Mental Health Underwriting

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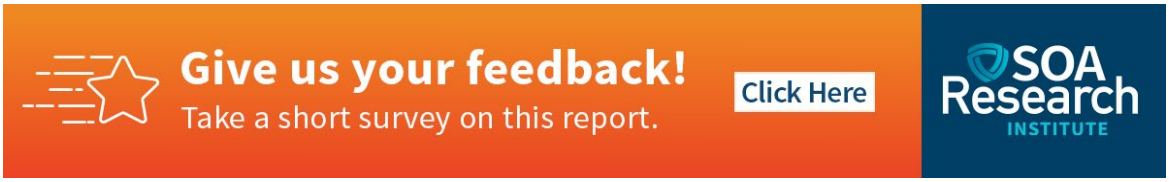

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Executive Summary

Objective: The current study aims to meet the following objectives: 1) examine existing literature and research studies on the association between mental health, morbidity, and health insurance underwriting, 2) examine publicly available survey data for demographic, socioeconomic, and health-related indicators to identify the relationship between mental health diagnoses, medical comorbidities, and mortality, and 3) establish guidelines on implementing sound social determinants of health (SDOH) data collection efforts to support improvements to mental health care, as well as life insurance underwriting practices.

Methods: Data was sampled from three data sources: 1) the Behavioral Risk Factor Surveillance System (BRFSS), 2) the SAMHSA Mental Health Client-Level Data (MH-CLD), and 3) the SAMHSA Treatment Episode Data Set - Discharge (TEDS-D) for the study period 2017-2021. Descriptive analyses were conducted to examine the prevalence of different mental health conditions (including serious mental illnesses and severe emotional disturbance), medical comorbidities, and substance use disorders. Logistic regression analyses were conducted to identify significant predictors of depressive disorder and to determine predictors of mortality during treatment.

Results: Depressive disorder was the primary diagnosis of approximately 19.17% of the survey population (BRFSS). Approximately 66% of individuals with depressive disorder have at least one comorbidity. Depressive disorder was more prevalent in white females who were 65 years of age and older. Alcohol-related disorders were the most prevalent substance use disorder among clients in the SAMHSA datasets. The likelihood of mortality during the course of mental health treatment was lower for individuals with private insurance (when compared to self-pay clients), but the likelihood of mortality was higher for Medicaid beneficiaries, clients who received free/charity care, and clients with other sources of payment. The overall likelihood of mortality during treatment was higher for clients with any type of substance use disorder (alcohol only, other drugs only, or alcohol and other drugs) than for clients with no substance use disorder.

Conclusions and Implications: Underwriting practices should be updated or modified to more accurately capture social determinants of health and other demographic information to identify characteristics and indicators for mental health risk assessment. This information would support predictive analytics, which could facilitate offering tailored products and services and improve decision making.

Introduction

Mental health and the challenges that may accompany it require innovative solutions that address all facets of the issue. For the patient, access to mental health providers and other resources is often out of reach. Fewer mental health providers or providers with limited appointment capacity make it difficult for patients to locate the needed services or even make an appointment. Recent shifts in post-pandemic insurance coverage leave some mental health and telehealth services partially or completely uncovered by existing health plans, resulting in exorbitant out-of-pocket costs. For the healthcare provider, adapting current resources to accommodate increased mental health patient volume requires primary care integration (AHIP, 2023a) and can be costly. The offering of virtual mental health services must now become routine, even with changes in reimbursement looming. Technological transformation or implementation of new software may be costly but nevertheless required as providers adapt to this unprecedented increase in volume. For the health insurer, the policy and reimbursement landscapes are no longer as prescriptive as they once were. The determination of what mental health services should be covered and what type of coverage should be given is an ever-changing underwriting decision. Mental health coverage is surely a societal need (AHIP, 2023b; Deferio, et al., 2019), but the scope of coverage still has many moving parts.

The collective benefits and impacts of addressing the mental health crisis begin with identifying the systemic shortcomings that support the foundation of holistic mental health care. This 'wrap-around' holistic approach by all stakeholders considers all factors that impact a person's mental health. Improving these factors could result in positive changes in treatment and overall benefits of the mental health services rendered. Examples of influences here would be physical environment, built environment, familial structure, and support, as well as many other factors included in the Social Determinants of Health (SDOH) as defined by the Centers for Disease Control and Prevention (CDC, n.d.). The state of a patient's SDOH, the lack of SDOH-related information collected, and the lack of awareness about SDOH by providers and insurers, may lead to decreased longevity or even premature death of the mental health patient.

