents to reach a 2060 population of approximately 465,000.[21]

Given these projections, the need for mental health services is likely to increase significantly in Utah — especially in Salt Lake, Utah and Washington Counties. It may be beneficial for HMHI to consider, in its long-erm planning, whether and how to expand its services and outreach to meet that growing need. For example, by 2060, Utah County will be more populous than Salt Lake County is today. HMHI currently has six facilities providing mental health care services in Salt Lake County. Meeting the mental health care needs of Utah County residents may require opening new facilities

in Utah County, partnering with other health care and community partners in Utah County, or expanding the promotion of HMHI services to Utah County residents through dedicated outreach and marketing activities.

Specific opportunities may exist for HMHI to expand its Tier 1 programs that demonstrate high social and economic impact, but which are provided at only few facilities in Utah County. These include the Treatment Resistant Mood Disorder programs. TMS and ketamine infusion therapy are each provided in only one mental health care facility in Utah County, while ECT is not provided in any Utah County facility as reported through the N-MHSS. High-impact expansion opportunities may also exist for HMHI's Substance Use and Recovery programming—as only two facilities provide outpatient detoxification services in Utah County—as well as Tier 1 programs offering psychiatric emergency and chronic disease management services. Additional planning and resources will be needed to determine the role HMHI should play in these and other counties relative to other health care organizations as the state's population grows.

Conclusion

There are several services provided by HMHI that are very meaningful because they would be difficult for patients to access but for the institute. These include services for treatment resistant mood disorders and detoxification, among others. To the extent that there is unmet demand for these services, expanding them into further HMHI facilities could be critical for Utah residents with mental health conditions. Expansion of other services that are common in the state may require less urgency as HMHI leaders plan for future strategic growth. Lastly, Utah's projected population growth suggests that HMHI should carefully consider how the organization aims to be a key part of meeting Utah's growing need for mental health care over the next four decades. If HMHI chooses to do so through additional HMHI facilities, these may be most impactful if built in Salt Lake, Utah, and Washington Counties or located based on factors in addition to county population size, such as prevalence of mental illness or mental health provider shortages.

Chapter 2: Public Perceptions around Substance Use Disorder in Utah

Introduction

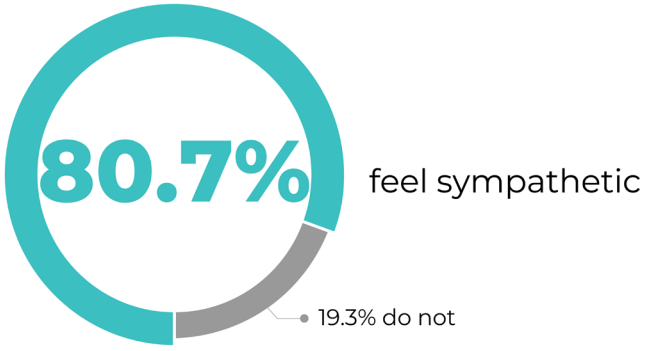
Substance use disorders (SUDs) are treatable, but highly stigmatized chronic diseases. Negative public perceptions and stigmatizing beliefs around drug use can be protective against initial experimentation with drugs. However, they also tend to negatively impact individuals already misusing drugs because they act as a barrier to starting and continuing substance use treatment.[3–9] Public perceptions toward people with SUDs also likely informs policy decisions about this population.[10–13] For these reasons, public attitudes about individuals experiencing SUD may have important population health, policy, and economic consequences in the state of Utah.

Despite this, there are considerable gaps in understanding attitudes toward individuals with SUDs in the U.S. There is some evidence that factors including demographics, physical health, mental health, and past substance use may be related to an individual's perceptions of those with SUDs.[3, 13-15] We used restricted access data from the Utah Behavioral Risk Factor Surveillance System (BRFSS) to investigate sympathetic attitudes toward those with SUDs in Utah. More information about the methods used in this chapter's analyses can be found in **Appendix C**.

Results

Most Utahns—approximately 80.7%—reported feeling sympathetic toward individuals with SUD. Age, race/ethnicity, religion, urbanicity, education, uninsurance, poor mental health, and past-month marijuana use are significantly related to feeling sympathetic toward individuals with SUD in Utah.

Figure 2.1 Estimated Percentage of Utahns who Feel Sympathy Toward Individuls with Substance Use Disorders

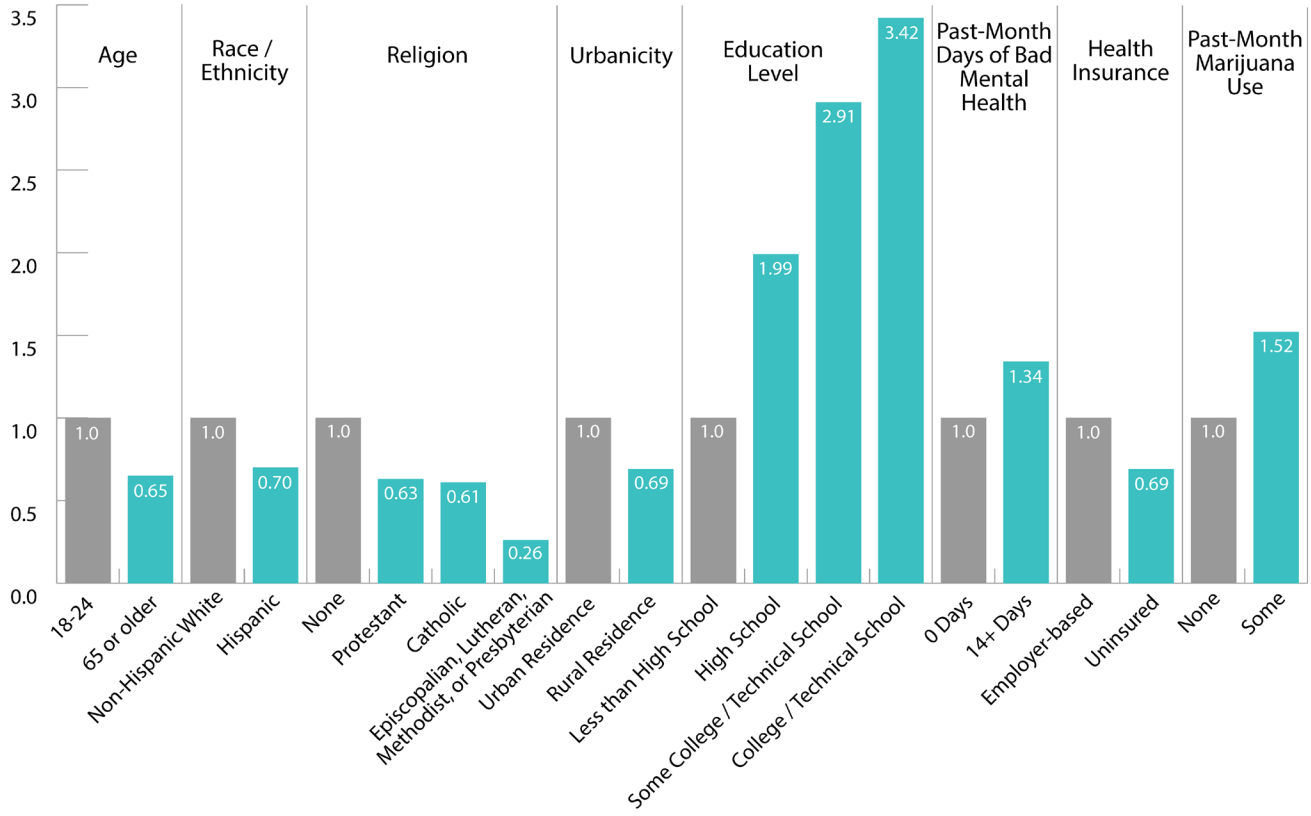


Utahns aged 65 or older were about two thirds as likely to express sympathy toward individuals with SUD, compared to those ages 18-24. Hispanic Utahns were also 0.70 times less likely than non-Hispanic White Utahns to express this sympathy.

Even when considering other factors, Protestants and Catholics were about two-thirds and half as likely, respectively, to feel sympathetic toward people with SUDs, compared to people with no religion. Utahns who self-identified as Episopalian, Lutheran, Methodist, or Presbyterian (considered jointly) were about a quarter as likely as those with no religion to express this sympathy. Jehovah's Witnesses were many times more likely than those with no religion to feel sympthetic toward those with a SUD, although this estimate is less certain than others in the analysis because few Jehovah's Witnesses were sampled. Spiritual and religious social support are related to better outcomes for those with SUDs, and some individuals with SUDs view spiritual support as an important part of recovery.[16, 17] This means religious groups may be a key source of social support for Utahns with SUDs. Approximately 14% of Utahns belong to a Protestant faith, 5% are Catholic, less than 4% identify as Episcopalian, Lutheran, Methodist, or Presbyterian (considered jointly), and less than 1% identify as a Jehovah's Witness.[18] Although each is a minority faith in the state, combined they represent nearly 25% of Utahns. Campaigns to increase sympathy towards individuals with SUDs among these religious groups may be beneficial to Utahns with SUDs.

Residents of rural counties were about two-thirds as likely to express this sympathy, compared to residents of urban counties, controlling for other factors. Oth-

Figure 2.2 Selected Adjusted Odds of Feeling Sympathetic Toward Those with Substance Use Disorders



er research has found that rural residents experience more problems with stigma and negative public opinion around SUD than urban residents. That research suggests rural residents may need different interventions to reduce SUD stigma than urban residents and that stigma in rural populations might be more difficult to change than that in urban populations.[19]

People with no health insurance were about two-thirds as likely to express sympathy toward those with SUDs compared to those with employer-based insurance, when we controlled for other factors. Other studies have found that uninsured individuals may be more likely than privately insured individuals to have SUDs.[20, 21] In combination with our findings, this suggests that initiatives to increase sympathy around SUDs may be critical for helping uninsured Utahns to seek and stay in SUD care.

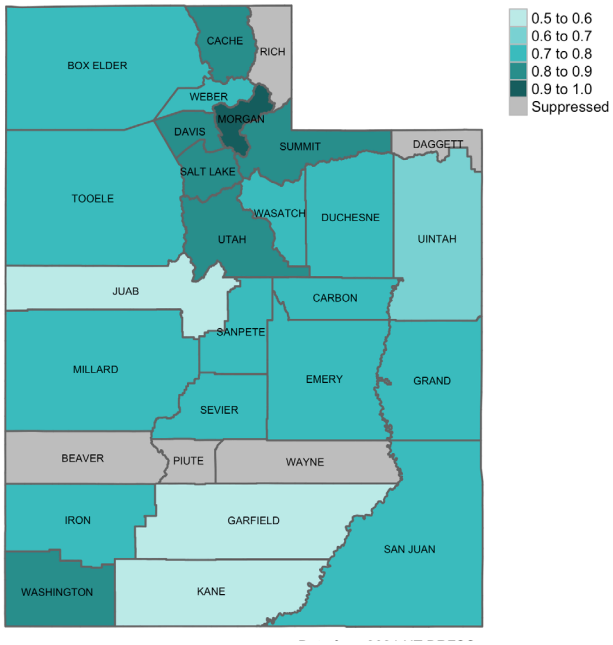
Our results show that, in Utah, increasing levels of education are related to increasing levels of SUD-related sympathy. High school graduates, individuals who attended some college or technical school, and college or technical school graduates were 1.99, 2.91, and 3.42 times more likely to express sympathy towards those with a SUD, respectively, when considering other factors.

Utahns who had experienced 14 or more days of bad mental health in the past month had 1.52 times the odds of expressing sympathy toward those with a SUD, compared to Utahns with no past-month days of bad mental health.

Finally, even taking other factors into account, individuals who had used marijuana in the past month had 1.6 times as likely to express sympathy toward individuals with SUD, compared to those who had not.

As noted above, an estimated 80.7% of all Utahns feel sympathetic toward individuals with SUDs. When examining this by county, the percentage of residents who are sympathetic to those with SUDs is lower than the state level in all but Davis, Morgan, Salt Lake, Summit, and Utah Counties—excluding suppressed counties (see **Figure 2.3**). For reference, the state's capitol is in Salt Lake County, and Salt Lake and Summit Counties are home to most of the state's ski industry, which includes a significant population of high socio-economic status and seasonal residents who may have different perspectives than other regions within Utah.[22,23] These counties are also geographically adjacent to one another. These results are likely related to our findings in the individual-level regression analysis.

Figure 2.3 Estimated Proportaion of Residents Who Feel Sympathetic toward Individuals with Substance Use Disorders, by County



Salt Lake and Davis Counties are the state's two most populous counties.[24] In addition, all five of these counties have higher proportions of residents who completed a college education than the state level. This is particularly pronounced in Summit and Utah Counties, which are number one and three in the state on this metric, with 51.8% and 43.8% of residents having a bachelor's degree or higher. The proportion of residents in the state with these degrees is 36.9%.[25] Utah County also has a lower proportion of residents living below 138% of the federal poverty line who are uninsured than the proportion measured at the state level (15.1% vs. 19.6%). That said, the proportion in Davis County is very similar to the state proportion, and the proportions in Salt Lake and Summit Counties are much higher than the state-level proportion (23.8% and 29.2%, respectively),[26] which does not seem concordant with our individual-level results but may be explained if uninsurance is a less important factor in SUD sympathy than other factors such as education or living in a rural county.

See **Tables A3 and A4 in Appendix A** for more detailed results.

These findings have implications for research and policymaking around SUD stigma. Stigma is a social phenomenon that occurs when individuals or groups are believed to be different than the general population in meaningful ways. Stigma involves four components: (1) a difference between the group in question and the general public, (2) use of negatively stereotyping language, (3) labelling of individuals as members of the group in question, and (4) a difference in social power between those that hold these views and those who are the subject of the view.[27] Most individuals who misuse drugs or have SUDs may experience some kind of stigmatization—whether it arises from the general public, health care providers, or themselves.[4,28,29] Although our work does not directly examine stigmatizing views, past research has suggested that as sympathetic and empathetic attitudes go up, stigmatizing views go down.[30–32] In Utah, the state has been involved in multiple anti-stigma campaigns related to SUD.[33,34] It is unclear whether these campaigns specifically sought to reach the Utah communities that we found are less likely than others to experience SUD sympathy. Future efforts to decrease negative perceptions around SUD in the state should focus on these groups. It may also be useful to target such campaigns to counties other than Davis, Morgan, Salt Lake, Summit, and Utah Counties.

Conclusion

Our results show that Utah residents who had used marijuana in the past month or had recent poor mental health were significantly more likely to express SUD sympathy. Increasing levels of education were also related to increasing likelihood of expressing sympathy. Older Utahn, Hispanics, Protestants, Catholics, Episcopalian, Lutheran, Methodist, or Presbyterian Utah, residents of rural counties, and those without health insurance were significantly less likely than their counterparts to feel sympathy toward individuals with SUDs. Given that negative attitudes around SUD are related to lower public support for public health-oriented policy and that SUD stigma—which may be inversely related to sympathetic views—is a meaningful barrier to treatment, public programs aiming to improve perceptions of individuals with SUDs should focus on these population groups.

Chapter 3: The Impact of HMHI Services on Emergency Department and Inpatient Utilization

Introduction

As of 2016, 10.9% of U.S. ED visits were related to mental health diagnoses.[1] One factor that predicts whether an individual with mental illness seeks emergency care is the severity of their condition.[2] Visits to emergency departments (EDs) can be very costly, to both patients and insurers.[3] Similar is true for inpatient psychiatric hospitalization; these visits are costly and used primarily for patients with severe mental illness.[4,5]

Some research suggests that a meaningful number of these visits could potentially be avoided.[6] Intervention in non-ED outpatient settings may result in less severe illness.[7] Because severity predicts ED and inpatient care, use of outpatient services other than the ED might prevent patients from needing more expensive emergency or inpatient care. We evaluated whether this might be the case at HMHI facilities. Information about our methodology for this chapter can be found in **Appendix C**.

This evaluation of mental health and substance use (MH/SU) services focused on quantifying changes in medical expenditures and service utilization following an index visit to a HMHI clinic. Three sets of outcomes were examined: 1) the percent decrease in both ED and inpatient service use over 90- and 180-day intervals, 2) estimated cost savings associated with changes in emergency department (ED) utilization, and 3) estimated cost savings associated with changes in inpatient utilization. The costs in this chapter are those paid jointly by the patients and their insurers.

Results

Table 3.1 Average and Median Emergency Department and Inpatient Cost Estimates per Patient

Emergency Department				Inpatient			
Group	Mean	Standard Deviation	Median	Group	Mean	Standard Deviation	Median
Overall	$3,090	$4,307	$1,794	Overall	$33,506	$51,373	$16,593
Older patients (60+)	$2,450	$3,824	$1,276	Older patients (60+)	$46,406	$62,147	$26,726
Middle age (18-59)	$3,186	$4,429	$1,840	Middle age (18-59)	$31,033	$50,050	$15,549
Children (<18 years)	$2,705	$2,672	$2,046	Children (<18 years)	$34,955	$48,571	$16,817
Female	$3,535	$4,790	$2,088	Female	$32,197	$50,253	$16,304
Male	$2,534	$3,537	$1,448	Male	$35,555	$53,025	$17,339
Any MH / SU Diagnosis	$1,647	$2,126	$1,010	Any MH / SU Diagnosis	$27,206	$38,279	$14,525
MDD Diagnosis	$1,735	$1,746	$1,290	MDD Diagnosis	$22,967	$29,742	$12,938
AUD Diagnosis	$2,329	$2,949	$1,488	AUD Diagnosis	$18,410	$39,443	$9,283
OUD Diagnosis	$609	$548	$363	OUD Diagnosis	$14,338	$14,405	$9,596
Self harm (X60-X84, Y87)	$2,345	$1,995	$2,036	Self harm (X60-X84, Y87)	$15,817	$15,214	$13.019

MH / SU, Mental Health / Substance Use
MDD, Major Depressive Disorder
AUD, Alcohol Use Disorder
OUD, Opioid Use Disorder

First, we provide basic information about ED and inpatient care use. Analyses of average and median cost estimates for emergency department (ED) and inpatient utilization reveal notable differences across demographic and diagnostic categories (**Table 3.1**). Overall, mean ED costs were $3,090 (but quite variable, based on the standard deviation of $4,307). Patients in the middle ages (18-59 years) incurred the highest average costs ($3,186) compared to older (18–59 years) and pediatric patients (<18 years). In contrast, individuals

Table 3.2 Average and Median Emergency Department and Inpatient Cost Estimates per Visit

Emergency Department				Inpatient			
Group	Mean	Standard Deviation	Median	Group	Mean	Standard Deviation	Median
Overall	$497	$874	$203	Overall	$5,253	$15,355	$530
Older patients (60+)	$342	$697	$139	Older patients (60+)	$4,141	$15,187	$212
Middle age (18-59)	$511	$665	$217	Middle age (18-59)	$4,653	$13,753	$483
Children (<18 years)	$803	$1,140	$377	Children (<18 years)	$10,840	$22,412	$3,691
Female	$566	$976	$223	Female	$5,301	$15,163	$588
Male	$409	$717	$178	Male	$5,186	$15,617	$470
Any MH / SU Diagnosis	$523	$729	$729	Any MH / SU Diagnosis	$7,601	$16,188	$2,084
MDD Diagnosis	$735	$850	$433	MDD Diagnosis	$7,184	$13,520	$2,270
AUD Diagnosis	$854	$1,168	$434	AUD Diagnosis	$4,561	$13,993	$944
OUD Diagnosis	$242	$255	$217	OUD Diagnosis	$4,122	$7,323	$872
Self harm (X60-X84, Y87)	$1,390	$1,637	$707	Self harm (X60-X84, Y87)	$3,493	$8,019	$431

MH / SU, Mental Health / Substance Use
MDD, Major Depressive Disorder
AUD, Alcohol Use Disorder
OUD, Opioid Use Disorder

with opioid use disorder showed the lowest mean ED costs ($609, SD = $548). Female ED patients had higher average costs than male patients ($3,535 vs. $2,534). Among MH/SU diagnostic subgroups, those with alcohol use disorder (AUD) had the highest mean ED costs ($2,329), whereas major depressive disorder (MDD) was associated with a lower mean ($1,735), suggesting potential variability in healthcare utilization patterns depending on clinical presentation.