Section 1: Literature Review

This section of the report reviews the available literature on the history of medical underwriting in the health and life insurance industries; addresses the connection between physical health, mental health, and life expectancy, and considers the influence of individual-level factors and social determinants of health (SDOH) on health-related outcomes.

1.1 HISTORY OF HEALTH INSURANCE UNDERWRITING

Individual-level factors (e.g., age, sex, occupation, family, and personal medical history) have been identified as predictors of the likelihood of developing a disease and subsequent use of healthcare services (Stone, 1993). Historically, commercial insurers have used these factors to set premiums and establish the parameters of policies for groups and individuals, thus requiring individuals to pay premiums congruent with expected medical costs (National Academies of Sciences, Engineering, and Medicine, 2018). This practice is referred to as risk rating. Direct risk rating is also called medical underwriting (Light, 1992).

Prior to the full implementation of the Affordable Care Act (ACA) in 2014, medical underwriting was permitted (Claxton, Cox, Damico, Levitt, & Pollitz, 2019). As a result, individuals with certain medical conditions or risk factors could be charged higher premiums based on anticipated higher utilization of services. Similarly, these individuals could be offered reduced or limited coverage for services, or denied insurance coverage altogether (Sumner et al., 1997). Some commercial insurers have charged higher premiums for individuals with mild forms of mental illness and substance use; in other cases, individuals with serious mental illnesses, or SMI (e.g., schizophrenia, bipolar disorder) have been denied health insurance (Light, 1992; Claxton et al., 2019; Ward, 2022). According to a survey by the Office of Technology Assessment (OTA), within the commercial insurance market, nearly 8% of applications were denied coverage due to medical reasons; 13% faced exclusion waivers; 5% were charged higher premiums, and 2% faced both exclusion waivers and higher premiums (U.S. Congress, 1988).

The ACA aimed to address numerous barriers to health insurance. As of 2014, the practice of medical underwriting is no longer permitted for qualified health insurance plans, and individuals cannot be denied or charged more for insurance coverage because of a pre-existing condition (Glied, Collins, & Lin, 2020; United Healthcare, n. d.). Furthermore, qualified health insurance plans are required to cover essential health benefits (i.e., doctor visits, inpatient and outpatient hospital services, prescription drugs, and mental health services) (https://www.healthcare.gov/, n. d.), and insurance plans must be sold at specified actuarial values (Glied et al., 2020).

Although the practice of medical underwriting has become less common, it is still used for certain coverage options that are not regulated by the ACA (e.g., Medicare Supplemental Insurance, or Medigap; self-insured group health insurance; short-term insurance, and *life insurance*) (United Healthcare, n. d.). Life insurance underwriting involves a multistep process (Crowley & Shoenthal, 2023), which is outlined below:

1. *Application quality check*. A 15- to 30-minute phone interview is conducted to collect information about personal and family health history (including mental health conditions such as depression and generalized anxiety disorder), behavioral risk (i.e., hobbies that may be deemed high-risk), and personal finances (Maier, et al., 2019; Crowley & Shoenthal, 2023).
2. *Medical exam.* Basic measurements (e.g., blood pressure) are collected, and blood and drug analyses are conducted (Maier, et al., 2019).
3. *Medical Information Bureau (MIB) reviews*. Medical records from 3-5 years prior are reviewed.
4. *Prescription review*. All medications prescribed to an individual within the past 3-5 years are reviewed.
5. *Attending physician statement*. An attending physician provides a summary of the individual's medical history if additional information is required.

6. *Motor vehicle report*. The motor vehicle report reflects the individual's driving history for the past seven years.
7. *Credit history*. Although this information is not used to determine the final premium for a life insurance policy, insurers seek a demonstrated level of financial stability before offering coverage. Factors like bankruptcy and multiple missed payments may result in an individual being deemed high-risk.
8. *Final rating*. Once the information has been verified, the insurance company renders an offer of coverage, which includes an overall risk class and price estimate (Crowley & Shoenthal, 2023).

1.2 MENTAL ILLNESS AND LIFE EXPECTANCY

Physical and mental health status are connected to life expectancy. Chronic medical conditions and mental illnesses frequently co-occur (Cheung et al., 2019; Conversano et al., 2019), and those with complex medical needs often face barriers to preventive and primary care services (Compton et al., 2020). As a result, these individuals are more likely to die prematurely than the general population (Lewis & Hayes, 2019).

Life expectancy for individuals with SMI is significantly shorter (20-25 years) than that of the general population (Compton et al., 2020; Insel, 2023), and researchers suggest that the mortality gap is growing (Hayes et al. 2017; Lewis & Hayes, 2019). Individuals with SMI often do not receive the appropriate level or quality of medical care when compared to the general population (Mechanic, 2012; Bahorik et al., 2017). The stigmatization of mental illness, particularly SMI, may present additional challenges with respect to navigating the healthcare system, leaving medical conditions that could be treated or managed undiagnosed (Mechanic, 2012; Miller, Paschall, & Svendsen, 2006). Modifiable risk factors, such as physical inactivity, poor diet, smoking, and substance use (addressed in greater detail in the following section), may exacerbate underlying medical conditions or contribute to the development of acute or chronic conditions (Bahorik et al., 2017).

Much of the literature has focused on the connection between SMI and life expectancy. However, common mental health disorders may also impact lifespan. Individuals with any mental health disorder have a reduced life expectancy (nearly 15 years of potential life lost, or YPLL) (Chan et al., 2023). The mortality rate for people with SMI is two to three times higher than the general population, and standardized mortality ratios (SMRs) for individuals with schizophrenia-related disorders have been found to be among the highest (John et al., 2018). Similarly, the odds of all-cause mortality are higher for individuals with schizophrenia (2.5 times higher than the general population) when compared to the odds of all-cause mortality for individuals with depression (1.7 times higher than the general population) (Lewis & Hayes, 2019). Much of the research on mental health and mortality has focused on SMI. However, the estimated global prevalence of depression is significantly higher than schizophrenia (300 million vs. 23 million) (Lewis & Hayes, 2019). It is necessary to understand better the health needs of individuals with common mental health conditions.

1.3 SUBSTANCE USE DISORDERS, HEALTH, AND MORTALITY

YPLL was greatest among individuals with substance use disorders (SUD) (20.4 years) and lowest among individuals with behavioral disorders (8.5 years) (Chan et al., 2023). According to the Centers for Disease Control and Prevention (CDC), there were 105,452 drug overdose deaths in 2022, resulting in a twofold increase from 2015 (Insel, 2023). In addition to drug overdose mortality rates, SUD can increase the likelihood of developing chronic medical conditions. For example, alcohol use disorder has been found to increase the risk of hypertension and heart conditions, and opioid use disorder can increase the risk of pulmonary edema (Bruckner, Yoon, & Gonzalez, 2017). Additionally, SUD is often a barrier to preventive and primary care services (American Pharmacists Association, 2013; Bruckner et al., 2017). To further complicate the issue, SUD and mental illnesses frequently co-occur. According to a 2018 estimate, approximately 9.3 million adults in the United States had co-occurring mental health conditions and SUD (Mehta et al., 2021). The overlap between mental illness (particularly SMI) and SUD introduces additional challenges in treatment delivery (Mehta et al., 2021), and as a result, individuals with co-occurring SMI

and SUD have been found to be at higher risk for premature mortality than individuals with or without SMI but no history of SUD (Iturralde et al., 2021).

1.4 THE ROLE OF THE SOCIAL DETERMINANTS OF HEALTH

The social determinants of health, or SDOH, refer to the non-medical factors that impact health outcomes. They encompass the "conditions in which people are born, grow, work, live, and age," as well as the external forces and systems that shape the conditions of daily life (CDC, n. d., para. 1). SDOH are grouped into five categories: 1) economic stability, 2) education access and quality, 3) health care access and quality, 4) neighborhood and built environment, and 5) social and community context (Healthy People 2030, n. d.). Addressing the social factors that contribute to adverse health outcomes can improve preventive care and the treatment of acute and chronic illness. Over time, this can lead to improvements in population health outcomes (Crear-Perry et al., 2021).

A recent study examined the extent to which SDOH contribute to racial and ethnic disparities in premature death, defined as death before the age of 75 years (Bundy et al., 2023). Black adults were found to have significantly higher rates of premature mortality than other racial and ethnic groups. Furthermore, several SDOH measures, including unemployment, lower income, food insecurity, low educational attainment (less than high school), lack of private health insurance, and being unmarried or not living with a partner were found to have significant, independent associations with premature death. Differences in all-cause mortality rates were no longer present after the researchers adjusted for SDOH, which suggests that the racial differences were completely explained by differences in SDOH (Bundy et al., 2023). These key findings not only highlight the impact of SDOH on mortality and longevity, but they also emphasize the importance of incorporating SDOH into current and future health services research.