Inpatient costs exhibited even more pronounced age differences, with older patients averaging $46,406 (SD = $62,147), far exceeding the mean costs for patients in the middle ages and children ($31,033 and $34,955, respectively). While individuals with any MH/SU diagnosis had a mean inpatient cost of $27,206 , those with opioid use disorder again demonstrated the lowest mean costs ($14,338), underscoring the heterogeneity of cost burdens across diagnostic profiles.

Of note, the high standard deviations across nearly all categories mean there is substantial variation in costs within these groups, highlighting the need for more granular analyses to better understand the factors that drive these cost differentials. In addition, the fact that mean costs are greater than median costs in all categories means that there are more high cost outliers than low cost ones in all categories.

Table 3.2 shows very different patterns. For example, in the ED setting, alcohol use disorder visits incur the highest mean costs ($854, SD = $1,168) and a median of $434, surpassing patients in the middle ages, who had the highest per patient costs but average costs of only $342 (SD = $697, median = $139) per visit. Lowest average cost per visit was among opioid use disorder cases ($242). Across diagnostic categories, individuals with alcohol use disorder (AUD) display elevated ED costs ($854) relative to those with opioid use disorder ($242) or major depressive disorder ($735). Female and male patients had similar costs.

By contrast, inpatient costs per visit are highest among children, averaging $10,840 (SD = $22,412), whereas those with self-harm diagnoses exhibit considerably lower inpatient costs per visit ($3,493, SD = $8,019). Among MH/SU diagnostic groups, individuals with MDD incur the highest mean inpatient costs per visit ($7,184). Female and male patients had similar costs.

Decrease in ED and Inpatient Utilization

The first outcome examined was the change in both ED and inpatient service utilization before and after the index visit to an HMHI service; meaning that we took all the patients who used a given service and compared the percentage of them who used the ED or inpatient services before they were seen in the HMHI clinic to the percentage of them who used ED or inpatient services after they were seen in the HMHI clinic (**Table 3.3**). For ED services, substantial reductions were observed across most settings over both 90- and 180-day intervals. For example, patients who had a Treatment Resistant Mood Disorder (TRMD) visit exhibited a 54% reduction in ED use within the next 90 days, or

Table 3.3 Estimated Percent Decrease in Emergency Department and Inpatient Utilization, Comparing Utilization Before and After Clinic Visit

Clinic	90 Days	180 Days
	% Decrease	% Decrease
Emergency Department		
TRMD	54.0%	44.9%
Inpatient	72.7%	72.7%
Receiving Center	28.8%	16.5%
Behavioral Health Clinics	61.2%	45.5%
Same Day Clinic	64.3%	54.1%
Outpatient Clinic	26.1%	22.3%
Day Treatment	72.9%	61.6%
Inpatient		
TRMD	66.4%	61.2%
Behavioral Health Clinics	43.4%	25.8%
Outpatient Clinic	44.4%	40.0%
Day Treatment	63.8%	59.1%

44.9% within the next 180 days. Visits in other settings were also related to decreased odds of ED utilization. For example, 2A use was related to reductions in ED use of 72.7% at other time points, and the Receiving Center also showed significant decreases in subsequent ED utilization (28.8% at 90 days and 16.5% at 180 days). Behavioral health clinics and the Same Day Clinic both experienced utilization reductions exceeding 60% at 90 days. Outpatient services and Day Treatment also demonstrated meaningful declines (e.g., 26.1% for outpatient and 72.9% for Day Treatment at 90 days) in ED utilization.

Inpatient service utilization followed similar trends, with TRMD achieving reductions of over 66% at 90 days (61.2% decrease at 180 days). Behavioral Health Clinics and outpatient clinics showed decreases (43.4% and 44.4% at 90 days, respectively). Day Treatment decreased inpatient utilization by 63.8% at 90 days and 59.1% at 180 days.

Emergency Department Cost Savings

Analysis of ED utilization revealed substantial cost savings across a range of service settings (**Table 3.4**). For instance, the TRMD clinic demonstrated overall cost savings of over $420,000, corresponding to an average per patient saving of $848. The Receiving Center also exhibited significant savings ($207,890 total or $263 per patient). Notably, HMHI behavioral health clinics, which serve the largest numbers of patients, achieved total savings of $1.4 million, with per-patient savings of $512. Further, additional services such as the Same Day Clinic and HMHI outpatient clinics reported higher per patient savings of $921 and $1,142, respectively. Day Treatment also demonstrated significant savings with an average of $1,182 per patient.

Inpatient Cost Savings

A similar pattern was observed for inpatient services in **Table 3.5**. The TRMD clinic had estimated cost savings of $498,885, yielding an average per-patient saving of $405. Similarly, services provided by HMHI behavioral health clinics were associated with aggregate savings

Table 3.4 Estimated Medical Cost Savings Associated with Emergency Department Utilization Prior and Subsequent to HMHI Clinic Visit

Clinic	N	Expenses, Before	Expenses, After	Cost Savings	Per Patient Savings
TRMD	497	$553,023	$131,750	$421,273	$848
Receiving Center	790	$603,465	$395,575	$207,890	$263
Behavioral Health Clinics	2,775	$2,017,884	$597,247	$1,420,637	$512
Same Day Clinic	132	$154,478	$32,863	$121,615	$921
Outpatient Clinic	433	$619,449	$125,102	$494,347	$1,142
Day Treatment	90	$124,112	$17,736	$106,376	$1,182
Total	**4,717**	**$4,072,411**	**$1,300,273**	**$2,772,138**	

Table 3.5 Estimated Medical Cost Savings Associated with Inpatient Utilization Prior and Subsequent to HMHI Clinic Visit

Clinic	N	Expenses, Before	Expenses, After	Cost Savings	Per Patient Savings
TRMD	1,233	$681,420	$182,535	$498,885	$405
Behavioral Health Clinics	2,189	$1,388,160	$280,938	$1,107,222	$506
Outpatient Clinic	704	$508,663	$71,821	$436,842	$621
Day Treatment	564	$126,530	$23,859	$102,671	$182
Total	**4,690**	**$2,704,773**	**$559,153**	**$2,145,620**	

of $1.1 million ($506 per patient). Outpatient clinic services and Day Treatment provided cost savings of $436,842 and $102,671, respectively.

Conclusion

At HMHI, over the time period we examined, the average ED patient spent (along with their insurer) $3,090 and the average ED visit cost $497. There was considerable cost variation by age, sex, and diagnosis. In general, ED care for self-harm and AUD is expensive, from both a per patient and per visit perspective. There were also meaningful differences in per patient and per visit costs. For example, patients in the middle ages had the higher per patient costs than children, but lower per visit costs than children, suggesting that patients in the middle ages use ED care more frequently than children do.

Over the period examined, the average patient receiving inpatient care paid (along with their insurer) $33,506, and the average inpatient visit cost $5,253. As with ED care, there was considerable cost variation by age, sex, and diagnosis. However, these patterns were different for inpatient care than ED care. While self-harm and AUD were the most costly diagnoses in ED care, the most costly diagnosis in inpatient care was MDD. Children had higher inpatient costs, at the patient and visit levels, than older patients did. This was not the case in ED care.

In almost all cases, there was great variability in costs, and there were more high cost outliers than low cost ones.

We also found that visits to HMHI clinics reduced patients' utilization of ED and inpatient care afterward, compared to before their clinic visits. This was true for every clinic we examined. The utilization decreases we observed resulted in very meaningful cost savings, overall and at the patient level.

These findings suggest that even earlier intervention in HMHI clinic settings could further reduce ED and inpatient visits and therefore costs to patients and their insurers. Perhaps the most valuable patients to target for earlier intervention would be among older patients, male patients, and patients with MDD. The most effective setting for earlier intervention would perhaps be the behavioral health clinics.

Chapter 4: Estimating the Risk of Emergency Department Use After an HMHI Clinic Visit

Introduction

Because emergency care is so costly, we also wanted to understand more about the risk that a patient will visit the Emergency Department (ED) soon after an HMHI clinic visit.[1] This information could be useful in better understanding patients' risk for an ED visit in the period immediately following a clinic visit and, potentially, begin to understand how to prevent the need for later emergency care during the initial visit.

We already know from the literature that certain features observable by physicians are predictive of ED utilization for mental health care, including severity of mental illness and particular diagnoses (e.g., substance use disorder, anxiety, mood disorders).[2,3] In this chapter, we explored whether the HMHI program providing care an an initial visit was also predictive of near-future ED use.

Results

Predicted ED Risk by HMHI Program

We estimated average emergency department (ED) utilization risk within 30 days of HMHI program visits using machine learning methods (see **Table 4.1**). More information about our methodology in this chapter can be found in **Appendix C**. The average predicted risk varied substantially across programs, from less than 1% to over 65%. The highest risk was observed for HMHI Receiving Center (65.3%), consistent with its probable role as a high-acuity crisis intake setting. Elevated risk was also found for TRMD (25.8%), CVC

Table 4.1 Average Predicted Probability of Emergency Department Utilization, by HMHI Program

HMHI Program	Mean Predicted Risk (%)	95% Confidence Interval
CNC Behavioral Health	13.1%	11.6%, 14.7%
CVC Behavioral Health	16.9%	14.4%, 19.7%
Day Treatment	2.4%	1.9%, 2.8%
Geriatric Psychiatry Clinic	9.7%	9.2%, 10.3%
HMHI Autism Spectrum Disorder	0.7%	0.6%, 0.8%
HMHI Behavioral Health Services Clinic	4.9%	4.7%, 5.1%
HMHI Coalville Behavioral Health	0.9%	0.4%, 1.5%
HMHI Continuity Services Clinic	6.3%	5.6%, 6.7%
HMHI Farmington Outpatient Clinic	4.1%	3.9%, 4.3%
HMHI Inpatient	4.2%	3.1%, 4.4%
HMHI Kamas Behavioral Health	2.8%	2.1%, 3.6%
HMHI Outpatient Clinic	4.5%	3.9%, 5.2%
HMHI Park City Behavioral Health	1.4%	1.3%, 1.6%
HMHI Receiving Center	65.6%	64.6%, 66.5%
HMHI Research Park Behavioral Health	8.2%	7.8%, 8.5%
HMHI Same Day Psychiatry Clinic	12.0%	10.0%, 14.2%
HMHI Summit County Jail	0.7%	0.5%, 0.9%
Other HMHI	0.2%	0.2%, 0.3%
Treatment Resistant Mood Disorder	3.3%	3.1%, 3.6%
UH Outpatient Behavioral Health	8.4%	7.0, 9.9%
WCSS Behavioral Health	9.3%	7.8%, 10.9%

Behavioral Health (16.5%), and CNC Behavioral Health (13.1%), potentially reflecting higher patient acuity, limited continuity of care, or programmatic differences.

In contrast, programs such as the HMHI Autism Spectrum Disorder Program exhibited very low predicted risk (<1%). Most general outpatient programs fell in the 2–10% range, including HMHI Outpatient Clinic (4.7%) and WCSS Behavioral Health (9.4%). These findings suggest meaningful variation in ED risk across programs, which may be attributable to differences in patient populations, clinical severity, care transitions, or care coordination effectiveness, in addition to other factors across programs.

Latent Class Analysis

We also used latent class analysis to explore how HMHI programs are related to near-future ED utilization. In latent class analysis, you provide an algorithm with information--usually these are easily observable variables--and it groups participants based on similarity of the provided variables, using complex machine learning methods. These groups, or classes, provide additional information about the participants. In this case, we provided the algorithm with variables describing patients' age, gender, race/ethnicity, reason for visit, and service provided. The algorithm grouped patients into 6 distinct classes based on those variables. We then calculated the proportion of program visits and average predicted ED risk for each class. We also examined which HMHI programs were most common in each class. See **Appendix C** for more information about our methods. Results are displayed in **Table 4.2**.

Latent Classes 0 and 4 were the largest, representing approximately 39% and 33% of all visits, respectively. Class 5 was the smallest, accounting for approximately 8% of visits.

Average predicted emergency department (ED) utilization risk varied meaningfully across latent classes. The highest risk was observed in Latent Class 4, which exhibited an average predicted ED risk of 8.5%. In contrast, Latent Class 5 demonstrated an extremely low average predicted ED risk of 0.6%. The remaining classes (0–3) were characterized by low-to-moderate predicted ED risk levels, ranging from 3.4% to 6.4%. Programmatic distributions across latent classes further highlighted important clinical and organizational differences. Latent Class 0 primarily included patients treated at general outpatient programs such as HMHI Farmington Outpatient Clinic and HMHI Kamas Behavioral Health. Latent Class 1 encompassed visits to Behavioral Health Services Clinic and Research Park Behavioral Health, suggestive of moderately higher mental health acuity. Latent Class 2 was dominated by Continuity Services Clinic visits, while Latent Class 3 included Day Treatment and Geriatric Psychiatry Clinic encounters, reflecting specialized populations. Latent Class 4, associated with the highest ED risk, captured a disproportionate number of visits from the Behavioral Health Services Clinic and the Receiving Center, both known to serve patients with acute mental health needs. Conversely, Latent Class 5, characterized by minimal ED risk, was almost exclusively composed of visits from the HMHI Autism Spectrum Disorder Program.

Table 4.2 Summary of Latent Classes

Latent Class	Approximate % of Visits	Average Predicted ED Risk	Dominant Programs
Class 0	39%	3.6%	Farmington Outpatient Clinic, Kamas Behavioral Health
Class 1	19%	4.3%	Behavioral Health Services Clinic, Research Park Behavioral Health
Class 2	4%	6.4%	Continuity Services Clinic
Class 3	2%	3.4%	Day Treatment, Geriatric Psychiatry Clinic
Class 4	33%	8.5%	Behavioral Health Serivces Clinic (higher acuity), Receiving Center
Class 5	8%	0.6%	Autism Spectrum Disorder Program

These findings indicate substantial heterogeneity in predicted 30-day ED risk among HMHI patients and suggest that both program type and patient complexity are important determinants of ED utilization risk. Future interventions aimed at reducing preventable ED use may benefit from tailored strategies targeting patients within higher-risk latent classes.

Conclusion

Substantial variation in predicted 30-day ED risk was observed across HMHI programs, reflecting differences in patient acuity, service models, and programmatic focus. Higher predicted ED risk was concentrated in programs serving more acute or crisis-oriented populations, such as the Receiving Center and Behavioral Health Services Clinic, whereas specialized outpatient programs, such as the Autism Spectrum Disorder Program, demonstrated markedly lower predicted risk.

These findings suggest that patient complexity and program characteristics jointly shape ED utilization patterns. Future interventions aiming to reduce preventable ED use may benefit from targeting high-risk patient subgroups identified through predictive modeling and tailoring engagement strategies to program-specific needs.

Chapter 5: Patient Engagement and Emergency Department Utilization

Introduction

Understanding patient engagement with mental health and substance use services is critical to improving outcomes and reducing unnecessary acute care utilization. Engagement, often operationalized as the number and continuity of service contacts, is considered a key factor influencing the success of behavioral health interventions.[1] There are limited prior studies suggesting that increased engagement in outpatient mental health care may be associated with reduced risk of emergency department (ED) visits, hospitalizations, or death. For example, a multi-state study using Medicaid claims data reported that having a follow-up visit within one week of a psychiatric hospital discharge resulted in 56% lower risk of suicide within six months.[2]

HMHI patients may receive services across a diverse range of programs, including outpatient clinics, day treatment programs, crisis stabilization units, and specialty behavioral health services. However, variation in patient engagement across programs and its relationship to ED utilization is unclear. This analysis aimed to characterize patterns of patient engagement across HMHI programs, assess the relationship between engagement and predicted 30-day ED utilization risk, and identify programmatic and demographic predictors of engagement levels.

In this chapter, we used electronic health record (EHR) data for HMHI visits between July 1, 2020 and June 30, 2023 and the machine learning-predicted ED risks calculated in the previous chapter. We categorized patients into low, medium, and high engagement groups based on visit frequency: a) Low Engagement was 1–2 visits; b) Medium Engagement was 3–5 visits; and c) High Engagement was 6 or more visits. We evaluated engagement patterns across programs, and examined the potential relationship between program-level engagement rates and ED risk. In addition, we analyzed how ED risk changed over time between a patient's first HMHI program visit and their first subsequent ED visit, comparing patient engagement levels. More information about our methods can be found in **Appendix C**.

Results

Figure 5.1. Levels of Patient Engagement, by Program

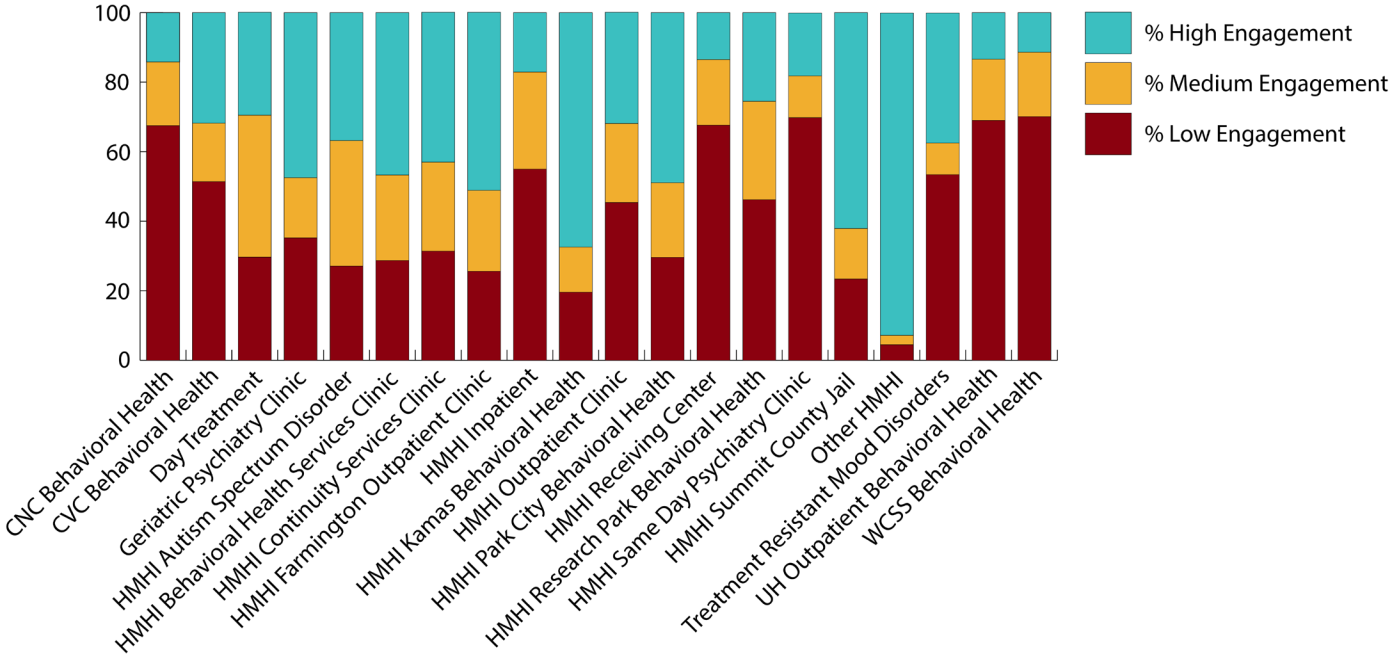


Table 5.1 Engagement and Predicted Emergency Department Risk, by HMHI Program				
Program	% Low Engagement	% Medium Engagment	% High Engagement	Average Predicted ED Risk
CNC Behavioral Health	67.5%	18.3%	14.2%	0.131
CVC Behavioral Health	51.4%	16.8%	31.8%	0.169
Day Treatment	29.7%	40.8%	29.6%	0.024
Geriatric Psychiatry Clinic	35.2%	17.3%	47.5%	0.097
HMHI Autism Spectrum Disorder	27.1%	36.1%	36.8%	0.007
HMHI Behavioral Health Services Clinic	28.7%	24.6%	46.7%	0.049
HMHI Continuity Services Clinic	31.4%	25.6%	43.1%	0.063
HMHI Farmington Outpatient Clinic	25.6%	23.3%	51.2%	0.041
HMHI Inpatient	55.0%	27.9%	17.1%	0.042
HMHI Kamas Behavioral Health	19.6%	13.0%	67.4%	0.029
HMHI Outpatient Clinic	45.4%	22.7%	32.0%	0.045
HMHI Park City Behavioral Health	29.6%	21.5%	48.9%	0.014
HMHI Receiving Center	67.6%	18.9%	13.5%	0.656
HMHI Research Park Behavioral Health	46.2%	28.3%	25.5%	0.082
HMHI Same Day Psychiatry Clinic	69.8%	12.0%	18.1%	0.120
HMHI Summit County Jail	23.4%	14.5%	62.1%	0.007
Other HMHI	4.5%	2.7%	92.7%	0.002
Treatment Resistant Mood Disorders	53.4%	9.1%	37.4%	0.033
UH Outpatient Behavioral Health	69.0%	17.6%	13.4%	0.084
WCSS Behavioral Health	70.1%	18.5%	11.4%	0.093

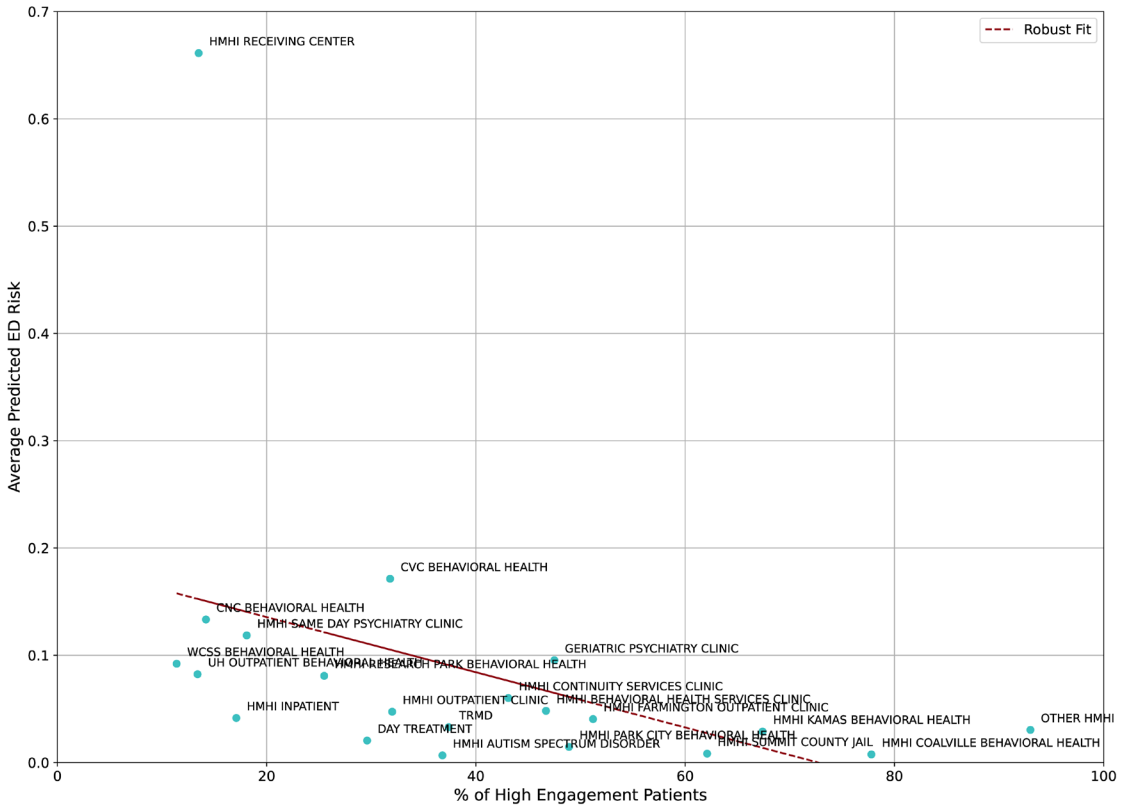
Patient engagement levels varied substantially across HMHI programs (**Table 5.1**). Programs such as Coalville Behavioral Health demonstrated the highest rates of high engagement, with over 90% of patients classified as high engagement. Conversely, programs such as WCSS and UH Outpatient Behavioral Health exhibited predominantly low engagement patterns. A stacked bar chart illustrates the engagement distribution across programs, highlighting considerable variation between sites (**Figure 5.1**). Overall, 67.5% of patients were classified as low engagement (1–2 visits), 18.3% as medium engagement (3–5 visits), and 14.2% as high engagement (≥6 visits).

At the individual patient level, higher engagement was associated with modest reductions in the predicted probability of 30-day emergency department (ED) utilization. Patients categorized as low engagement had an average predicted ED risk of 15.24%, compared to 14.49% among medium engagement patients and 13.77% among high engagement patients. Although the absolute differences in predicted risk were small, they followed a consistent downward trend across increasing engagement levels.

At the program level, higher patient engagement was associated with lower predicted emergency department (ED) risk. A plot of the percentage of high engagement patients versus the mean predicted ED risk per program revealed a negative trend (**Figure 5.2**). Indeed, statistical tests show there is a moderate negative correlation between high engagement rates and predicted ED risk ($r = -0.441$; $p = 0.045$). This indicates that, programs with higher proportions of highly engaged patients tended to have lower average predicted ED risk. For instance, Coalville Behavioral Health exhibited both high engagement and low ED risk. In contrast, programs with low engagement rates, such as the Receiving Center, demonstrated markedly higher predicted ED utilization risk.

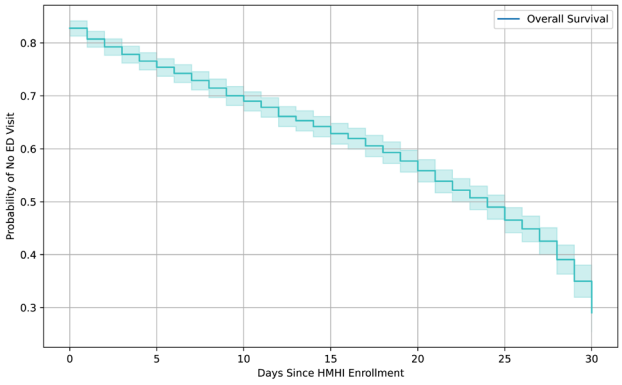
These tests do not consider the influence of other factors on engagement and ED risk. To account for this, we also examined a logistic regression model, which would account for other factors. In that analysis, which adjusted for age, gender, race, and ethnicity, we still detected a relationship between engagement level and predicted ED risk. Each one-category increase in engagement level (e.g., from low to medium) was associated with a 6% decrease in the odds of predicted

Figure 5.2. Association Between Engagement and Predicted 30-Day Emergency Department Risk by HMHI Program



ED utilization (odds ratio: 0.943; 95% CI: 0.910–0.975; $p < 0.001$). These findings suggest that higher patient engagement is associated with meaningful, although modest, reductions in ED risk even after adjusting for demographic characteristics. The regression model confirms a negative association between the proportion of high engagement patients and predicted ED risk, consistent with the findings from our simpler tests.

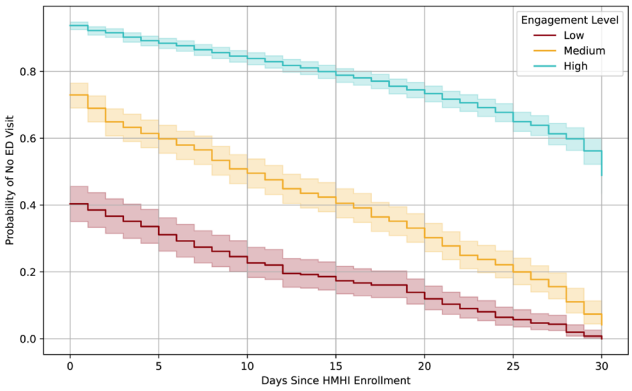
Figure 5.3. Probability That a Patient Has Not Visited the Emergency Department Over Time, Since HMHI Visit



We also conducted a survival analysis using this data. The results of such analyses can be use to evaluate the time from HMHI program entrance to first ED visit.

As shown in **Figure 5.3**, the probability of averting an ED visit declined steadily over the 30-day follow-up period. Approximately 70% of HMHI patients avoided an ED visit by day 15, decreasing to 30–40% by day 30.

Figure 5.4. Probability That a Patient Has Not Visited the Emergency Department Over Time Since HMHI Visit, by Patient Engagement



There are significant differences in time from HMHI program entrance to first ED visit when you examine patient engagement levels separately (**Figure 5.4**). Patients classified as high engagement demonstrated significantly greater likelihood of avoiding an ED visit—compared to those with medium or low engagement. Low engagement patients exhibited the steepest decline in survival probability, suggesting that lower

Table 5.2 Predictors of Time to First ED Visit

Predictor	Hazard Ratio	95% Confidence Interval	p-value
Engagement level (per category increase)	0.36	(0.34, 0.39)	<0.01
Age in years			
< 18	0.72	(0.52, 0.99)	0.04
18-44	Ref.	-	-
45-64	0.99	(0.87, 1.13)	0.88
65+	0.64	(0.50, 0.83)	<0.01
Gender			
Female	Ref.	-	-
Male	1.32	(1.18, 1.49)	<0.01
Race/ethnicity			
Non-Hispanic White	Ref.	-	-
Non-Hispanic Black or African American	1.37	(1.05, 1.79)	0.02
Hispanic / Latino	1.01	(0.84, 1.22)	0.88
Non-Hispanic Asian	1.15	(0.71, 1.86)	0.57
Non-Hispanic Native Hawaiian or Other Pacific Islander	1.26	(0.63, 2.53)	0.52
Non-Hispanic Other Race / Ethnicity	0.96	(0.73, 1.26)	0.76

engagement is associated with earlier and more frequent ED utilization. These patterns were consistent throughout the 30-day period.

Finally, we further assessed the relationship between engagement and time to first ED visit while adjusting for demographic factors (**Table 5.2**). Higher engagement was significantly associated with lower hazard of ED utilization, even when accounting for other factors. Each one-category increase in engagement level (e.g., from low to medium) was associated with a 64% reduction in the risk of ED utilization.

Conclusion

These findings suggest that higher patient engagement is associated with reduced predicted risk of 30-day emergency department utilization across HMHI programs. Programs that achieved higher proportions of high-engagement patients demonstrated notably lower ED risk. In addition, higher patient engagement with HMHI programs was associated with delayed time to first ED visit.

Given that we measured engagement in terms of number of visits, high engagement may be reflective of continuity of care. If so, our findings are perhaps not surprising. Continuity of care is related to better clinical outcomes in mental health care patients, including ED visits.[3-5]

These results underscore the importance of promoting sustained engagement in mental health and substance use treatment and suggest that engagement-enhancing strategies may have meaningful impact on reducing preventable ED utilization. HMHI may want to explore targeted strategies to improve engagement, which could include the use of peer providers, family involvement, critical time intervention, and integrated care.[1] In addition, examining engagement trajectories over time could help identify early warning signals for disengagement and allow for tailored interventions before ED use escalates.

Chapter 6: The Local Economic Impact of HMHI's Federally Funded Research Activities

Introduction

Federally funded research, the focus of this chapter, is a significant and defining characteristic of University of Utah Health and HMHI operations. Research funded through federal sources – such as grants and contracts from entities including the National Institutes of Health and National Science Foundation – is often considered to be highly significant, impactful, and innovative. The pursuit and award of federal research funding is typically a competitive and laborious undertaking made by collaborative research investigators. Not only is the receipt of federal research funding indicative of high scientific achievement achieved by HMHI investigators, federally funded research activities conducted at HMHI are also important to the local economy in several ways. First, federal research funding is exogenous – originating from outside of the state of Utah – and leads to the creation of new economic activity, jobs, and income within the local economy. Second, the innovations developed through the research process can have potential clinical and commercial applications.

In this chapter, we aimed to estimate the local impact of HMHI's federally funded research activities on the Salt Lake City Metropolitan Statistical Area economy. See **Appendix C** for a description of the methods used in this analysis.

Results

Table 6.1 summarizes the projected local impact of HMHI's federally funded research activities on the Salt Lake metropolitan area economy in 2020 U.S. dollars, as measured by the estimated gross economic output, value-added, household earnings, and the number of jobs generated by the project. Each measure of estimated local economic impact is detailed by calendar year.

Table 6.1 Estimated Local Economic Impact of HMHI's Federally Funded Research Activities in 2020 U.S. Dollars, 2018-2023

Calendar Year	Estimated Gross Economic Output	Estimated Value Added	Estimated Household Earnings	Estimated Number of Jobs
2018	$5,496,751	$3,121,122	$1,480,929	26
2019	$13,223,820	$7,508,645	$3,562,749	62
2020	$16,369,030	$9,294,534	$4,410,128	77
2021	$17,221,294	$9,778,459	$4,639,744	81
2022	$16,198,756	$9,197,850	$4,364,253	76
2023	$7,592,162	$4,310,922	$2,045,473	36
Total	**$76,101,814**	**$43,211,532**	**$20,503,277**	**357**

Across the six-year analysis period, HMHI's federally funded research activities are estimated to have generated about $76,101,813.61 in gross economic output, including over $15 million in gross economic output per year from 2020-2022. HMHI's federally funded research activities are estimated to have generated about $43,211,531.64 in value added in the Salt Lake metropolitan area. The estimated gains in local household earnings resulting from HMHI's federally funded research activities totaled about $20,503,277.25. Finally, HMHI's federally funded research activities were estimated to add **357** jobs to the local economy from 2018-2023.

Table 6.2 provides a more detailed assessment of the estimated impact of HMHI's federally funded research activities on specific industries within the local economy. HMHI's research activities primarily impact the professional, scientific, and tehcnical services industry, but there are impacts across all local industries. Others with high impact are real estate, finance and insurance, administrative and support, health care and social assistance, retail trade, and wholesale trade.

Table 6.2 Estimated Local Economic Impact of HMHI's Federally Funded Research Activities in 2020 U.S. Dollars, by Industry, 2018-2023

Industry	Estimated Gross Economic Output	Estimated Value Added	Estimated Household Earnings	Estimated Number of Jobs
Agriculture, forestry, fishing and hunting	$15,051	$7,526	$3,763	0.14
Mining, quarrying, and oil and gas extraction	$79.018	$41,390	$11,288	0.18
Utilities	$481,633	$278,444	$48,916	0.31
Construction	$417,666	$180,612	$90,306	1.47
Durable goods manufacturing	$816,519	$364,988	$161,799	2.92
Nondurable goods manufacturing	$2,633,932	$778,891	$364,988	5.51
Wholesale trade	$1,911,482	$1,151,404	$376,276	4.66
Retail trade	$2,031,890	$1,309,440	$590,753	16.79
Transportation and warehousing	$2,103,383	$989,606	$500,447	10.92
Information	$1,907,719	$1,038,522	$361,225	5.15
Finance and insurance	$3,495,604	$1,964,161	$729,975	16.15
Real estate and rental and leasing	$6,103,196	$4,421,243	$827,807	30.27
Professional, scientific, and technical services	$44,137,171	$24,555,769	$12,748,230	169.37
Management of companies and enterprises	$1,298,152	$820,282	$526,786	6.20
Administrative and support and waste management and remediation services	$2,761,866	$1,817,413	$1,166,455	30.55
Educational services	$485,396	$338,648	$184,375	5.80
Health care and social assistance	$2,351,725	$1,422,323	$899,300	16.54
Arts, entertainment, and recreation	$270,919	$169,324	$101,595	4.73
Accomodation	$353,699	$210,715	$90,306	3.03
Food services and drinking places	$985,843	$519,261	$290,732	14.13
Other services	$1,456,188	$812,756	$413,904	10.68
Households	Not applicable	$18,814	$18,814	1.51

Conclusion

The analysis in this chapter makes it clear that HMHI—through its research activities—has a meaningful impact on the local economy, and those impacts are felt across a wide variety of industries. The institute's entire economic impact would be even higher.

These estimates allow policymakers, organizations, and analysts to assess the potential economic consequences of different scenarios, such as the return on public investment in HMHI's federally funded research activities. Crude estimates based on the results in this chapter suggest that approximately every $1.00 exogenously invested in HMHI's research activities by the federal government would be expected to generate about $2.02 in gross economic output, $1.15 in value-added, and $0.55 in household earnings in the local economy (2020 U.S. dollars).

Matheson Center for
HEALTH CARE STUDIES

An Analysis of Social and Economic Impact of the Huntsman Mental Health Institute

References and Appendices

THE UNIVERSITY of UTAH
Matheson Center for Health Care Studies
Health Economics Core, Clinical and Translational Sciences Institute
in collaboration with
The Sorenson Impact Institute

References

References for Chapter 1

1. Mental Health America. Adult Data 2022. Mental Health America. Published October 2021. Accessed August 31, 2023. https://www.mhanational.org/issues/2022/mental-health-america-adult-data
2. KFF. Mental Health in Utah. Mental Health and Substance Use State Fact Sheets. Published March 20, 2023 Accessed August 31, 2023. https://www.kff.org/statedata/mental-health-and-substance-use-state-fact-sheets/
3. Mental Health America. Access to Care Data 2022. Mental Health America. Accessed August 31, 2023. https://mhanational.org/issues/2022/mental-health-america-access-care-data
4. Yang JC, Roman-Urrestarazu A, McKee M, Brayne C. Demographic, socioeconomic, and health correlates of unmet need for mental health treatment in the United States, 2002–16: evidence from the national surveys on drug use and health. Int J Equity Health. 2019;18(1):122. doi:10.1186/s12939-019-1026-y
5. Sorenson Impact Institute at the University of Utah, Huntsman Mental Health Institute at the University of Utah, University of Utah Clinical and Translational Science Institute. Development of a Social and Economic Impact Monetization Framework for Mental Health and Substance Use Healthcare Services in an Academic Mental Health Institute.; 2025. Accessed December 8, 2025. https://sorensonimpactinstitute.com/wp-content/uploads/2025/12/Development-of-a-Social-and-Economic-Impact-Monetization-Framework-for-Mental-Health-and-Substance-Abuse-Use-Healthcare-Services-in-an-Academic-Mental-Health-Institute-2.pdf
6. Substance Abuse and Mental Health Services Administration. National Mental Health Services Survey. National Mental Health Services Survey. Accessed August 31, 2023. https://www.samhsa.gov/data/data-we-collect/nmhss-national-mental-health-services-survey
7. Health Resources & Services Administration. HPSA Find Tool. data.HRSA.gov. Accessed March 17, 2022. https://data.hrsa.gov/tools/shortage-area/hpsa-find
8. Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2016-2021].
9. Office of Research and Evaluation. Utah Behavioral Risk Factor Surveillance System Survey Data. Salt Lake City, UT: Utah Department of Health and Human Services, [2016-2021].
10. Sundquist K, Frank G, Sundquist J. Urbanisation and incidence of psychosis and depression: Follow-up study of 4.4 million women and men in Sweden. The British Journal of Psychiatry. 2004;184(4):293-298. doi:10.1192/bjp.184.4.293
11. Summers L. Utah Behavioral Health Assessment & Master Plan.; 2024. Accessed October 8, 2025. https://d36oiwf74r1rap.cloudfront.net/wp-content/uploads/2024/01/BehaviorHealthPlan-Jan2024-Final.pdf
12. National Institute on Alcohol Abuse and Alcoholism. Understanding Alcohol Use Disorder | National Institute on Alcohol Abuse and Alcoholism (NIAAA). Alcohol's Effects on Health. Published April 2023. Accessed October 2, 2023. https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/understanding-alcoholuse-disorder
13. Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, Correlates, Disability, and Comorbidity of DSMIV Alcohol Abuse and Dependence in the United States: Results From the National Epidemiologic Survey on Alcohol and Related Conditions. Archives of General Psychiatry. 2007;64(7):830-842. doi:10.1001/archpsyc.64.7.830
14. Grant BF, Goldstein RB, Saha TD, et al. Epidemiology of DSM-5 Alcohol Use Disorder: Results From the National Epidemiologic Survey on Alcohol and Related Conditions III. JAMA Psychiatry. 2015;72(8):757-766. doi:10.1001/jamapsychiatry.2015.0584
15. Haas AP, Eliason M, Mays VM, et al. Suicide and Suicide Risk in Lesbian, Gay, Bisexual, and Transgender Populations: Review and Recommendations. Journal of Homosexuality. 2010;58(1):10-51. doi:10.1080/00918369.2011.534038

16. Bostwick WB, Boyd CJ, Hughes TL, McCabe SE. Dimensions of Sexual Orientation and the Prevalence of Mood and Anxiety Disorders in the United States. Am J Public Health. 2010;100(3):468-475. doi:10.2105/AJPH.2008.152942
17. Russell ST, Fish JN. Mental Health in Lesbian, Gay, Bisexual, and Transgender (LGBT) Youth. Annu Rev Clin Psychol. 2016;12:465-487. doi:10.1146/annurev-clinpsy-021815-093153
18. Medley G, Lipari RN, Bose J, Cribb DS, Kroutil LA, McHenry G. Sexual Orientation and Estimates of Adult-Substance Use and Mental Health: Results from the 2015 National Survey on Drug Use and Health. Substance Abuse and Mental Health Services Administration; 2016. https://www.samhsa.gov/data/sites/default/files/NSDUH-SexualOrientation-2015/NSDUH-SexualOrientation-2015/NSDUH-SexualOrientation-2015.pdf
19. Grundy SA, Brown RC, Jenkins WD. Health and Health Care of Sexual Minority Individuals in the Rural-United States: A Systematic Review. J Health Care Poor Underserved. 2021;32(4):1639-1652. doi:10.1353/hpu.2021.0157
20. Matthews DD, Blosnich JR, Farmer GW, Adams BJ. Operational Definitions of Sexual Orientation and Estimates of Adolescent Health Risk Behaviors. LGBT Health. 2014;1(1):42-49.
21. Hollingshaus M, Hogue M, Bateman M, Backlund M, Albers E. Utah Long-Term Planning Projections: A Baseline Scenario of Population and Employment Change in Utah and Its Counties. Kem C. Gardner Policy Institute, University of Utah; 2022.