While the impact of SDOH has been explored in extant literature, the focus has primarily been on physical health. However, it is necessary to further explore and address the association between SDOH and mental health because mental illness has been identified as an independent risk factor for adverse health outcomes and premature death (Deferio et al., 2019). SDOH data are collected by a variety of stakeholders, including patients, healthcare providers, researchers, and public-private entities, but the data are rarely collected in a structured, comprehensive way (Deferio et al., 2019). Additionally, it is unclear whether SDOH data are meaningfully incorporated into the life insurance underwriting process. This finding highlights a unique opportunity to improve current industry practices.

Section 2: Health Behaviors and Underlying Predictors of Mental Health – the BRFSS

The Behavioral Risk Factor Surveillance System (BRFSS) is maintained by the CDC and has served as the repository for self-reported behavioral factors since its inception in 1984. The BRFSS annual survey collects demographic, health-related and behavioral survey responses from over 400,000 (500,000+ some years) adults throughout the United States. The annual survey is administered telephonically and consists of three distinct components: the core component that all states include in annual survey distribution, the optional module component which states can choose to include in annual survey distribution, and the state-added component which contains questions of particular interest to the individual state. Core component questions are subcategorized as three types—standard questions, rotating questions, or emerging questions. Standard core questions address demographics and health behaviors (such as eating habits, exercise patterns, etc.). Rotating core questions are asked in alternating years by all states and are included as optional module questions during the off year. Emerging core questions address current societal issues that may impact their standard question responses (example: pandemic impacts of living environment or health behaviors). Optional module questions are standard core questions that have been 'rotated off' for that reporting year, which states may still include in the telephonic survey. The state-added component questions are proposed by the individual state and address state-specific issues (local infrastructure, local governance, local public services issues, etc.).

2.1 BRFSS QUESTION/SAMPLE SELECTION AND RESPONDENT DEMOGRAPHICS

Questions and responses utilized for this research project include items that provide respondent sociodemographic information, their disclosed health behaviors, as well as chronic illnesses and comorbidities. This data supports this research by possibly identifying trends and/or an increased likelihood of depressive disorder being present with certain categories or conditions. The 'Healthy Days' measures or Health Related Quality of Life questions (HRQOL-4) as created/submitted by the HHS/CDC were also included in the sample selection/dataset. The HRQOL-4 questions are designed to specifically assess general health, physical health, mental health, and overall unhealthy days of respondents (with unhealthy days meaning poor physical and mental health). This data supports this research by possibly identifying trends and/or increased likelihood of depressive disorder having identifiable impacts on overall health.

The BRFSS dataset selected for this research covers the 2017–2021 survey years. Sample data for this mental health and mortality research includes responses to 64 questions for a total of 2,146,371 respondents/observations. The key outcome variable for inclusion in this study is the 'Depressive Disorder' variable, with additional variables for analysis covering demographics, chronic illness and comorbidities, individual habits and lifestyle, and Social Determinants of Health (SDOH). Items selected as additional variables were questions and responses from the standardized core section of the survey, which excludes optional modules and state-added questions (to ensure consistency). The SDOH domains captured in the BRFSS dataset are economic/financial stability, education, healthcare access, and neighborhood characteristics. Social and community details are not present in this dataset and will be captured in the SAMHSA findings presented later in this report. Table 1 summarizes the demographics of the survey respondents included in this research report.

Table 1

BRFSS RESPONDENT DEMOGRAPHICS AND PREVALENCE OF DEPRESSIVE DISORDER

Respondent Demographic Characteristics and Depressive Disorder Prevalence					
	Total Survey Responses		Prevalence of Depressive Disorder (DD)		
Variable/Category	Frequency (n)	Percentage (%)	Frequency (n)	Percentage of DD (%)	Percentage of Category (%)
Age Range					
18yrs-25yrs	150,120	6.99%	33,308	8.10%	22.19%
26yrs-34yrs	208,433	9.71%	46,910	11.40%	22.51%
35yrs-44yrs	264,768	12.34%	56,262	13.68%	21.25%
45yrs-54yrs	328,823	15.32%	68,700	16.70%	20.89%
55yrs-64yrs	432,174	20.14%	92,199	22.41%	21.33%
65yrs+	762,053	35.50%	114,038	27.72%	14.96%
	2,146,371	100.00%	411,417	100.00%	
Respondent Sex					
Male	973,738	45.37%	136,163	33.10%	13.98%
Female	1,171,236	54.57%	274,986	66.84%	23.48%
Refused/Unknown	1,397	0.07%	268	0.07%	19.18%
	2,146,371	100.00%	411,417	100.00%	
Respondent Race					
White	1,629,416	75.91%	324,678	78.92%	19.93%
Black/African American	167,899	7.82%	26,358	6.41%	15.70%
Asian	51,943	2.42%	4,356	1.06%	8.39%
Alaskan/Native American	38,092	1.77%	8,182	1.99%	21.48%
Hispanic/Latino	187,175	8.72%	31,743	7.72%	16.96%
Other	71,846	3.35%	16,100	3.91%	22.41%
	2,146,371	100.00%	411,417	100.00%	
Veteran Status					
Yes	267,891	12.48%	43,391	10.55%	16.20%
No	1,868,181	87.04%	366,720	89.14%	19.63%
Refused/Unknown	10,299	0.48%	1,306	0.32%	12.68%
	2,146,371	100.00%	411,417	100.00%	