References for Chapter 2

1. U.S Centers for Disease Control and Prevention. Disease of the Week - Substance Use Disorders (SUDs). Centers for Disease Control and Prevention. Published October 5, 2022. Accessed May 10, 2024. https://www.cdc.gov/drugoverdose/featured-topics/substance-use-disorders/index.html
2. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health. Office of the Surgeon General; 2016. https://www.hhs.gov/sites/default/files/facing-addiction-in-america-surgeon-generals-report.pdf
3. Palamar J, Halkitis P, Kiang M. Perceived public stigma and stigmatization in explaining lifetime illicit drug use among emerging adults. Addict Res Theory. 2013;21. doi:10.3109/16066359.2012.762508
4. Hill JV, Leeming D. Reconstructing 'the Alcoholic': Recovering from Alcohol Addiction and the Stigma this Entails. Int J Ment Health Addict. 2014;12(6):759-771. doi:10.1007/s11469-014-9508-z
5. Frank D. The Trouble with Morality: The Effects of 12-Step Discourse on Addicts' Decision-Making. J Psychoactive Drugs. 2011;43(3):245-256. doi:10.1080/02791072.2011.605706
6. Kamaradova D, Latalova K, Prasko J, et al. Connection between self-stigma, adherence to treatment, and discontinuation of medication. Patient Prefer Adherence. 2016;Volume 10:1289-1298. doi:10.2147/PPA.S99136
7. Brooks AJ. Factors Influencing Women's Recovery from Substance Abuse: A Grounded Theory Approach - ProQuest. Dissertation. The University of Arizona; 1995. Accessed November 13, 2023. https://www.proquest.com/docview/304163405?pq-origsite=gscholar&fromopenview=true
8. Crapanzano KA, Hammarlund R, Ahmad B, Hunsinger N, Kullar R. The association between perceived stigma and substance use disorder treatment outcomes: a review. Subst Abuse Rehabil. 2018;10:1-12. doi:10.2147/SAR.S183252
9. Tucker JA, Foushee HR, Simpson CA. Public Perceptions of Substance Abuse and How Problems are Resolved: Implications for Medical and Public Health Services. Southern Medical Journal. 2008;101(8):786-790. doi:10.1097/SMJ.0b013e31817c931c
10. Schneider A. SOCIAL CONSTRUCTION OF TARGET POPULATIONS: IMPLICATIONS FOR POLITICS AND POLICY. American Political Science Review. 1993;87(2). doi:10.2307/2939044
11. Kuettel BT. Perceptions of Substance Use Disorder and Associated Sanctions: A Factorial Vignette Experiment. Criminal Justice Review. 2022;48(2). doi:10.1177/07340168221105002

12. Kennedy-Hendricks A, Barry CL, Gollust SE, Ensminger ME, Chisolm MS, Mcginty EE. Social Stigma Toward Persons With Prescription Opioid Use Disorder: Associations With Public Support for Punitive and Public Health-Oriented Policies. Psychiatric Services. 2017;68:462-469. doi:10.1176/appi.ps.201600056
13. Sylvester SM, Haeder SF, Callaghan T. Just say no? Public attitudes about supportive and punitive policies to combat the opioid epidemic. Journal of Public Policy. 2022;(42):270-297. doi:10.1017/S0143814X21000155
14. Kulesza M, Larimer ME, Rao D. Substance Use Related Stigma: What we Know and the Way Forward. J Addict Behav Ther Rehabil. 2013;2(2):782. doi:10.4172/2324-9005.1000106
15. Miller PK, Cuthbertson CA, Loveridge S. Social Status Influence on Stigma Towards Mental Illness and Substance Use Disorder in the United States - ProQuest. Community Ment Health J. 2022;58(2):249-260. doi:10.1007/s10597-021-00817-6
16. Muhamad, N. A., Rafan, S. N., Dali, N. S. M., Abdullah, N., Chemi, N., Shafie, H., … Noordin, S. (2020). Determining the Effects of Psychosocial and Spiritual Support Among Patients With Substance Abuse: A Scoping Review. Global Journal of Health Science, 7(2), 234–246. Retrieved from https://www.researchgate.net/profile/Nor-Soleha-Mohd-Dali/publication/341311628_Determining_the_Effects_of_Psychosocial_and_Spiritual_Support_Among_Patients_With_Substance_Abuse_A_Scoping_Review/links/5eba1cd0299bf1287f7fcbd4/Determining-the-Effects-of-Psychosocial-and-Spiritual-Support-Among-Patients-With-Substance-Abuse-A-Scoping-Review.pdf
17. Walton-Moss, B., Ray, E. M., & Woodruff, K. (2013). Relationship of spirituality or religion to recovery from substance abuse: A systematic review. Journal of Addictions Nursing, 24(4), 217–226. https://doi.org/10.1097/JAN.0000000000000001
18. Pew Research Center. (n.d.). Religious Landscape Study. Pew Research Center's Religion & Public Life Project. Retrieved from https://www.pewresearch.org/religious-landscape-study/database/
19. Ashworth, M., Thunström, L., Clancy, G. L., Thompson, R. A., Johnson, D., & Fletcher, E. (2024). Addressing rural and non-rural substance use disorder stigma: Evidence from a national randomized controlled trial. Addictive Behaviors Reports, 19, 100541. https://doi.org/10.1016/J.ABREP.2024.100541
20. Wu, L.-T., Kouzis, A. C., & Schlenger, W. E. (2003). Substance Use, Dependence, and Service Utilization Among the US Uninsured Nonelderly Population. American Journal of Public Health, 93(12), 2079–2085. https://doi.org/10.2105/AJPH.93.12.2079
21. Saloner, B., Bandara, S., Bachhuber, M., & Barry, C. L. (2017). Insurance Coverage and Treatment Use Under the Affordable Care Act Among Adults With Mental and Substance Use Disorders. Psychiatric Services, 68(6), 542–548. https://doi.org/10.1176/appi.ps.201600182
22. Kem C. Gardner Policy Institute. (2024). The Economic Contributions of Utah's Ski Industry. Salt Lake City. Retrieved from https://d36oiwf74r1rap.cloudfront.net/wp-content/uploads/2024/05/Ski-Industry-FS-May2024.pdf
23. Means, S. P. (2018, November 22). In 2017, only 12 U.S. counties had per capita income over $100K. One was in Utah. The Salt Lake Tribune. Salt Lake City. Retrieved from https://www.sltrib.com/news/2018/11/22/utahs-summit-county-among/
24. Utah Department of Health and Human Services. (2025, March 19). IBIS-PH - Query Result - Population Density Query Module by Utah Counties - Population Density. Retrieved October 28, 2025, from https://ibis.utah.gov/ibisph-view/query/result/pop/PopDensity/Density.html
25. Utah Department of Workforce Services. (2024, December). Educational Attainment by County. Utah Department of Workforce Services. Retrieved October 28, 2025, from https://jobs.utah.gov/wi/data/library/other/eduattainment.html
26. U.S. National Institute on Minority Health and Health Disparities. (2025, October 30). Insurance Table for Utah Counties | HDPulse Data Portal. National Institutes of Health. Retrieved October 28, 2025, from https://hdpulse.nimhd.nih.gov/data-portal/healthcare/table?age=174&age_options=age_6&demo=00043&demo_options=insurance_12&healthcaretopic=040&healthcaretopic_options=healthcare_3&race=00&race_options=raceall_1&sex=0&sex_options=sex_3&statefips=49&statefips_options=area_states

27. Andersen MM, Varga S, Folker AP. On the definition of stigma. J Eval Clin Pract. 2022;28(5):847-853. doi:10.1111/jep.13684
28. Radcliffe, P., & Stevens, A. (2008). Are drug treatment services only for 'thieving junkie scumbags'? Drug users and the management of stigmatised identities. Social Science & Medicine, 67(7), 1065–1073. https://doi.org/10.1016/J.SOCSCIMED.2008.06.004
29. Mak, W. W. S., Chan, R. C. H., Wong, S. Y. S., Lau, J. T. F., Tang, W. K., Tang, A. K. L., … Lee, D. T. F. (2017). A Cross-Diagnostic Investigation of the Differential Impact of Discrimination on Clinical and Personal Recovery. Psychiatric Services (Washington, D.C.), 68(2), 159–166. https://doi.org/10.1176/appi.ps.201500339
30. Johnson-Kwochka, A., Aalsma, M. C., Monahan, P. O., & Salyers, M. P. (2021). Development and examination of the attribution questionnaire-substance use disorder (AQ-SUD) to measure public stigma towards adolescents experiencing substance use disorders. Drug and Alcohol Dependence, 221, 108600. https://doi.org/10.1016/J.DRUGALCDEP.2021.108600
31. Mcginty, E., Pescosolido, B., Kennedy-Hendricks, A., & Barry, C. L. (n.d.). Communication Strategies to Counter Stigma and Improve Mental Illness and Substance Use Disorder Policy. https://doi.org/10.1176/appi.ps.201700076
32. Supervised, N. W., & Murray, J. (2015). A Q-Methodology study into the stigma of substance misusers and whether inducing empathy can improve attitudes towards this group.
33. Utah State University. (n.d.). Debunked Podcast Office of Health Equity and Community Engagement Extension Health and Wellness. Retrieved from https://extension.usu.edu/communitywellness/debunked
34. Utah Department of Health & Human Services. (n.d.). Community | Stop the Opidemic. Retrieved from https://opidemic.utah.gov/what-are-opioids/community/

References for Chapter 3

1. Rhee TG, Rosenheck RA, Theriault KM. Increasing Emergency Department Visits for Mental Health Conditions in the United States. J Clin Psychiatry. 2020;81(5):20m13241. Accessed October 5, 2025. https://www.psychiatrist.com/jcp/ed-visits-for-mental-health-conditions-in-the-us/
2. Niedzwiecki MJ, Pranav ;, Sharma J, Kanzaria HK, Mcconville S, Hsia RY. Factors Associated With Emergency Department Use by Patients With and Without Mental Health Diagnoses. JAMA Network Open. 2018;1(6):183528. doi:10.1001/jamanetworkopen.2018.3528
3. Lee MH, Schuur JD, Zink BJ. Owning the Cost of Emergency Medicine: Beyond 2%. Annals of Emergency Medicine. 2013;62(5):498-505.e3. doi:10.1016/J.ANNEMERGMED.2013.03.029
4. Stensland M, Watson PR, Grazier KL. An Examination of Costs, Charges, and Payments for Inpatient Psychiatric Treatment in Community Hospitals. Psychiatric Services. 2012;63(7):666-671. Accessed October 5, 2025. https://psychiatryonline.org/doi/pdf/10.1176/appi.ps.201100402
5. Nordstrom K, Berlin JS, Nash SS, Shah SB, Schmelzer NA, Worley LLM. Boarding of Mentally Ill Patients in Emergency Departments: American Psychiatric Association Resource Document. Western Journal of Emergency Medicine. 2019;690(5). doi:10.5811/westjem.2019.6.42422
6. Weinick RM, Burns RM, Mehrotra A. Many emergency department visits could be managed at urgent care centers and retail clinics. Health Aff. 2010;29(9):1630-1636. doi:10.1377/hlthaff.2009.0748
7. Dell'Osso B, Glick ID, Baldwin DS, Altamura AC. Can Long-Term Outcomes Be Improved by Shortening the Duration of Untreated Illness in Psychiatric Disorders? A Conceptual Framework. Psychopathology. 2013;46:14-21. doi:10.1159/000338608

References for Chapter 4

1. Stensland M, Watson PR, Grazier KL. An Examination of Costs, Charges, and Payments for Inpatient Psychiatric Treatment in Community Hospitals. Psychiatric Services. 2012;63(7):666-671. Accessed October 5, 2025. https://psychiatryonline.org/doi/pdf/10.1176/appi.ps.201100402

2. Niedzwiecki MJ, Pranav ;, Sharma J, Kanzaria HK, Mcconville S, Hsia RY. Factors Associated With Emergency Department Use by Patients With and Without Mental Health Diagnoses. JAMA Network Open. 2018;1(6):183528. doi:10.1001/jamanetworkopen.2018.3528
3. Stroever S, Brett C, Michael K, Petrini J. Emergency department utilization for mental health conditions before and after the COVID-19 outbreak. The American Journal of Emergency Medicine. 2021;47:164-168. doi:10.1016/J.AJEM.2021.03.084

References for Chapter 5

1. Dixon LB, Holoshitz Y, Nossel I. Treatment engagement of individuals experiencing mental illness: review and update. World Psychiatry. 2016;15:13-20. doi:10.1002/wps.20306
2. Fontanella CA, Warner LA, Steelesmith DL, Brock G, Bridge JA, Campo J v. Association of Timely Outpatient Mental Health Services for Youths After Psychiatric Hospitalization With Risk of Death by Suicide. JAMA Network Open. 2020;3(8):e2012887. doi:10.1001/jamanetworkopen.2020.12887
3. Engström I, Hansson L, Ali L, et al. Relational continuity may give better clinical outcomes in patients with serious mental illness - a systematic review. BMC Psychiatry. 2023;23. doi:10.1186/s12888-023-05440-1
4. Choi Y, Nam CM, Lee SG, Park S, Ryu H gun, Park E cheol. Association of continuity of care with readmission, mortality and suicide after hospital discharge among psychiatric patients. International Journal for Quality in Health Care. 2020;32(9):569-576. doi:10.1093/intqhc/mzaa093
5. de Cruppé W, Assheuer M, Geraedts M, Beine K. Association between continuity of care and treatment outcomes in psychiatric patients in Germany: a prospective cohort study. BMC Psychiatry. Published online 2023. doi:10.1186/s12888-023-04545-x

Appendix A: Supplemental Tables

Table A1. County Characteristics in the State of Utah

County Name	Facilities (n)	HMHI Facilities (n)	Population (n)	Facilities (per capita)	HMHI Facilities (per capita)	Provider Shortage Score	Average Drive Time to Care (minutes)
Beaver	1	0	7,072	1.414	0.000	11.0	65.9
Box Elder	13	0	57,666	2.254	0.000	9.0	24.7
Cache	18	0	133,154	1.352	0.000	9.0	9.6
Carbon	7	0	20,412	3.429	0.000	15.0	4.1
Daggett	0	0	935	0.000	0.000	19.0	125.2
Davis	43	1	362,679	1.186	0.028	0.0	15.8
Duchesne	4	0	19,596	2.041	0.000	19.0	52.1
Emery	3	0	9,825	3.053	0.000	16.0	49.4
Garfield	3	0	5,083	5.902	0.000	10.5	79.6
Grand	3	0	9,669	3.103	0.000	17.0	7.0
Iron	8	0	57,289	1.396	0.000	14.7	9.5
Juab	0	0	11,786	0.000	0.000	17.0	29.3
Kane	3	0	7,667	3.913	0.000	11.0	30.3
Millard	3	0	12,975	2.312	0.000	13.0	76.5
Morgan	0	0	12,295	0.000	0.000	13.0	29.7
Piute	0	0	1,438	0.000	0.000	17.0	64.1
Rich	2	0	2,510	7.968	0.000	13.5	66.1
Salt Lake	217	6	1,185,238	1.831	0.051	18.2	13.5
San Juan	3	0	14,518	2.066	0.000	17.1	62.0
Sanpete	3	0	28,437	1.055	0.000	19.0	13.4
Sevier	5	0	21,522	2.323	0.000	14.0	22.1
Summit	2	1	42,357	0.472	0.236	15.0	11.0
Tooele	7	0	72,698	0.963	0.000	13.3	10.0
Uintah	3	0	35,620	0.842	0.000	15.0	41.6
Utah	89	0	659,399	1.350	0.000	14.0	15.4
Wasatch	6	0	34,788	1.725	0.000	15.0	4.9
Washington	34	0	180,279	1.886	0.000	13.0	16.3
Wayne	1	0	2,486	4.023	0.000	16.0	24.5
Weber	42	0	262,223	1.602	0.000	18.0	29.7

Table A2. Population Characteristics in the State of Utah, by County

County Name	% Non-white[c]	% Uninsured[b]	% In Poverty[c]	% Unemployed[c]	% Finished college[c]	% Depression[a]	% Binge Drinking[a]	% LGB[a]	% Transgender[a]	% Considered Suicide[a]
Beaver	16.5%	13.0%	9.2%	2.7%	26.8%	14.8%	12.8%	Suppressed	Suppressed	Suppressed
Box Elder	11.9%	10.0%	8.0%	2.3%	24.2%	24.2%	8.3%	5.7%	Suppressed	6.2%
Cache	15.3%	9.7%	11.0%	2.0%	39.0%	23.6%	8.2%	5.5%	Suppressed	5.9%
Carbon	13.6%	9.5%	15.9%	3.5%	16.7%	26.9%	13.1%	4.6%	Suppressed	3.6%
Daggett	5.5%	11.8%	7.2%	4.5%	19.3%	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed
Davis	15.7%	7.7%	6.4%	2.2%	38.0%	24.6%	8.6%	5.3%	Suppressed	4.6%
Duchesne	12.9%	14.9%	13.1%	3.2%	14.5%	22.1%	9.5%	4.0%	Suppressed	2.8%
Emery	8.4%	9.7%	11.8%	3.3%	15.1%	21.2%	8.8%	3.8%	Suppressed	Suppressed
Garfield	10.7%	13.9%	9.9%	5.9%	25.2%	11.8%	Suppressed	Suppressed	Suppressed	Suppressed
Grand	19.2%	15.4%	11.1%	3.2%	26.9%	21.4%	12.7%	4.8%	Suppressed	Suppressed
Iron	14.1%	11.0%	13.3%	2.4%	29.2%	21.8%	8.8%	5.8%	Suppressed	6.2%
Juab	6.9%	10.7%	8.8%	2.0%	21.1%	23.6%	11.2%	Suppressed	Suppressed	Suppressed
Kane	7.6%	11.8%	9.4%	2.5%	30.1%	20.5%	Suppressed	Suppressed	Suppressed	Suppressed
Millard	16.3%	14.4%	10.2%	2.3%	23.5%	19.5%	4.7%	Suppressed	Suppressed	Suppressed
Morgan	4.9%	7.2%	4.5%	2.0%	39.7%	20.2%	Suppressed	Suppressed	Suppressed	Suppressed
Piute	10.2%	13.2%	15.1%	4.1%	20.3%	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed
Rich	6.0%	15.7%	8.0%	5.0%	23.4%	17.7%	Suppressed	Suppressed	Suppressed	Suppressed
Salt Lake	28.5%	11.0%	8.8%	2.3%	37.1%	23.9%	14.8%	7.9%	0.5%	6.2%
San Juan	56.8%	14.1%	26.8%	4.4%	20.6%	16.9%	8.0%	3.2%	Suppressed	5.2%
Sanpete	14.6%	11.4%	11.7%	2.7%	23.0%	21.4%	5.7%	5.4%	Suppressed	3.5%
Sevier	8.6%	12.1%	9.7%	2.8%	21.8%	23.5%	10.1%	4.4%	Suppressed	7.6%
Summit	15.2%	8.4%	5.8%	2.1%	55.2%	17.3%	16.3%	4.8%	Suppressed	5.8%
Tooele	16.1%	9.0%	5.6%	2.5%	23.0%	28.1%	12.5%	5.9%	Suppressed	4.4%
Uintah	16.9%	15.3%	11.9%	3.6%	17.3%	20.5%	11.6%	6.4%	Suppressed	5.5%
Utah	18.4%	8.6%	8.1%	2.1%	42.3%	22.9%	6.4%	6.4%	0.7%	5.5%
Wasatch	16.3%	9.9%	4.9%	2.3%	44.2%	18.4%	11.1%	8.1%	Suppressed	3.7%
Washington	15.8%	13.0%	9.4%	2.5%	30.5%	21.3%	7.8%	4.4%	Suppressed	4.3%
Wayne	8.2%	18.5%	11.1%	4.4%	21.8%	18.7%	12.9%	Suppressed	Suppressed	Suppressed
Weber	21.7%	10.7%	9.3%	2.5%	26.3%	26.0%	12.6%	6.3%	1.2%	7.8%

Data from authors' analysis of Utah Behavioral Risk Factor Surveillance System Survey[a], U.S. Census Bureau Small Area Income and Povrety estiamtes[b], and American Community Survey[c].