More than half of all respondents in the total/all-inclusive sample set were 55 years or older, which comprised 55.64% of total respondents. The middle two ranges, 35yrs-44yrs and 45yrs-54yrs comprise 27.66% of total respondents. The remaining two age ranges, 18yrs-25yrs and 26yrs-34yrs, comprise the remaining 16.7% of total respondents. Approximately 45.37% respondents identified as male, 54.57% identified as female, and .07%

unidentified/refused to answer. Approximately 75.91% of total all-inclusive sample set respondents identified as white, with the remaining five race categories comprising 21.08%. Of the total sample set of 2,146,371 respondents selected for this study, approximately 411,417 respondents reported a confirmed diagnosis of depressive disorder, comprising 19.17% of the total recorded responses. Age range percentages range from 8.10% confirmed diagnosis in the 18yrs-25yrs age range, to 27.72% confirmed diagnosis in the 65yrs and older age range. Survey results show that a confirmed diagnosis of depressive disorder was twice as prevalent among females than males, 66.84% and 33.10%, respectively. Respondents in various age groups noted confirmed diagnosis ranging from 8.10 % for 18yrs-25yrs to 27.72% for those 65 years and older. Approximately 78.92% of respondents identified as white, with the remaining five race categories comprising 21.08%. Most respondents reported non-veteran status in the total selected sample set as well as those with confirmed depressive disorder diagnosis, (87.04% and 89.14%, respectively). Further within-category analysis indicates that 22.19% of all respondents in the 18yrs-25yrs age category report confirmed depressive disorder diagnosis (33,308 out of 150,120 total respondents in this category). The 26yrs-34yrs age category reports the highest percentage of all respondents with confirmed diagnosis at 22.51%, with the 65yrs and older age category reflecting the lowest percentage at 14.96%. Results also indicate that 23.48% of all female respondents have confirmed depressive disorder diagnosis, compared to 13.98% for male respondents (19.18% refused/unknown). Within-category analysis for race show that Alaskan/Native American respondents have the highest confirmed cases of depressive disorder among all reporting/defined race categories (excludes Other). Approximately 21.48% of all Alaskan/Native American respondents report a depressive disorder diagnosis, as compared to 19.93% for white respondents, 16.96% for Hispanic/Latino respondents, 15.70% for Black/African American respondents and 8.39% for Asian respondents. Respondents noting Other as their preferred race category show 22.41% depressive disorder diagnosis for all respondents in this category.

2.2 SDOH – ECONOMIC AND FINANCIAL STABILITY

Economic stability and financial security are directly correlated to sustained health and health outcomes. These factors have been shown to support household stability, promote health and well-being (illness maintenance and access to services), and reduce incidents of health inequity. The variables utilized from the BRFSS dataset as indicators of economic and financial stability are employment status, income range, and marital status. Employment status categories capture self-employment (independent wages) as well as workforce employment (company wages) of survey respondents. Homemakers', students', and retirees' employment status were also collected in the annual survey. As reported, 41.19% of the total respondent sample set were employed for wages (not self-employed) and approximately 29.90% of total respondents were retired. Self-employed respondents were 8.82% of the sample population and 6.82% reported being unable to work. The remaining categories comprised the remaining 13.27%. Income range categories capture reported income of up to $200,000. Approximately 77.09% of the total sample set reported individual income levels of less than $100,000, with the largest portion (26.75%) of these falling within the $20,000–$49,999 income range. The respondents with confirmed diagnosis of DD follow a similar trend, with 80.76% of all reported income being below $100,000, with 29.93% falling within the $20,000–$49,999 income range. Marital status is directly linked to household economic and financial stability, often supporting health and access to care. In this study, marital status with confirmed depressive disorder diagnosis ranged from 0.62% for unmarried couples to 40.60% for married respondents. Table 2 summarizes the economic stability and financial security related responses, in the context of confirmed cases of depressive disorder. For all respondents, those not in the workforce have the highest percentages of confirmed diagnosis (apart from retired respondents). The unable to work category reflects the largest percentage of diagnosed depressive disorder, with 50.19% of all respondents in the category, followed by those out of the workforce greater than one year and those out of the workforce less than one year, with 32.06% and 28.12%, respectively. Retired respondents have a lower percentage of 15.35% of all respondents reporting the diagnosis. Results also indicate that employed and self-employed respondents report 16.68% and 13.43% of all respondents having confirmed diagnosis, with students and homemakers reporting 21.92% and 20.70% of all respondents having depressive disorder. Income categories range from 12.00% (lowest) for the $200,000+ salary range to 31.94% (highest) for the $19,999 or less salary range.

Separated and divorced marital status categories have the highest total number of respondents reporting confirmed depressive disorder diagnosis, with 31.91% and 27.79%, respectively. Unmarried and never married categories reflect 25.08% and 22.94% of total respondents with confirmed cases, while widowed and married categories report 17.93% and 15.13%.

Table 2

ECONOMIC STABILITY RESPONSES AS INDICATORS OF DEPRESSIVE DISORDER

Economic Stability and Depressive Disorder Prevalence					
	Total Survey Responses		Prevalence of Depressive Disorder (DD)		
Variable/Category	Frequency (n)	Percentage (%)	Frequency (n)	Percentage of DD (%)	Percentage of Category (%)
Employment Status					
Employed	884,077	41.19%	147,452	35.84%	16.68%
Self Employed	189,360	8.82%	25,434	6.18%	13.43%
Out of Workforce > 1yr	45,224	2.11%	14,499	3.52%	32.06%
Out of Workforce < 1yr	52,007	2.42%	14,622	3.55%	28.12%
Homemaker	100,856	4.70%	20,881	5.08%	20.70%
Student	56,105	2.61%	12,299	2.99%	21.92%
Retired	641,815	29.90%	98,547	23.95%	15.35%
Unable to Work	146,418	6.82%	73,493	17.86%	50.19%
Refused/Unknown	30,509	1.42%	4,190	1.02%	13.73%
	2,146,371	100.00%	411,417	100.00%	
Income Range					
$0-$19,999	266,458	12.41%	85,105	20.69%	31.94%
$20,000-$49,999	574,079	26.75%	123,154	29.93%	21.45%
$50,000-$74,999	283,876	13.23%	49,809	12.11%	17.55%
$75,000-$99,999	530,141	24.70%	74,179	18.03%	13.99%
$100,000-$149,999	47,642	2.22%	7,664	1.86%	16.09%
$150,000-$199,999	19,769	0.92%	2,788	0.68%	14.10%
$200,000+	18,952	0.88%	2,274	0.55%	12.00%
Refused/Unknown	405,454	18.89%	66,444	16.15%	16.39%
	2,146,371	100.00%	411,417	100.00%	
Marital Status					
Married	1,104,209	51.45%	167,048	40.60%	15.13%
Divorced	285,379	13.30%	79,302	19.28%	27.79%
Widowed	247,898	11.55%	44,459	10.81%	17.93%
Separated	43,953	2.05%	14,026	3.41%	31.91%
Never Married	368,966	17.19%	84,642	20.57%	22.94%
Unmarried Couple	77,305	3.60%	19,386	4.71%	25.08%
Refused/Unknown	18,661	0.87%	2,554	0.62%	13.69%
	2,146,371	100.00%	411,417	100.00%	

2.3 SDOH – EDUCATION ACCESS AND QUALITY

People with higher levels of education are more likely to be healthier and live longer (https://www.healthcare.gov/). Educational access and quality include key issues such as educational attainment in general and language and literacy. These factors can influence how people prepare for and respond to an emergency, and in the context of this study, how they seek and secure economic stability as well as access to healthcare services. Educational access and quality refer to an individual having the means to participate in educational programs from elementary, secondary, and higher education to training programs and other continuing education opportunities. This domain also references the quality of education that is made available. This is based on learning outcomes, social and networking opportunities and academic standards held by the schooling institution. The education level of respondents weighed heavily on the higher education categories, with 64.45% reported as having some college education or being a college graduate (31.24% and 33.21%, respectively). Among all respondents, those with some high school education report the highest percentage of depressive disorder cases at 25.54%, followed by respondents with some college education at 21.68%. Other categories report lower percentages of confirmed cases, with no schooling, elementary, high school graduate/GED, and college graduate education levels having 16.14%, 19.89%, 19.31% and 16.57% of total respondents, respectively. Table 3 summarizes the education access and quality responses, in the context of confirmed cases of depressive disorder.