Table A3. Survey-Weighted Sample Characteristics, Stratified by Sympathy Toward Individuals with Substance Use Disorder				
Variable	**Level**	**Not sympathetic n (%)**	**Sympathetic n (%)**	**p-value**
Sympathetic Toward SUD	Not sympathetic	339,402.4 (100.0)	0.0 (0.0)	<0.001
	Sympathetic	0.0 (0.0)	1,416,074.7 (100.0)	
Age in Years	18-24	37,902.3 (11.2)	205,706.2 (14.5)	0.013
	25-34	64,753.1 (19.1)	298,315.3 (21.1)	
	35-44	67,027.1 (19.7)	283,429.1 (20.0)	
	45-54	57,068.7 (16.8)	211,308.5 (14.9)	
	55-64	47,145.0 (13.9)	198,554.5 (14.0)	
	≥ 65	65,506.0 (19.3)	218,761.2 (15.4)	
Sex at Birth	Male	180,827.1 (53.3)	693,429.6 (49.0)	0.020
	Female	158,575.2 (46.7)	722,645.1 (51.0)	
Race / Ethnicity	Non-Hispanic White	243,127.0 (71.6)	1,175,749.4 (83.0)	<0.001
	Non-Hispanic Black	2,366.4 (0.7)	11,933.2 (0.8)	
	Non-Hispanic Asian	6,475.3 (1.9)	35,941.6 (2.5)	
	Non-Hispanic American Indian / Alaska Native	4,038.1 (1.2)	10,514.9 (0.7)	
	Hispanic	74,357.1 (21.9)	142,422.7 (10.1)	
	Non-Hispanic Other Race	90,38.5 (2.7)	39,513.0 (2.8)	
Marital Status	Married	215,371.0 (63.5)	888,095.6 (62.7)	0.685
	Unmarried	124,031.4 (36.5)	527,979.1 (37.3)	
Religion	None	87,101.8 (25.7)	416,096.1 (29.4)	<0.001
	Protestant	14,301.4 (4.2)	36,435.9 (2.6)	
	Catholic	48,667.0 (14.3)	71,623.3 (5.1)	
	Jewish	550.5 (0.2)	4,522.7 (0.3)	
	Church of Jesus Christ of Latter-day Saints	142,597.7 (42.0)	751,378.4 (53.1)	
	Other	13,641.1 (4.0)	47,699.8 (3.4)	
	Baptist, Southern Baptist	2,114.7 (0.6)	4,577.9 (0.3)	
	Buddhist, Hindu, Muslim, Islam	1,776.9 (0.5)	8,390.0 (0.6)	
	Born-again Christian, Church of Christ, Pentecostal	21,599.9 (6.4)	58,889.6 (4.2)	
	Episcopalian, Lutheran, Methodist, Presbyterian	4,019.3 (1.2)	4,620.3 (0.3)	
	Greek Orthodox, Eastern Orthodox	686.1 (0.2)	1,677.4 (0.1)	
	Jehovah's Witness	208.5 (0.1)	4,300.0 (0.3)	
	Native American religion	303.3 (0.1)	728.3 (0.1)	
	Non-denominational	1,834.0 (0.5)	5,134.8 (0.4)	
Veteran Status	No	304,291.4 (89.7)	1,308,293.4 (92.4)	0.003
	Yes	35,110.9 (10.3)	107,781.4 (7.6)	
Identifiy as LGBT	No	295,484.6 (87.1)	1,280,670.4 (90.4)	0.005
	Yes	43,917.8 (12.9)	135,404.3 (9.6)	
Urbanicity	Urban	317,690.8 (93.6)	1,355,097.6 (95.7)	0.001
	Rural	21,711.6 (6.4)	60,977.1 (4.3)	

Table A3. Survey-Weighted Sample Characteristics, Stratified by Sympathy Toward Individuals with Substance Use Disorder				
Variable	**Level**	**Not sympathetic n (%)**	**Sympathetic n (%)**	**p-value**
Education	< High School	55,012.6 (16.2)	63,962.8 (4.5)	<0.001
	High School Graduate	89,048.8 (26.2)	293,699.9 (20.7)	
	Attended College / Technical School	111,683.8 (32.9)	568,921.1 (40.2)	
	College / Technical School Graduate	83,657.2 (24.6)	489,491.0 (34.6)	
Employment Status	Employed	220,199.7 (64.9)	950,968.0 (67.2)	0.178
	Not employed	119,202.7 (35.1)	465,106.7 (32.8)	
General Health Status	Good	327,287.8 (96.4)	1,380,010.5 (97.5)	0.064
	Poor	12,114.5 (3.6)	36,064.3 (2.5)	
Days of Bad Mental Health in Past Month	Zero days	190,487.3 (56.1)	674,227.6 (47.6)	<0.001
	1-13 days	99,504.7 (29.3)	494,014.1 (34.9)	
	14+ days	49,410.4 (14.6)	247,833.0 (17.5)	
Ever Had Depression	No	265,334.2 (78.2)	1,038,236.5 (73.3)	0.004
	Yes	74,068.2 (21.8)	377,838.2 (26.7)	
Primary Health Insurance	Employer-based	165,160.3 (48.7)	831,847.4 (58.7)	<0.001
	Other private	29,873.9 (8.8)	154,073.5 (10.9)	
	Medicare	58,870.0 (17.3)	214,236.9 (15.1)	
	Medigap	Suppressed	Suppressed	
	Medicaid	22,533.8 (6.6)	67,824.8 (4.8)	
	CHIP	Suppressed	Suppressed	
	Military-related	10,292.1 (3.0)	32,765.6 (2.3)	
	IHS	Suppressed	Suppressed	
	State-sponsored	2,176.0 (0.6)	5,625.6 (0.4)	
	Other government	5,208.7 (1.5)	21,023.6 (1.5)	
	Uninsured	44,766.6 (13.2)	87,192.4 (6.2)	
Past-Month Marijuana Use	No	319,037.9 (94.0)	1,284,996.1 (90.7)	0.005
	Yes	2,0364.5 (6.0)	131,078.6 (9.3)	
Smoked 100 Cigarettes in Life	No	245,016.9 (72.2)	1,111,428.8 (78.5)	<0.001
	Yes	94,385.5 (27.8)	304,645.9 (21.5)	
Past-Month Alcohol Use	No	219,143.4 (64.6)	951,845.8 (67.2)	0.135
	Yes	120,259.0 (35.4)	464,228.9 (32.8)	

Table A4. Survey-Weighted Multiple Logistic Regression Between Sympathy for Individuals with Substance Use Disorders and Potential Predictors				
Variable	**Level**	**Adjusted Odds Ratio**	**95% Confidence Interval**	**p-value**
Age in Years	18-24	Ref.	-	-
	25-34	0.83	0.58, 1.18	0.302
	35-44	0.84	0.6, 1.19	0.338
	45-54	0.79	0.55, 1.12	0.179
	55-64	0.85	0.6, 1.22	0.385
	≥ 65	0.65	0.44, 0.97	0.033
Sex at Birth	Male	Ref.	-	-
	Female	1.16	0.99, 1.37	0.074
Race / Ethnicity	Non-Hispanic White	Ref.	-	-
	Non-Hispanic Black	1.17	0.5, 2.7	0.719
	Non-Hispanic Asian	1.06	0.5, 2.25	0.884
	Non-Hispanic American Indian / Alaska Native	0.6	0.28, 1.28	0.188
	Hispanic	0.7	0.54, 0.9	0.006
	Non-Hispanic Other Race	1	0.58, 1.75	0.987
Marital Status	Married	Ref.	-	-
	Unmarried	1.15	0.97, 1.37	0.106
Religion	None	Ref.	-	-
	Protestant	0.63	0.42, 0.94	0.023
	Catholic	0.61	0.44, 0.86	0.005
	Jewish	1.9	0.42, 8.55	0.403
	Church of Jesus Christ of Latter-day Saints	1.2	0.95, 1.51	0.128
	Other	0.82	0.51, 1.31	0.407
	Baptist, Southern Baptist	0.51	0.19, 1.39	0.19
	Buddhist, Hindu, Muslim, Islam	1.31	0.38, 4.6	0.669
	Born-again Christian, Church of Christ, Pentecostal	0.77	0.54, 1.09	0.143
	Episcopalian, Lutheran, Methodist, Presbyterian	0.26	0.13, 0.54	<0.001
	Greek Orthodox, Eastern Orthodox	0.82	0.22, 3.03	0.762
	Jehovah's Witness	9.41	1.6, 55.24	0.013
	Native American religion	0.76	0.18, 3.29	0.718
	Non-denominational	0.64	0.2, 2.03	0.448
Veteran Status	No	Ref.	-	-
	Yes	0.81	0.62, 1.05	0.105
Identifiy as LGBT	No	Ref.	-	-
	Yes	0.98	0.75, 1.29	0.911
Urbanicity	Urban	Ref.	-	-
	Rural	0.69	0.53, 0.89	0.004

Table A4. Survey-Weighted Multiple Logistic Regression Between Sympathy for Individuals with Substance Use Disorders and Potential Predictors

Variable	Level	Adjusted Odds Ratio	95% Confidence Interval	p-value
Education	< High School	Ref.	-	-
	High School Graduate	1.99	1.42, 2.79	<0.001
	Attended College / Technical School	2.91	2.07, 4.08	<0.001
	College / Technical School Graduate	3.42	2.42, 4.83	<0.001
Employment Status	Employed	Ref.	-	-
	Not employed	0.94	0.78, 1.14	0.541
General Health Status	Good	Ref.	-	-
	Poor	0.77	0.52, 1.15	0.203
Days of Bad Mental Health in Past Month	Zero days	Ref.	-	-
	1-13 days	1.11	0.93, 1.34	0.246
	14+ days	1.34	1.03, 1.76	0.032
Ever Had Depression	No	Ref.	-	-
	Yes	1.11	0.9, 1.38	0.34
Primary Health Insurance	Employer-based	Ref.	-	-
	Other private	1.1	0.83, 1.45	0.517
	Medicare	1	0.76, 1.33	0.981
	Medigap	Suppressed	Suppressed	Suppressed
	Medicaid	0.8	0.56, 1.16	0.242
	CHIP	Suppressed	Suppressed	Suppressed
	Military-related	0.88	0.54, 1.43	0.616
	IHS	Suppressed	Suppressed	Suppressed
	State-sponsored	0.52	0.21, 1.25	0.144
	Other government	0.85	0.47, 1.54	0.587
	Uninsured	0.69	0.52, 0.92	0.01
Past-Month Marijuana Use	No	Ref.	-	-
	Yes	1.52	1.06, 2.2	0.024
Smoked 100 Cigarettes in Life	No	Ref.	-	-
	Yes	0.97	0.81, 1.17	0.741
Past-Month Alcohol Use	No	Ref.	-	-
	Yes	1.05	0.85, 1.29	0.672

Table A5. Unweighted and Weighted Sample Characteristics			
Variable	**Level**	**Unweighted (n = 8,003) n (%)**	**Weighted (n=1,755,477.1) n (%)**
Sympathetic Toward SUD	Not sympathetic	1,609 (20.1)	339,402.4 (19.3)
	Sympathetic	6,394 (79.9)	1,416,074.7 (80.7)
Age in Years	18-24	577 (7.2)	243,608.5 (13.9)
	25-34	1,129 (14.1)	363,068.4 (20.7)
	35-44	1,450 (18.1)	350,456.2 (20.0)
	45-54	1,320 (16.5)	268,377.2 (15.3)
	55-64	1,327 (16.6)	245,699.5 (14.0)
	≥ 65	2,200 (27.5)	284,267.2 (16.2)
Sex at Birth	Male	4,001 (50.0)	874,256.8 (49.8)
	Female	4,002 (50.0)	881,220.3 (50.2)
Race / Ethnicity	Non-Hispanic White	6,936 (86.7)	1,418,876.4 (80.8)
	Non-Hispanic Black	51 (0.6)	14,299.6 (0.8)
	Non-Hispanic Asian	85 (1.1)	42,416.9 (2.4)
	Non-Hispanic American Indian / Alaska Native	81 (1.0)	14,553.1 (0.8)
	Hispanic	702 (8.8)	216,779.8 (12.3)
	Non-Hispanic Other Race	148 (1.8)	48,551.4 (2.8)
Marital Status	Married	5,386 (67.3)	1,103,466.6 (62.9)
	Unmarried	2,617 (32.7)	652,010.5 (37.1)
Religion	None	1,881 (23.5)	503,197.9 (28.7)
	Protestant	285 (3.6)	50,737.3 (2.9)
	Catholic	494 (6.2)	120,290.3 (6.9)
	Jewish	29 (0.4)	5,073.2 (0.3)
	Church of Jesus Christ of Latter-day Saints	4,560 (57.0)	893,976.2 (50.9)
	Other	231 (2.9)	61,341.0 (3.5)
	Baptist, Southern Baptist	35 (0.4)	6,692.6 (0.4)
	Buddhist, Hindu, Muslim, Islam	28 (0.3)	10,166.9 (0.6)
	Born-again Christian, Church of Christ, Pentecostal	336 (4.2)	80,489.5 (4.6)
	Episcopalian, Lutheran, Methodist, Presbyterian	48 (0.6)	8,639.6 (0.5)
	Greek Orthodox, Eastern Orthodox	12 (0.1)	2,363.6 (0.1)
	Jehovah's Witness	18 (0.2)	4,508.5 (0.3)
	Native American religion	11 (0.1)	1,031.6 (0.1)
	Non-denominational	35 (0.4)	6,968.8 (0.4)
Veteran Status	No	7,176 (89.7)	1,612,584.8 (91.9)
	Yes	827 (10.3)	142,892.3 (8.1)
Identifiy as LGBT	No	7,379 (92.2)	1,576,155.0 (89.8)
	Yes	624 (7.8)	179,322.1 (10.2)
Urbanicity	Urban	7,060 (88.2)	1,672,788.4 (95.3)
	Rural	943 (11.8)	82,688.7 (4.7)

Table A5. Unweighted and Weighted Sample Characteristics			
Variable	**Level**	**Unweighted (n = 8,003) n (%)**	**Weighted (n=1,755,477.1) n (%)**
Education	< High School	315 (3.9)	118,975.4 (6.8)
	High School Graduate	1,726 (21.6)	382,748.6 (21.8)
	Attended College / Technical School	2,497 (31.2)	680,604.9 (38.8)
	College / Technical School Graduate	3,465 (43.3)	573,148.2 (32.6)
Employment Status	Employed	4,765 (59.5)	1,171,167.7 (66.7)
	Not employed	3,238 (40.5)	584,309.4 (33.3)
General Health Status	Good	7,740 (96.7)	1,707,298.3 (97.3)
	Poor	263 (3.3)	48,178.8 (2.7)
Days of Bad Mental Health in Past Month	Zero days	4,411 (55.1)	864,715.0 (49.3)
	1-13 days	2,469 (30.9)	593,518.7 (33.8)
	14+ days	1,123 (14.0)	297,243.4 (16.9)
Ever Had Depression	No	6,149 (76.8)	1,303,570.7 (74.3)
	Yes	1,854 (23.2)	451,906.4 (25.7)
Primary Health Insurance	Employer-based	3,983 (49.8)	997,007.7 (56.8)
	Other private	792 (9.9)	183,947.4 (10.5)
	Medicare	2,029 (25.4)	273,106.9 (15.6)
	Medigap	Suppressed	Suppressed
	Medicaid	370 (4.6)	90,358.6 (5.1)
	CHIP	Suppressed	Suppressed
	Military-related	207 (2.6)	43,057.7 (2.5)
	IHS	Suppressed	Suppressed
	State-sponsored	37 (0.5)	7,801.6 (0.4)
	Other government	100 (1.2)	26,232.3 (1.5)
	Uninsured	471 (5.9)	131,958.9 (7.5)
Past-Month Marijuana Use	No	7,467 (93.3)	1,604,034.0 (91.4)
	Yes	536 (6.7)	151,443.2 (8.6)
Smoked 100 Cigarettes in Life	No	6,107 (76.3)	1,356,445.7 (77.3)
	Yes	1,896 (23.7)	399,031.4 (22.7)
Past-Month Alcohol Use	No	5,634 (70.4)	1,170,989.3 (66.7)
	Yes	2,369 (29.6)	584,487.9 (33.3)

Appendix B: Description of HMHI Units and Services

The Huntsman Mental Health Institute (HMHI) was dedicated in 2021 following a $150 million gift from the Huntsman Foundation to the University of Utah. HMHI integrates research, education, and clinical care within one institutional structure. It employs over 1,600 faculty, staff, and trainees across more than 20 locations in Utah and Idaho, serving diverse patient demographics ranging from children to geriatric patients. HMHI is recognized as a critical mental health care, research, and training center within the Mountain West, addressing the ongoing challenge of untreated mental health conditions in this region. HMHI utilizes an integrated approach to clinical care, research, and education. This facilitates multidisciplinary solutions to mental health issues, enhancing outcomes in clinical practice, research, and training. HMHI also serves as a regional training center addressing shortages of mental health professionals while delivering clinical services.

Geographic Service Area

HMHI's main hospital is a 170-bed freestanding psychiatric facility located at the University of Utah. This hospital draws patients from throughout the Mountain West region, providing specialized psychiatric care that may not be available in more remote communities. The facility includes 66 beds dedicated to children and adolescents, with the remaining accommodating adult patients with varying levels of acuity and specialized needs. Additional campus facilities include a short-stay, receiving center for brief crisis intervention and referral, adult recovery services for substance use disorders, and child and adolescent day treatment programs. The hospital's location on the University's medical campus facilitates integration with other healthcare services and supports the University's academic mission.