Table 3
EDUCATION ACCESS AND QUALITY AS INDICATORS OF DEPRESSIVE DISORDER

Education Level and Depressive Disorder Prevalence					
	Total Survey Responses		Prevalence of Depressive Disorder (DD)		
Variable/Category	Frequency (n)	Percentage (%)	Frequency (n)	Percentage of DD (%)	Percentage of Category (%)
Education Level					
No Schooling	3,080	0.14%	497	0.12%	16.14%
Elementary (Grades 1-8)	47,171	2.20%	9,381	2.28%	19.89%
Some HS (9th Grade)	97,308	4.53%	24,855	6.04%	25.54%
HS Graduate/GED	572,146	26.66%	110,500	26.86%	19.31%
Some College (1-3 Yrs)	592,715	27.61%	128,527	31.24%	21.68%
College Graduate	824,423	38.41%	136,619	33.21%	16.57%
Refused/Missing	9,528	0.44%	1,038	0.25%	10.89%
	2,146,371	100.00%	411,417	100.00%	

2.4 HEALTHCARE ACCESS AND QUALITY

The ACA afforded millions of people the ability to access healthcare services, closing the gap between those with some form of health insurance coverage and the uninsured. Results of this data analysis show that most respondents have some form of coverage and an established relationship with at least one healthcare provider. Of total survey responses, 72.63% reported as having healthcare insurance coverage, and 83.62% reported as having a health relationship with at least one provider. The subset of respondents with confirmed depressive disorder has similar results, with 72.29% having health insurance coverage and 86.73% having a health relationship with at least one provider. For all respondents within the healthcare coverage categories, the results are similar. Approximately 19.08% of all respondents having healthcare insurance coverage have depressive disorder and 19.47% of all respondents having no healthcare insurance coverage have depressive disorder. Results also show that 42.55% of all

respondents with at least one healthcare provider have confirmed depressive disorder diagnosis. Table 4 summarizes measures selected as indicators of healthcare access and quality. The 'Healthy Days' measures were designed to assess health needs as well as trends in both physical health and mental health. The questions that capture this information, termed Health-Related Quality of Life (HRQOL), are included in several population health surveys and questionnaires and datasets such as this study's survey (BRFSS) and the National Health and Nutrition Examination Survey (NHANES), both used for state-level and national-level analysis (NIH, CDC). Table 5 and Figure 1 summarize the results for the HRQOL-4 healthy days questions.

Table 4

HEALTHCARE ACCESS AND QUALITY AS INDICATORS OF DEPRESSIVE DISORDER

Healthcare Access and Quality and Depressive Disorder Prevalence					
	Total Survey Responses		Prevalence of Depressive Disorder (DD)		
Variable/Category	Frequency (n)	Percentage (%)	Frequency (n)	Percentage of DD (%)	Percentage of Category (%)
Healthcare Coverage					
Yes	1,558,917	72.63%	297,416	72.29%	19.08%
No	140,879	6.56%	27,434	6.67%	19.47%
Refused/Unknown	446,575	20.81%	86,567	21.04%	19.38%
	2,146,371	100%	411,417	100.00%	
Provider Relationship					
Yes, One Provider	$ 1,541,636	71.83%	298,132	72.46%	19.34%
Yes, Multiple Providers	$ 252,996	11.79%	58,717	14.27%	23.21%
No Relationship	$ 339,491	15.82%	52,734	12.82%	15.53%
Refused/Unknown	$ 12,248	0.57%	1,834	0.45%	14.97%
	$ 2,146,371	100.00%	411,417	100.00%	