HMHI includes a network of community-based clinics and services throughout Utah and Idaho. These include the Downtown Behavioral Health Clinic in Salt Lake City and the Park City Behavioral Health Clinic, which provide outpatient mental health services. The Neurobehavior HOME Program in Salt Lake City offers specialized services for individuals with developmental disabilities. In addition, HMHI operates numerous other clinical sites across its service area, maintaining a presence in more than 20 locations throughout Utah and Idaho. This distributed model of care increases accessibility for patients who might otherwise face geographic barriers to treatment, particularly in rural and frontier communities.

HMHI has developed robust telemedicine capabilities that further extend its geographic reach. Virtual appointments allow patients in remote areas to access psychiatric evaluation, medication management, and therapy services without traveling long distances to specialty care centers. The CALL-UP program, for example, provides psychiatric consultation to primary care providers throughout Utah. This approach increases the impact of limited psychiatric resources by supporting front-line providers in managing mental health conditions.

Clinical Programs and Treatment Services

Comprehensive Assessment and Treatment (CAT) Program

The Youth Comprehensive Assessment and Treatment (CAT) Program serves children and adolescents ages 4-17, providing an intensive 4-6 week treatment program. It utilizes a multidisciplinary team approach to evaluate youths and initiate effective treatment plans. The CAT Program addresses a wide spectrum of conditions including mood disorders, anxiety disorders, psychosis, autism spectrum disorders, trauma-related issues, personality challenges, and substance abuse. Treatment modalities include Acceptance and Commitment Therapy (ACT), Dialectical Behavioral Therapy (DBT), and expressive therapies, supported by comprehensive psychiatric evaluation and nursing oversight.

Neurobehavior HOME Program

The Neurobehavior HOME Program is a specialized coordinated care model designed specifically for individuals with developmental disabilities across the lifespan. This program addresses both the medical and mental health needs of this population. Services include preventive healthcare, behavior management, case management, crisis management, nutritional

counseling, individual and group therapy, medication management, psychiatric evaluations, and psychological testing. The HOME Program serves over 1,000 people of all ages, providing continuity of care that addresses both immediate needs and long-term health maintenance.

HMHI Behavioral Health Clinics
HMHI operates specialized outpatient behavioral health clinics, offering accessible mental health services to diverse populations. The Downtown Behavioral Health Clinic provides therapy and medication management for adults, children, and teens, along with specialized services in perinatal/maternal mental health counseling and neuropsychological testing. Similarly, the Park City location offers individual therapy, group therapy, psychiatric evaluation, medication management, and ketamine-assisted psychotherapy. Both clinics are staffed by board-certified psychiatrists, advanced practice nurses, clinical psychologists, clinical social workers, and senior residents in training.

Day Treatment and Intensive Outpatient Programs
HMHI offers multiple flexible day programs that provide structured therapeutic environments without requiring overnight hospitalization. These include age-specific day treatment programs such as Kidstar for children ages 5-12 and TeensCope for adolescents ages 12-18, along with the Mental Health Intensive Outpatient Program for individuals requiring more support than weekly therapy but less than full-day treatment. Additional specialized day programs include the Autism Adventure Camp, offering targeted intervention for children on the autism spectrum, and the Optimal Aging Program, addressing the unique mental health needs of older adults. HMHI's ROPES Challenge Course represents an innovative therapeutic approach that incorporates adventure-based counseling techniques to build confidence, trust, and communication skills.

Hospital and Inpatient Services

Adult Inpatient Psychiatric Services
HMHI's adult inpatient psychiatric services represent a comprehensive approach to acute mental health treatment, including six specialized units to accommodate varying levels of patient acuity and needs. Each unit maintains an environment appropriate to specific patient populations, with some designed for those detoxing from substance use and others providing intensified safety protocols for patients experiencing psychosis. Treatment is delivered by collaborative teams including psychiatrists, social workers, nurses, expressive therapists, and psychologists who work together to assess, stabilize, and develop discharge plans for each patient. The therapeutic approach integrates medication evaluation and management with evidence-based interventions drawn from acceptance and commitment therapy, dialectical behavioral therapy, and cognitive behavioral therapy.

Child and Adolescent Inpatient Services
The child and adolescent inpatient services at HMHI provide critical acute psychiatric care for youth facing immediate mental health crises who cannot remain safe in less restrictive environments. With 66 beds dedicated to children and adolescents, HMHI maintains specialized units including a latency unit for younger children, two teen units, and space for the Comprehensive Assessment and Treatment program. During inpatient stays, mental health specialists monitor patients for safety, clarify diagnoses, and develop appropriate treatment plans and medication schedules. The hospital program offers multiple therapeutic modalities including expressive therapy, individual therapy, group therapy, and family therapy.

Crisis Intervention and Support Services

HMHI manages a number of community crisis intervention and support services designed to prevent mental health crises and support individuals through such emergencies when they occur. These specialized programs focus on mental health crisis management, suicide prevention, and emotional wellness, providing critical services to keep community members safe. Professional teams are trained to respond appropriately to crises, de-escalate dangerous situations, and connect individuals with appropriate resources for ongoing care. These services represent a major component of the mental health safety net, helping to reduce unnecessary hospitalizations, emergency department visits, and involvement with law enforcement while ensuring that individuals in crisis receive appropriate care.

988 Suicide & Crisis Lifeline
HMHI operates Utah's component of the national 988 Suicide & Crisis Lifeline, providing 24/7 free and confidential crisis support to individuals experiencing mental health emergencies. When Utah residents dial 988, they are connected directly to the Utah Crisis Line, staffed by certified crisis workers at HMHI who have specialized training in suicide prevention, de-escalation, and stabilization. This service represents an important, state-wide front-line safety net intervention for preventing suicide and supporting individuals through acute mental health crises. The crisis line also works in close coordination with Mobile Crisis Outreach Teams (MCOT) across the state to facilitate in-person crisis intervention when needed.

SafeUT Program
The SafeUT program represents a specialized crisis intervention service for students, parents, and educators, using an app-based intervention that provides 24/7, real-time access to licensed mental health counselors through phone communication, live chat, or confidential tip submission. SafeUT addresses the unique mental health challenges faced by military personnel and their support networks. The program recognizes the specific stressors associated with military service and provides a confidential avenue for seeking help without stigma or barriers.

Research, Education, and Training

Research Initiatives
HMHI conducts pioneering research that advances understanding of brain function and mental health conditions and informs the translation of scientific discoveries into improved patient care. HMHI researchers investigate a wide range of mental health conditions, developing and testing new treatment approaches while also exploring fundamental questions about brain function and the biological basis of psychiatric disorders.

Educational Programs and Professional Training
As a regional training center for psychiatry and related disciplines, HMHI plays a critical role in developing the mental health workforce for the State of Utah and nationally through accredited programs in clinical psychology, psychiatry, and other specialties. The institute hosts significant educational initiatives including the Child Psychiatry fellowship and serves as the primary training site for adult psychiatry residents. These initiatives help address long-standing and significant shortages of mental health professionals throughout the region.

Appendix C: Methodology

Methods for Chapter 1

Study design and data

This cross-sectional study uses data from several sources to examine the distribution of mental health-care facilities and services in Utah. Data on the facilities, their locations, and services offered at each was obtained from the Substance Abuse and Mental Health Services Administration's 2020 National Mental Health Services Survey (N-MHSS), which aims to collect data on all mental health care facilities in the United States. N-MHSS data for HMHI facilities was reviewed and corrected by HMHI staff. This was the primary dataset for our analysis. Geospatial information describing the state of Utah, its boundaries, location of population centers, and population estimates were obtained from he U.S. Census Bureau. Data describing county-level socioeconomic status were obtained from the U.S. Census Bureau Small Area Income and Poverty estimates, as well as the American Community Survey. Poverty estimatesare from 2021, unemployment estimates are from 2022, and college completion estimates are from 2017-2021.Data on provider shortages were obtained from theU.S. Health Resources and Services Administration. Variables describing disease prevalence and the proportion of the population that is LGBTQ+ was obtained from Utah's restricted Behavioral Risk Factor Surveillance Survey (Utah BRFSS) data. Utah BRFSS estimates of depression and binge drinking prevalence
use data from 2016-2021. Utah BRFSS estimates of the size of the LGBT population use data from 2018-2021 because the relevant survey questions were not fielded in before that period. The analyses of suicidality only use 2019 and 2021 data because the relevant survey question was not fielded before 2019 or in 2020

Statistical analysis

Each facility's street address, provided by N-MHSS, was geocoded for mapping using Open Street Maps. Then summary data was obtained showing the number of Utah facilities offering each of the major services provided by HMHI and identifying which of those facilities was affiliated with HMHI. Each service was categorized as common or provided at few facilities. For all facilities, services provided at few facilities were defined as those offered at fewer than 100 locations. For HMHI facilities, services provided at few facilities were defined as those offered at fewer than half of HMHI locations. This summary data was mapped, showing the locations of each relevant services, for qualitative observation of geospatial distribution. Variables from the supplementary data were used to calculate each county's number of facilities per capita, number of HMHI facilities per capita, average within-county travel time to care from population centers, percentage of population with lifetime depression, percentage of population currently binge drinking, percentage of population who has considered suicide, percentage of population that is LGB, and percentage of the population that is transgender. Routing analysis was also performed using Open Street Maps. After these estimates were obtained, decision tree regression was performed between the number of facilities in a county and population size, percent in poverty, percent unemployed, percent uninsured, proportion of population that is nonwhite, proportion of population that is LGB, proportion of population that is transgender, depression prevalence, binge drinking prevalence, and prevalence of suicidal thoughts. Multiple imputation using predictive mean matching data was performed to simulate missing data. Select supplemental data was also mapped alongside the distribution of facilities providing certain services to further examine potential relationships between the locations of facilities and variables such as population size or disease prevalence.

Limitations of Utah BRFSS data

The Utah BRFSS data, while potentially enlightening, has some important limitations to note. First, it excludes children and institutionalized individuals. This limits the generalizability of the data, especially given that institutionalized individuals may disproportionately struggle with mental illness or substance use disorders. Second, small cell sizes must be suppressed. Third, and perhaps most important, the Utah BRFSS was not administered to a large number of Utah residents. Analyzing that already small dataset by county may therefore lead to unrealiability in statistical estimates drawn from that data. For example, consider a hypothetical county in Utah. In this county, which

we have invented for the sake of this example, only 25 individuals were surveyed between 2018 and 2021. Two of those people indicated they had identified as lesbian, gay, or bisexual. After applying survey weights, this suggests that 33 adults in this hypothetical county identify as LGB, which represents 7.1% of the adult noninstitutionalized population in the hypothetical county. In this case, that figure is similar to estimates in the literature of the U.S. LGB population. However, because of the small number of people surveyed in our invented county, variation in the underlying number of survey respondents who said they identify as LBG could cause significant changes in the final estimation of the LGB population in that county. Sensitivity analysis showed that, if one additional Invented County resident indicated identifying as LGB, our estimates of the LGB population in that county would rise to approximately 38 individuals, or 8.3% of the adult non-institutionalized population. The result of this limitation is that, especially in counties with few residents and when analyzing less common characteristics, estimates drawn from Utah BRFSS data are vulnerable to variation that occurs purely by chance. Estimates in such counties or for such characteristics may therefore be meaningfully less reliable than those for populous counties and more common characteristics. Daggett, Piute, and Rich Counties all had fewer than 100 individuals surveyed between 2016-2021 and estimates in those counties are therefore the most vulnerable to this phenomenon. Given these limitations, some estimates in our report should be interpreted cautiously. We included these data, despite their limitations, because such information is so scarce that even data which may suffer from reliability issues could provide insights not previously available.

Methods for Chapter 2

The data used in this study came from the 2021 BRFSS. The BRFSS is a nationally representative health survey that collects information from more than 400,000 U.S. adults annually. It is administered via telephone by state health departments, with support from the U.S. Centers for Disease Control and Prevention (CDC). Participants are not compensated. The survey has a standardized core questionnaire administered everywhere in the U.S. alongside optional modules and state-added questions. The data can be weighted to be representative at the state level using weights provided by the CDC. Data for the core questionnaire and optional modules can be obtained from the CDC. Data from state-added questions must be obtained from the relevant state health departments, some of whom (including Utah) restrict access to that data and impose their own reporting requirements.

Our outcome variable describes sympathy toward individuals with substance use disorder. This variable comes from a question added to the survey by the state of Utah for 2021's survey administration. The question asks, "How would you respond to the following statement? I am generally caring and sympathetic towards people who abuse substances. Would you say you strongly agree, agree, disagree, or strongly disagree?" It also includes a definitional note: "Substance abuse refers to using a legal or illegal substance that causes the user significant problems or distress." We dichotomized this outcome variable by combining responses into "agreement" and "disagreement".
The other BRFSS variables used in our analysis describe the survey respondents' age, sex at birth, race/ethnicity, marital status, religion, veteran status, self-identification as a sexual or gender minority (LGBTQ+), the urbanicity of the county of residence, education, employment status, general health status, past-month days of poor mental health, depression diagnosis history, primary health insurance, past-month marijuana use, history of cigarette use, past-month of alcohol use, and county of residence. Each of these categorical variables is described in Table 1. More information about these variables can be found in Appendix 2. Supplementary mapping data were obtained from the U.S. Census Bureau. Materials and analysis code for this study are not available.

The data were weighted using weights and instructions provided by the CDC. The CDC generates these weights based on geographic area, number of landline and cellular phones in a household, number of adults using those phones, and a correction to address overlapping landline and cellphone sampling frames. In all our analyses, we applied the CDC's weights as instructed by the agency. After weighting the data, we performed three major types of analyses. First, we

conducted survey-weighted summary analyses stratified by our outcome variable. Chi-square tests were performed to evaluate the univariate relationships between each variable and our binary indicator of SUD sympathy. Second, we estimated a survey-weighted logistic regression model to understand the relationships between sympathy toward individuals with SUD and all other BRFSS variables in our data, excluding county of residence. Results for our summary analyses and logistic regression were considered statistically significant if the relevant p values were less than 0.005. Third, we estimated the weighted proportion of individuals who expressed SUD-related sympathy in each county and mapped those estimates using state and county boundaries. Throughout all our analyses, individuals with missing data for any variable were omitted from our analyses. In our reporting of results, any results drawn from groups or areas with fewer than 10 responses were suppressed to comply with Utah's restricted BRFSS data use requirements. All analyses were performed in RStudio.

This study did not meet the definition of human subjects research. As a result, University of Utah IRB approval was not required by the U.S. Department of Health and Human Services.

A limitation of this work is that our outcome is derived from a single self-reported measure. It is possible sympathy toward individuals with SUDs is overestimated in our results if survey responses were distorted by social desirability bias [56]. Further, we did not evaluate how sympathetic feelings were impacted by social contact with individuals who have SUDs. In addition, BRFSS is fielded only via telephone and its administration during this study period may have been impacted by the COVID-19 pandemic. However, there is evidence that the pandemic may not have impacted BRFSS response rates in a major way [57]. Utah's full BRFSS sample sizes were about 12,129 in 2019 and 10,843 in 2021 [58, 59]. Finally, our religion variable only measures self-identified religious affiliation and does not account for internal or external religiosity. Despite these limitations, we believe that the relative dearth of studies on this issue and the limitations of those that do exist indicate that this research is important. Our specific results are also likely to be relevant to policymakers in Utah.

Methods for Chapter 3

Our data consisted of electronic health records for patients seen by HMHI providers in UHealth for encounters between July 1, 2020 and June 30, 2023. This included records for 1,048,574 visits for 26,568 patients. Total payments and payers were identified for each patient visit in addition to HMHI program or unit, emergency or inpatient utilization, admission and discharge dates, and ICD-10-CM diagnosis codes and CPT codes. Patient demographic information included age, gender, and race/ethnicity.

We examined the patients who visited HMHI clinics. For each clinic, we calculated the number and percentage of patients with ED or inpatient utilization preceding and subsequent to their index clinic visit. We then compared those totals to estimate the change in utilization associated with clinic visits. We also calculated changes in total reimbursements associated with thsoe changes. Change in ED/inpatient utilization was measured for 90- and 180-days preceding and subsequent to the index visit.

Medical care cost savings were measured using reimbursement data, and attribution of these savings was based on the first HMHI clinic visited by a patient subsequent to an ED/inpatient utilization. Results were stratified by ED and inpatient setting, HMHI clinic, diagnosis, and patient characteristics.

Methods for Chapter 4

Risk Estimation

Utilizing EHR data for HMHI patients, we developed a machine learning-based predictive model estimating the risk of emergency department (ED) utilization within 30 days following visits to HMHI programs for mental health or substance use. The dataset comprised patient-level visit records, with each observation representing a single healthcare encounter. Visits were classified as HMHI program visits if they occurred at

organizations designated as HMHI and were not categorized as emergency visits. Emergency department visits were identified separately and linked to the preceding HMHI visits on a per-patient basis. Specifically, for each ED visit, the analysis attributed the visit to the earliest preceding HMHI program visit occurring within a 30-day timeframe, ensuring that ED events were associated with the most temporally proximate HMHI intervention.

Following the attribution process, a binary outcome variable was created for all HMHI program visits, indicating whether an ED visit occurred within 30 days. The analytical dataset included all HMHI visits, irrespective of whether an ED visit occurred, allowing for unbiased risk estimation. The dataset was partitioned into a training set (80%) and a testing set (20%) using stratified random sampling to preserve the distribution of the outcome variable. All patient- and visit-level variables, excluding identifiers and outcome-related fields (e.g., patient-class, admission dates), were considered as candidate predictors. These include age, sex, race/ethnicity, and reason for visit. Missing values were imputed using the most frequent category for each variable, and categorical predictors were transformed via one-hot encoding.

A Random Forest classifier was trained on the 80% training subset. To enhance internal validity and mitigate overfitting, 5-fold cross-validation was performed on the training set, evaluating model performance across key metrics including accuracy, precision, recall, and F1-score. The final model was then fitted to the entire training set and evaluated on the held-out testing set to assess generalizability. Predicted probabilities of ED utilization were generated for each HMHI program visit in the testing set, and these probabilities were subsequently aggregated at the program level to estimate the average predicted ED risk for each HMHI program. To quantify uncertainty in these estimates, we conducted bootstrap resampling (1,000 iterations) to generate 95% confidence intervals for the average predicted ED risk associated with each program. Performance was assessed on the training subset via cross-validation. Using 5-fold stratified cross-validation on the training dataset, the Random Forest classifier achieved an average accuracy of 98.8%, with a precision of 88.8%, recall of 86.1%, and an F1 score of 87.4% (**Table C1**). The high precision indicates that the model maintained a low false positive rate when predicting ED visits, while the high recall rate demonstrates effective sensitivity in identifying true positive cases. There was overall strong model discrimination for the outcome (ED visit within 30 days). Precision, recall, and F1 suggests that the model demonstrates good internal validity. These results indicate that the model is unlikely to be overfitting the training data and is expected to generalize well to unseen observations.

Table C1. 5-Fold Cross Validation Model Performance

Metric	Mean Score
Accuracy	0.988
Precision	0.888
Recall	0.861
F1 Score	0.874

Latent Class Analysis

Using EHR data on HMHI patients, a latent class analysis was conducted using Gaussian Mixture Modeling to identify subgroups of HMHI patients based on patient age in eyars, gender, race/ethnicity, reason for visit, and HMHI service. Reasons for visit were categorized into seven categories: Suicidal / Self-Harm, Depression /Anxiety, Psychosis, Substance Use, Aggression / Violence, Other Mental Health (e.g., mood disorder, bipolar disorder, ADHD, PTSD, eating disorder), and Medical Physical Issue (e.g., pain, injury, seizure, headache). All categorical variables were transformed using one-hot encoding and continuous variables were standardized using z-score normalization. After evaluating models with 2 to 6 classes, the 6-class solution was selected based on optimal fit criteria, including lowest Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values. The final model assigned each patient visit to one of six latent classes. Class membership varied substantially across the sample (Table 1).

Limitations

Several limitations should be noted. First, although predicted risks align with expectations concerning high vs. low-acuity programs, the machine learning model was trained using EHR variables alone; unmeasured factors such as social determinants, treatment adherence, or provider variation were not included and may affect ED utilization across programs. Second, while ED attribution was based on the most temporally proximate MHI visit within 30 days, some ED visits

may not be causally linked to prior behavioral health encounters. Finally, the model's predicted probabilities are statistical estimates and do not imply causality. Future research is needed incorporate additional clinical and socio-economic measures, and to explore causal pathways linking behavioral health services to preventable ED utilization.

Methods for Chapter 5

Patient engagement with HMHI services was operationalized based on the number of HMHI program visits recorded for each patient. Using EHR data on utilization, we aggregated the number of HMHI visits per patient. Patients were categorized into three engagement groups: (a) Low Engagement: 1–2 visits; (b) Medium Engagement: 3–5 visits; and (c) High Engagement: 6 or more visits. This categorization approximated natural cutpoints in the distribution of visit counts while ensuring sufficient sample sizes across engagement groups.

To characterize differences in patient engagement across HMHI programs, we merged patient-level engagement categories with each program. The distribution of engagement levels (low, medium, high) was then calculated for each HMHI program (**Figure 1**). Stacked bar plots were created to visualize the proportion of patients at each engagement level within programs.

We also analyzed the association between engagement levels and predicted 30-day emergency department (ED) utilization risk. For each program, two measures were calculated:

- The proportion of patients classified as high engagement.
- The mean predicted probability of 30-day ED utilization based on machine learning modeling.

These two measures were merged at the program level, and a scatterplot was generated to visualize the relationship between program-level engagement rates and ED risk. Pearson's correlation coefficient was computed to assess the strength and significance of the association. To further account for potential outliers, a robust linear regression model was estimated using Huber weighting. This model evaluated the association between percentage of high-engagement patients and predicted ED risk while reducing the influence of extreme observations.

To evaluate time to first emergency department (ED) visit following first visit to an HMHI program, we conducted a survival analysis using Kaplan-Meier estimation and Cox proportional hazards regression. The Kaplan-Meier method was used to estimate the probability of zero ED utilization over the 30-day follow-up period after HMHI treatment. Patients were censored at the end of the observation period if no ED visit occurred. Separate Kaplan-Meier curves were generated to compare survival probabilities across patient engagement levels (low, medium, high). Confidence intervals were displayed for each survival estimate.

Finally, multivariable Cox proportional hazards modeling was utilized to identify predictors of time to first ED visit. The model included engagement level (low, medium, high), age, gender, race, and ethnicity as covariates. Hazard ratios (HRs) and 95% confidence intervals were reported. Model discrimination was evaluated using the concordance statistic (c-index). Assumptions of proportional hazards were assessed using Schoenfeld residuals.

Limitations

Several limitations should be considered when interpreting these findings. First, the analysis relied on visit frequency as a proxy for engagement, which may not capture the quality, intensity, or therapeutic effectiveness of individual visits. Second, confounding by indication is possible; patients with higher clinical severity may require more frequent visits yet still exhibit higher acute care use, potentially biasing observed associations. Although robust regression was employed to reduce the influence of outliers, unmeasured patient-, provider-, or system-level factors could still affect both engagement and ED risk. Additionally, engagement level categorization was based solely on visit counts and did not account for other indicators of therapeutic engagement, such as treatment adherence, participation in group therapy, or longitudinal clinical improvement.

Methods for Chapter 6

The Regional Input-Output Modeling System (RIMS) II is an economic modeling framework developed by the U.S. Bureau of Economic Analysis (BEA) to analyze the economic impact of various activities, such as new construction projects or policy changes, at the regional level within the United States. As used in this project, the goal of RIMS II is to estimate the direct, indirect, and household (induced) impacts of economic activities on a specific region's economy.

RIMS II operates based on input-output (I/O) analysis, which examines the relationships between different sectors of an economy and how changes in one sector can impact other sectors. The model takes into account various factors, including inter-industry transactions, consumer spending, and regional economic structure. It aims to quantify the ripple effects of changes in one sector on the rest of a local economy. I/O analysis is generally accepted as a "gold standard" in economic impact measurement, and RIMS II is one of the most widely used I/O impact analysis models. Note, the BEA does not endorse any resulting estimates and/or conclusions about the economic impact of a proposed change on an area.

Measured Impacts

The RIMS II framework provides estimates for various economic measures, such as employment, output, and value-added, in both dollar terms and job equivalents. These estimates allow policymakers, organizations, and analysts to assess the potential economic consequences of different scenarios, such as the opening of a new health care facility, changes in government spending, or shifts in consumer preferences.

Four measures of changes in local economic activity were estimated and presented in this report:

1. Gross economic output: The total market value of industry output generated through the new construction project within a specific region. This equals intermediate inputs plus value added. Gross output is a duplicative total in that goods and services will be counted multiple times if they are used in the production of other goods and services. As such, gross economic output provides a measure of the overall scale of economic activity generated through the new construction project that is taking place within a region. Gross output is not the same as gross domestic product (GDP).

2. Value-added: The value of gross output minus intermediate inputs generated through the new construction project. The value of this measure is equal to the sum of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus. Value-added can be thought of as the net contribution that a particular economic activity makes to the overall economy, directly contributing to the region's income. It is closely related to GDP.

3. Household earnings: The total income received by households within a specific region generated through the new construction project. The total compensation of employees plus the net earnings of sole proprietors and partnerships. In the RIMS II model, earnings exclude personal contributions to social insurance programs, such as Social Security and Medicare, and employee pension plans.

4. Employment: The count of jobs generated through the new construction project that includes both full-time and part-time workers. Whether an employee works 40 or 4 hours per week, they are counted the same in the RIMS II model.

Final-Demand Change and Expenditure Input

For this analysis, the final demand changes consisted of the research expenditures exogenously funded by federal sources, including grants and contracts procured by HMHI investigators. These expenditures included direct and indirect costs. Direct costs are allowable expenses incurred as a result of a research project or program being funded and implemented. Examples of direct costs include salaries and wages of project personnel, trainee costs (e.g., tuition), laboratory supplies, equipment, and participant incentives. Indirect costs – also known as overhead costs or facilities and administration costs by the National Institutes of Health, are not directly attributable to a specific project but are necessary for the overall operation of an organization or institution. These costs may include expenses for the general infrastructure and support services of the

organization, such as rent or depreciation on facilities; utilities; administrative staff salaries; library services; or general office supplies.

In August 2023, HMHI staff provided us with estimated expenditures for the research activities funded by federal sources by fiscal year (FY; **Table C2**).

Table C2. Federally Funded Research Expenditures at HMHI, FY 2019-2023

Fiscal Year	Expenditures
2019	$5,273,799.26
2020	$7,643,548.01
2021	$8,543,379.52
2022	$9,286,390.08
2023	$8,826,858.99

The expenditure inputs shown in Table 1 were adjusted prior to analysis. Because the RIMS II model multipliers are based on 2020 data, the expenditure totals by fiscal year were converted to expenditures by calendar year (CY). Since the University of Utah fiscal year begins July 1, the expenditures shown in Table 1 for each fiscal year were divided evenly into two calendar years (e.g., fiscal year 2022 was divided into calendar years 2021 and 2022). We then deflated the calendar year expenditures to 2020 dollars using a Consumer Price Index adjustment. **Table C3** shows the specific expenditures used as find-demand inputs for this analysis, representing HMHI's estimated federally funded research expenditures for CY 2018-2023.

Table C3. Estimated Expenditure Inputs for the RIMS II Model Analysis: CY 2018-2023

Calendar Year	Expenditures (2020 U.S. Dollars)
2018	$2,717,800.10
2019	$6,538,353.28
2020	$8,093,463.77
2021	$8,514,854.97
2022	$8,009,273.90
2023	$3,753,850.33

Note: The expenditures were deflated to 2020 dollars using the Consumer Price Index because the RIMS II multipliers are based on 2020 data.

Model Industry and Local Economic Region

To use the RIMS II model, the industry initially affected by the change in final demand must be identified. For this analysis, the relevant research activities fall under Detailed Industry (NAICS) #541700 "Scientific Research and Development Services." The local economic region was the Salt Lake City, Utah Metropolitan Statistical Area (MSA). As of the 2020 census, the Salt Lake City, Utah MSA had a population of 1,257,936 people.

Multipliers and Level of Analysis

RIMS II provides Type I and Type II multipliers of economic activity. For this analysis, we used Type II multipliers. Type II multipliers account for the direct, indirect, and household (induced) impacts of the final demand changes. The direct impact is related to the first round of inputs purchased by the final-demand industry. The indirect impact is related to the subsequent rounds of inputs purchased by supporting industries. The induced – or household – impact is related to the tertiary impacts that result from the spending of income earned by the workers directly and indirectly affected by the initial economic change. Type II multipliers quantify the cumulative effects of the direct, indirect, and household (induced) rounds of industry spending. The multipliers used for this analysis are based on the 2012 Benchmark Input-Output Table for the Nation and 2020 regional data.

Table C4 describes the Type II multipliers used to estimate the measured impacts described above.

Table C4. RIMS II Final-Demand Multipliers

Outcome	Definition	Application
Gross economic output	Total market value of industry output in the Salt Lake City, Utah MSA per $1 change in final demand	Final-demand expenditures x final-demand multiplier for NAICS #541700 = gross economic output impact
Value added	Total value added created in the Salt Lake City, Utah MSA per $1 change in final demand	Final-demand expenditures x final-demand value-added multiplier for NAICS #541700 = value-added impact
Household earnings	Total household earnings created in the Salt Lake City, Utah MSA per $1 change in final demand	Final-demand expenditures x final-demand earnings multipler for NAICS #541700 = earnings impact
Employment	Total number of jobs created in the Salt Lake City, Utah MSA per $1 million change in final demand	Final-demand output x final-demand employment multiplier for NAICS #541700 = jobs impact

Model Assumptions

It is important to note that while RIMS II is a useful tool for understanding the potential economic impacts of various activities, it relies on certain assumptions and simplifications. Therefore, the accuracy of its estimates depends on the quality of the input data and the underlying assumptions used in the model. For example, our analysis assumed that the economic activity generated by HMHI's federally funded research activities in the Salt Lake City, Utah MSA is greater than the simple total of spending associated with the research activities. As money is spent and earned through HMHI's federally funded research activities, it is, in turn, spent, earned, and re-spent by other entities in the local economy through successive cycles of spending, earning, and spending. For these analyses, it was assumed that all of the estimated federally funded research expenditures were made within the local economy.

Like any economic modeling framework, RIMS II relies on a set of assumptions to simplify the complexities of real-world economic interactions. Some of the key assumptions of RIMS II include:

1. Constant Relationships: RIMS II assumes that the relationships between industries and regions remain constant over the period of analysis. This means that the input-output coefficients, which represent the proportion of inputs a particular industry purchases from other industries, are assumed to stay consistent.

2. Linear Relationships: The model assumes linear relationships between industries, implying that a change in output or demand in one industry results in a proportional change in other related industries.

3. Stable Technology: RIMS II assumes that production technologies within industries do not change during the analysis period. This assumption helps to maintain the consistency of input-output coefficients.

4. Full Employment: The model assumes that the economy is operating at full employment, meaning that all available labor resources are being utilized. This assumption can affect the way employment impacts are estimated.

5. Homogeneous Labor: Labor is treated as a single, homogeneous factor of production. Differences in skills, wages, and labor types are not fully accounted for.

6. No Spatial Spillovers: RIMS II typically assumes that the economic impacts are confined to the specific region being analyzed and does not consider potential spillover effects on neighboring regions or beyond.

7. Fixed Consumption Patterns: Consumer spending patterns are assumed to remain constant throughout the analysis period. Changes in consumer behavior due to economic impacts are not considered.

8. Stable Trade Patterns: The model assumes that trade patterns between regions remain consistent over time. Changes in trade relationships are not explicitly accounted for.

9. No Environmental Considerations: Environmental impacts, both positive and negative, are not directly incorporated into the model's calculations.

10. Static Analysis: RIMS II provides a snapshot of the economy at a specific point in time and does not consider dynamic changes or adjustments that might occur over time.

11. Limited Institutional Changes: The model typically assumes that institutions and policies remain constant during the analysis period, which might not reflect real-world changes.

It's important to recognize that these assumptions simplify the complexity of the real economy, and the accuracy of the model's results depends on how well these assumptions align with the actual economic conditions being analyzed. While RIMS II can provide valuable insights, one must be aware of its limitations and potential deviations from real-world outcomes.

Appendix D: Common Services Both in Utah & at HMHI

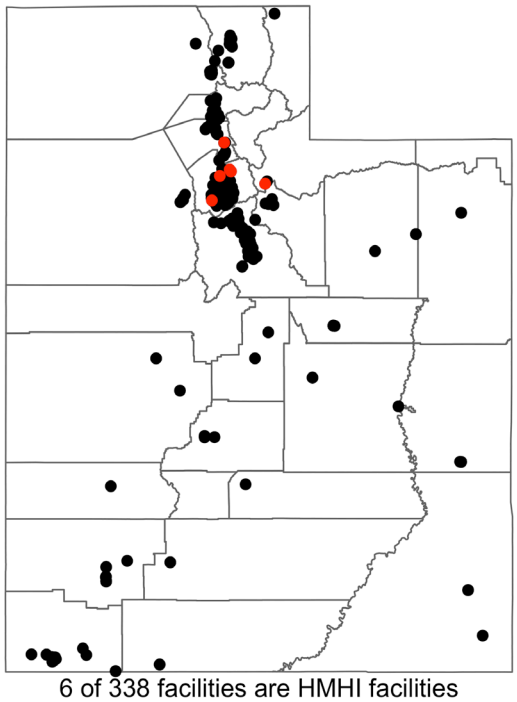
Tier 1 Programs

Many other services provided as part of Tier 1 HMHI programs are commonly provided both in the state and among HMHI facilities. They are provided in the following Tier 1 Programs, among others: SafeUT and the 988 Suicide Crisis Line, Nuerobehavior HOME, Maternal Mental Health, Substance Use and Recovery, and the Trauma Clinic.

SafeUT and 988 Suicide Crisis Line

HMHI administers at least two programs aimed toward providing immediate support to individuals experiencing a mental health crisis, which could include suicidal behavior. These services are available at all times. The first is SafeUT, which provides for immediate contact with licensed counselors through a suite of apps—SafeUT for students, parents or guardians, and educators; SafeUT Frontline for law enforcement, firefighters, health care providers and their families; and SafeUT National Guard for members of the Utah Air and Army national guard, as well as civilian personnel and their families. The second program is the national Suicide Prevention Lifeline. HMHI manages all calls and texts placed to the national hotline within the state of Utah, with the exception of those in which individuals express a preference for Spanish language or veteran-specific crisis services.

Figure D1. Facilities with Suicide Prevention Services



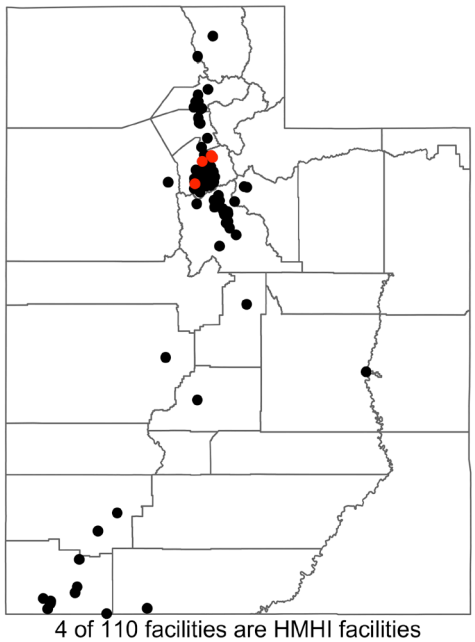
6 of 338 facilities are HMHI facilities

One way of examining the geographic distribution of the kind of services provided by these programs is to examine facilities with suicide prevention services (**Figure D1**). These services include identifying risk factors; educating staff on the signs of suicidal behavior and using methods to detect risk; and the assessment, intervention, and management of suicidal patients including treatment of an underlying mental or substance use disorder, and use of psychotropic medication, supportive services, and education. Hotlines help individuals to contact the nearest suicide prevention mental health provider. There are 337 such facilities in Utah, six of which are HMHI facilities. They are largely located along the Wasatch Front.

Neurobehavior HOME

HMHI's Neurobehavior HOME program provides coordinated care for individuals—both children and adults—with developmental disabilities. This program provides a wide array of services, only some of which can be examined using N-MHSS data.

Figure D2. Facilities with Physical Exams

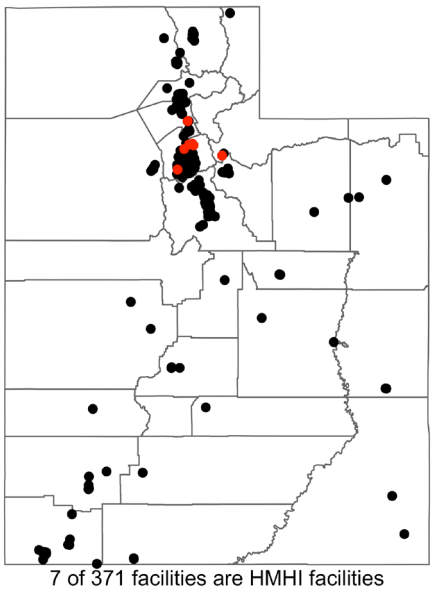


4 of 110 facilities are HMHI facilities

One such service is physical exams and well-child check-ups (**Figure D2**). Just over 100 facilities in Utah provide complete medical histories or physical exams

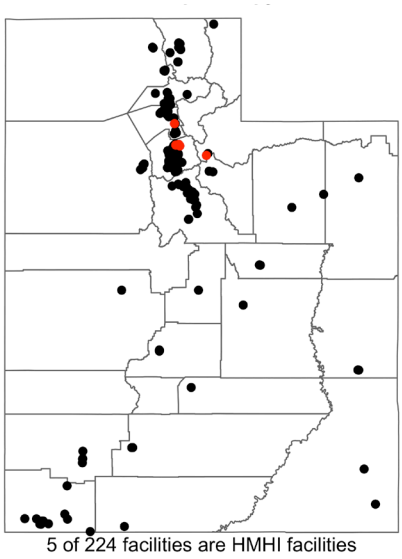
— almost all located along the Wasatch Front. Half of HMHI facilities provide these services.

Figure D3. Facilities with Case Management



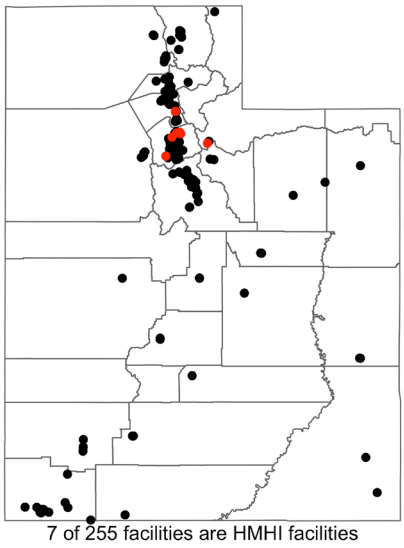
Case management helps people arrange for appropriate services and supports through a case manager who monitors the needs of clients/patients and their families and coordinates services, such as mental health, social work, health, educational, vocational, recreational, transportation, advocacy, and respite care, as needed. This is an important part of the Neurobehavior HOME program. It is common in Utah, with nearly all of the state's mental health care facilities providing some form of case management (**Figure D3**).

Figure D4. Facilities with Group Therapy



Group therapy is another important element of the Neurobehavior HOME program. It involves groups of usually 4 to 12 people who have similar problems and who meet regularly with a therapist. Interactions between group members are used to provide support and motivate potential behavior change. Approximately 2/3 of the mental health care facilities in the state provide these services, and almost all HMHI facilities do (**Figure D4**).

Figure D5. Facilities with Individual Psychotherapy



Similarly, about 2/3 of Utah's facilities provide individual psychotherapy, which is defined in the data as focusing on a patient's current life and relationships within the family, social, and work environments through one-on- one conversations with a therapist (**Figure D5**). The goal is to identify and resolve problems with insight, as well as build on strengths. All HMHI facilities provide this service, which is administered as part of Neurobehavior HOME and other programs at HMHI.

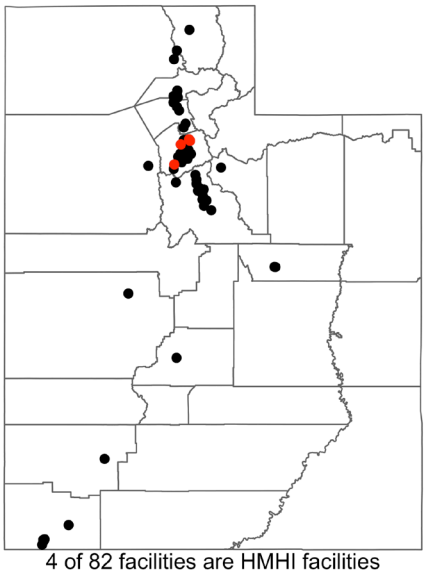
Other services administered under the Neurobehavior HOME program include nutritional counseling, medication management, and billing/insurance support. These could not be examined using N-MHSS data.

Maternal Mental Health

Another Tier 1 program at HMHI is their maternal mental health program. Through this program, HMHI provides extensive inpatient and outpatient services to pregnant or postpartum women who are experiencing perinatal mood and anxiety disorders, birth trauma, pregnancy loss, infertility, or an infant's hospitalization in the Neonatal Intensive Care Unit. Such programs, tailored specifically to pregnant and postpartum wom-

en, are relatively uncommon in Utah. Less than a third of the state's mental health care facilities administer one (**Figure D6**).

Figure D6. Facilities with Pregnancy or Postpartum Services

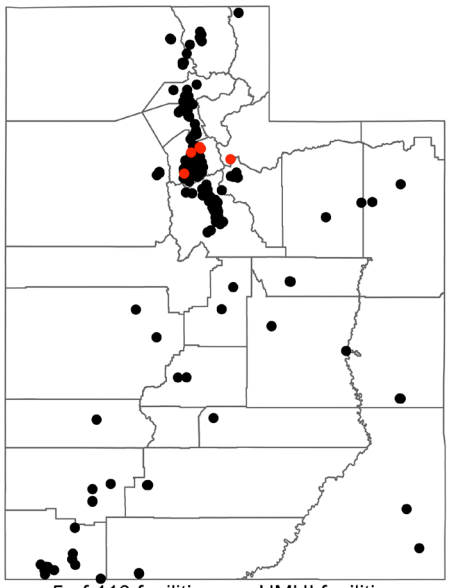


4 of 82 facilities are HMHI facilities

Substance Use and Recovery

HMHI provides significant addiction recovery services through its substance use and recovery program. Through it, HMHI administers inpatient detoxification, behavioral therapies, medication assisted treatment, psychiatric medication management, experiential therapies, family therapy, and aftercare support in both the inpatient and outpatient settings.

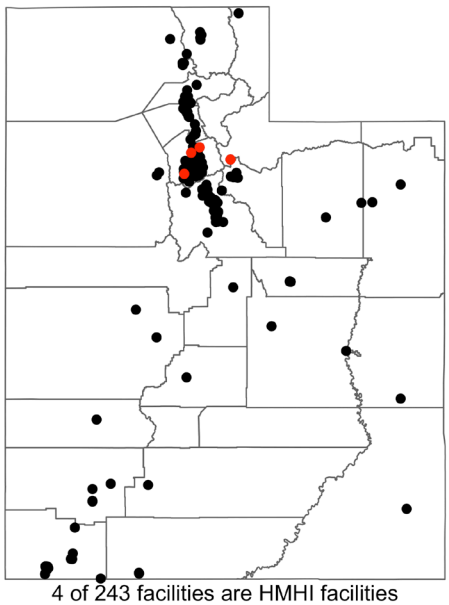
Figure D7. Facilities with Substance Use Treatment



5 of 410 facilities are HMHI facilities

The N-MHSS data defines substance use treatment as a range of services, including problem identification and diagnosis, brief interventions, assessment of substance use and related problems, treatment planning, counseling, medical services, psychiatric services, psychological services, social services, and follow-up for persons with alcohol or other drug problems. In general, such services are provided in many Utah and HMHI locations (**Figure D7**).

Figure D8. Facilities with SUD Counseling



4 of 243 facilities are HMHI facilities

In N-MHSS, SUD counseling is defined as short-term treatment that includes discussion of individuals' personal experience and enabling the patient to work through interpersonal relationship issues and gain greater self-understanding. It is relatively common in Utah and among HMHI facilities (**Figure D8**).

Another service provided through HMHI's Substance Use and Recovery Program is services specifically tailored for persons with co-occurring mental and substance abuse disorders. Again, many mental health facilities in the state provide such services and they are also provided at more than half of HMHI's locations (**Figure D9**).

Some facilities providing substance use treatment may go beyond specialized programs for those with co-occurring substance use and mental health disorders and integrate care for such patients. Under SAMHSA's definition in the N-MHSS, such facilities provide combined treatment for mental illness and substance abuse

from the same clinician or treatment team. Further, effective integrated treatment programs view recovery as a long-term, community-based process. This is less common than the services depicted in **Figure D9**. Integrated care for these patients is provided in 165 Utah facilities, five of which are HMHI facilities (**Figure D10**).

Figure D9. Facilities with Services for Co-occurring Substance Use and Mental Health Issues

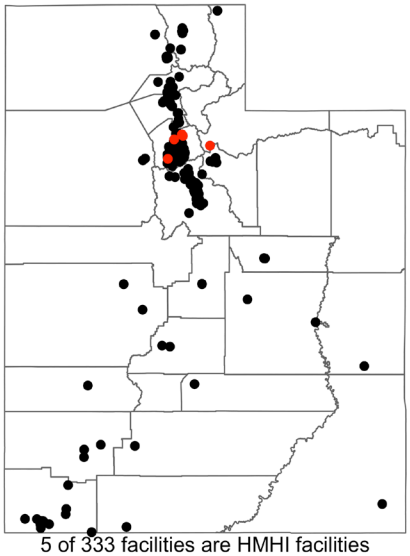
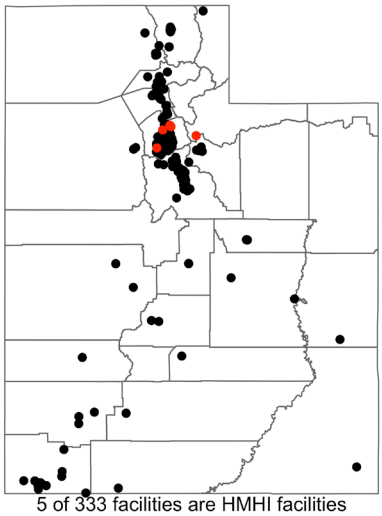
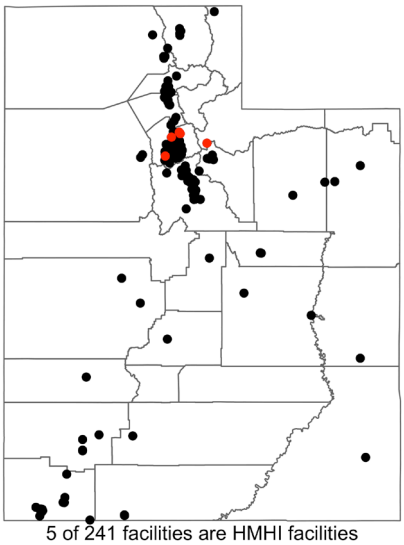


Figure D10. Facilities with Integrated Substance Use and Mental Health Treatment



Finally, some facilities provide substance abuse education services. Again, five HMHI facilities provide this service. This service can be found at a total of 165 Utah facilities (**Figure D11**).

Figure D11. Facilities with SUD Education

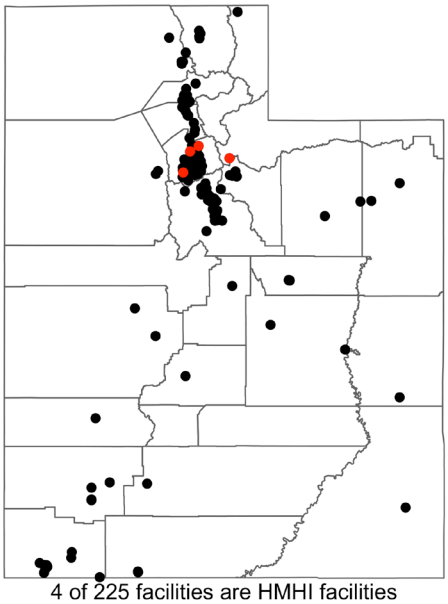


Trauma Clinic

HMHI provides a suite a services to individuals who have experienced trauma and subsequently developed mental health problems. Some of these can be examined using N-MHSS data.

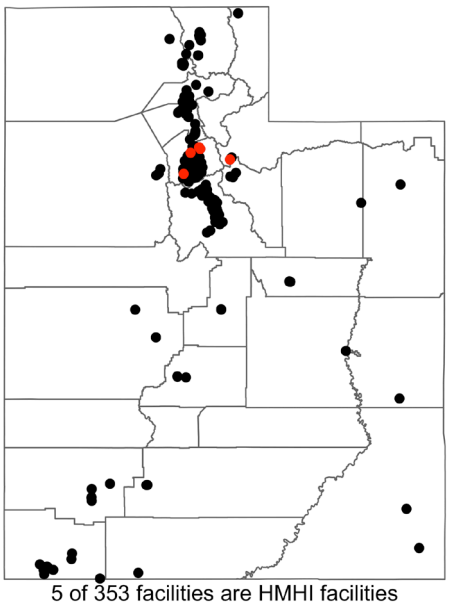
The first is trauma-related counseling. In N-MHSS, this is defined as multiple types of therapy designed for individuals who have experienced traumatic events. his is provided at many facilities in Utah, five of which are HMHI facilities (**Figure D12**).

Figure D12. Facilities with Trauma-Related Counseling



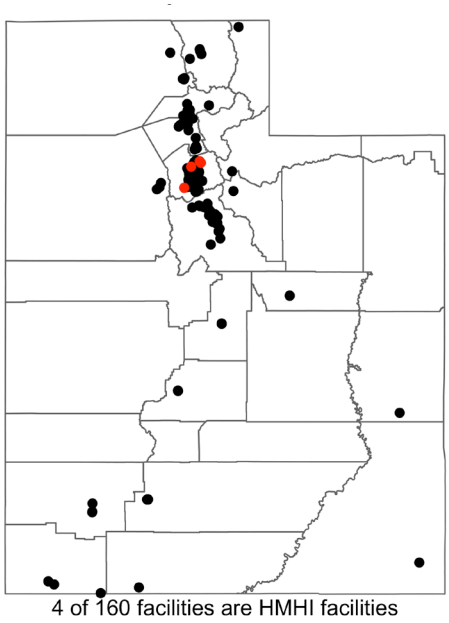
There are also programs specifically tailored for persons who have experienced trauma, more tailored than simply counseling services applied to patients who have suffered trauma. Perhaps as a result, fewer facilities provide these services than those depicted in Figure C12. Still, they are relatively common among both Utah and HMHI facilities (**Figure D13**).

Figure D13. Facilities with Specialized Trauma Services



Lastly, HMHI and other Utah facilities provide services specifically tailored for individuals with post-traumatic stress disorder. 160 Utah facilities provide these services, four of which are HMHI facilities (**Figure D14**).

Figure D14. Facilities with Specialized PTSD Services



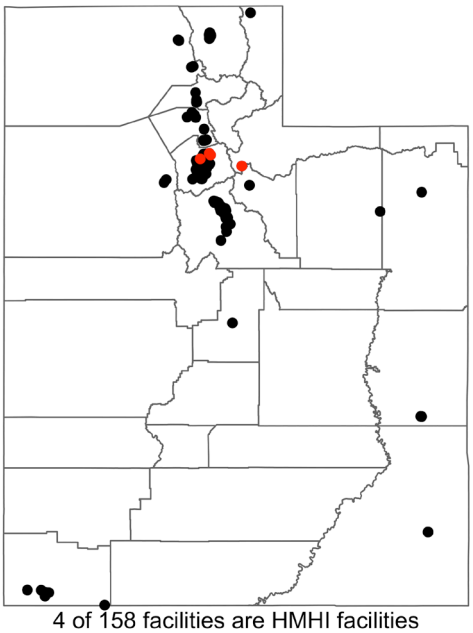
Other Services

As with the Tier 1 Programs, many other services provided at HMHI are commonly provided both in the state and among HMHI facilities. They are part of the following programs, among others: Anti-Stigma Campaigns, Autism Spectrum Disorder Services, and CAT Programs.

Spanish-Language Services

In N-MHSS data, facilities are considered to provide spanish-language services only if staff counselors provide treatment in Spanish. Four of Utah's 156 facilities providing such services are HMHI facilities (see **Figure D15**).

Figure D15. Facilities with Spanish Services



Therapy Modalities

Several therapy modalities are common both in Utah and among HMHI facilities: cognitive behavioral therapy, motivational interveiwing, dialectical behavior therapy, and family psychoeducation. These therapy modalities are used in many HMHI programs.

SAMHSA defines cognitive behavioral therapy as care which involves recognizing unhelpful patterns of thinking and reacting, and then modifying or replacing these with more realistic or helpful ones. It is extremly common in Utah and is provided at nearly all HMHI facilities (**Figure D16**).

Figure D16. Facilities with Cognitive Behavioral Therapy

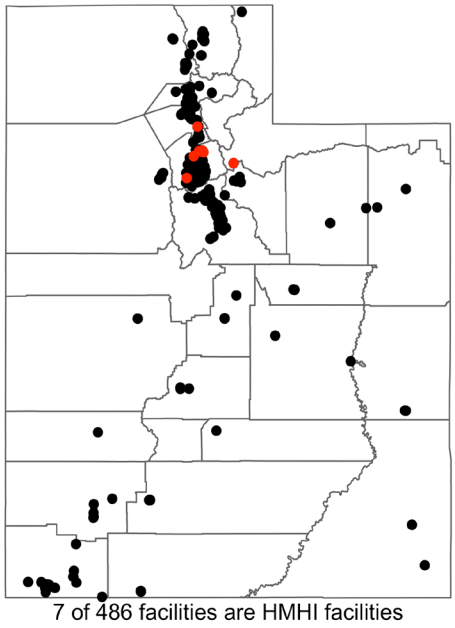
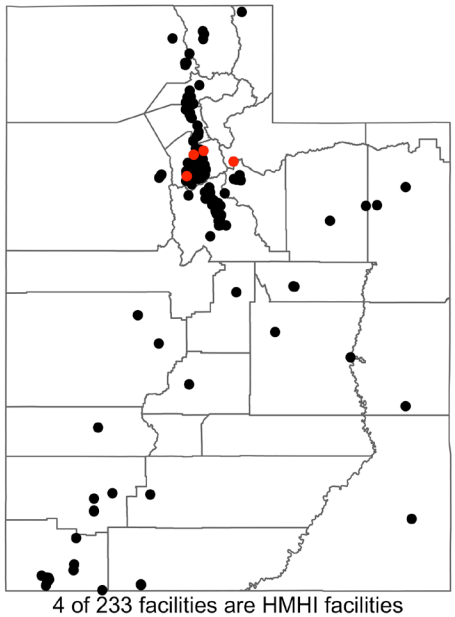
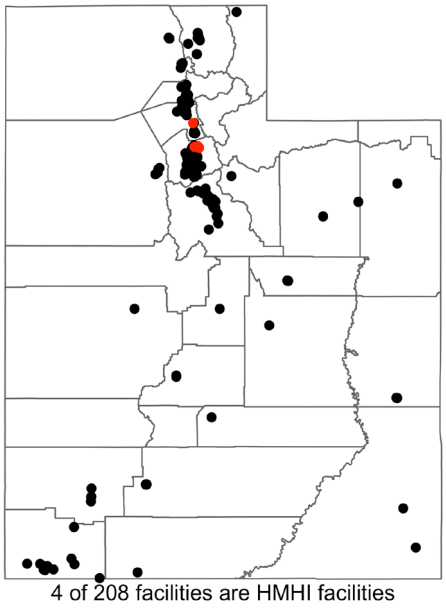


Figure D17. Facilities with Motivational Interviewing



Motivational interviewing is defined in the data as a counseling approach which works to improve individuals' motivation to change rather than the process of behavior change itself. It is not provided at nearly as many facilities in Utah or at HMHI as cognitive behavioral therapy, but remains relatively common (**Figure D17**).

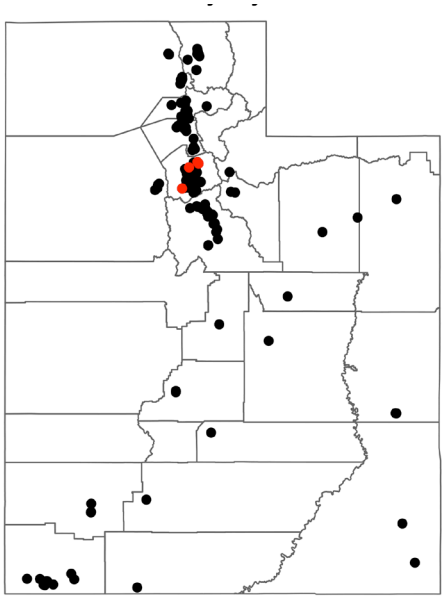
Figure D18. Facilities with Dialectical Behavior Therapy



The N-MHSS data defines dialectival behavior therapy as a type of cognitive behavioral therapy approach primarily for patients multiple mental health disorders that emphasizes balancing behavioral change, problem-solving, and emotional regulation with validation, mindfulness, and acceptance. It is available at a similar number of Utah mental health care facilities as motivational interviewing (**Figure D18**).

Finally, family psychoeducation is a type of family-based intervention that helps patients and their support group through relationship building, education, collaboration, and problem solving. The goal is that, through these activities, the group will 1) learn about mental illness; 2) improve their management of the patient's mental illness; 3) reduce stress within the group; 4) provide social support; 5) focus on the future; and 6) find ways for a patient's support group to help them as they recover. It is available at a similar number and distribution of facilities in Utah as motivational interviewing and dialectical behavior therapy (**Figure D19**).

Figure D19. Facilities with Family Psychoeducation

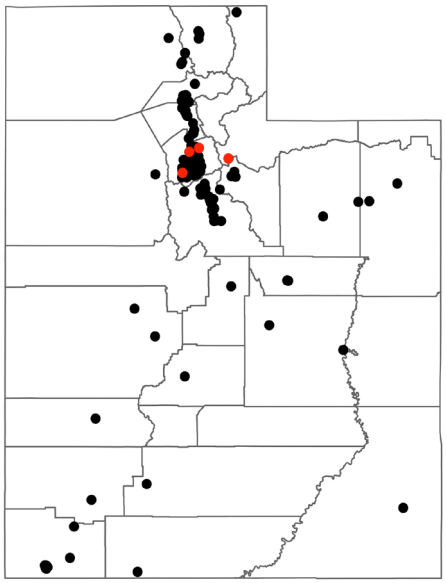


4 of 186 facilities are HMHI facilities

Anti-Stigma Campaigns

Although not classified as a Tier 1 program, HMHI's anti-stigma campaign is unique and potentially impactful. Its properties aren't well described by any variable available in the data, however. It involves unusual features such as relying on a network of Utah community leaders to guide anti-stigma messaging in difficult-to-reach communities and convening groups of national advocacy organizations to coordinate campaign strategies. Although other Utah organizations do not engage in this level of anti-stigma campaign activities, it may still be useful to consider, more broadly, the geographic distribution of all community outreach programs in the state.

Figure D20. Facilities with Community Outreach



4 of 180 facilities are HMHI facilities

180 Utah mental health care facilities perform outreach of any kind to persons in the community. Four of those are HMHI facilities (**Figure D20**).