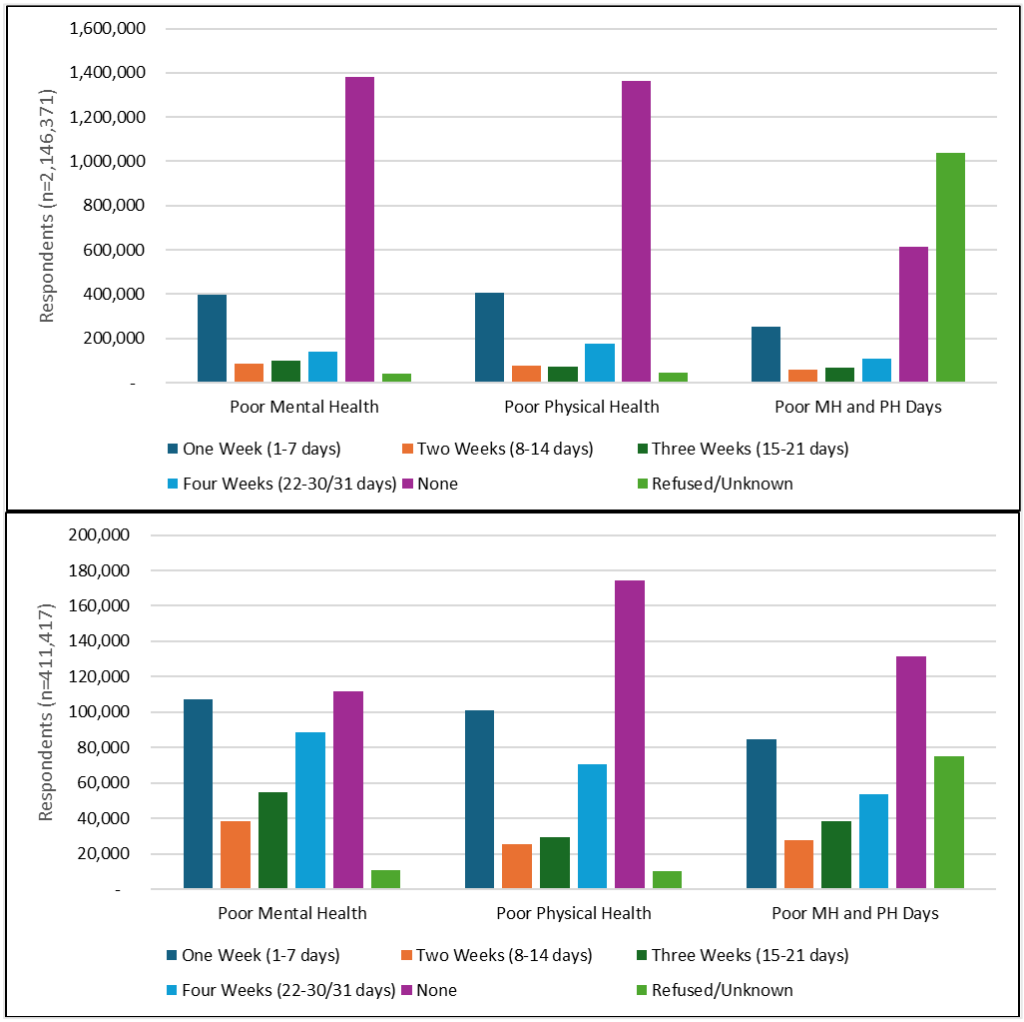
Table 5

HEALTH STATUS/GENERAL HEALTH AS INDICATORS OF DEPRESSIVE DISORDER

Health Status/General Health and Depressive Disorder Prevalence					
	Total Survey Responses		Prevalence of Depressive Disorder (DD)		
Variable/Category	Frequency (n)	Percentage (%)	Frequency (n)	Percentage of DD (%)	Percentage of Category (%)
Health Status/General Health					
Excellent Health	371,596	17.31%	32,687	7.94%	8.80%
Very Good Health	710,741	33.11%	102,864	25.00%	14.47%
Good Health	671,894	31.30%	135,772	33.00%	20.21%
Fair Health	283,675	13.22%	92,551	22.50%	32.63%
Poor Health	103,004	4.80%	46,357	11.27%	45.01%
Refused/Unknown	5,461	0.25%	1,186	0.29%	21.72%
	2,146,371	100.00%	411,417	100.00%	

Figure 1

MENTAL PHYSICAL HEALTH DAYS – TOTAL RESPONDENTS/DEPRESSIVE DISORDER RESPONDENTS COMPARISON



Approximately 17.31% of respondents in the total sampled population reported excellent health. The largest portion of respondents reported health status in the very good health and good health categories, with 33.11% and 31.30%, respectively. The remaining 18.27% falls into the remaining three categories with fair health reported at 13.22%, and poor health was reported at 4.80% (0.25% unknown). Respondents with depressive disorder follow a similar pattern, with 58% of respondents reporting very good health (25.00%) and good health (33.00%). When examining prevalence of depressive disorder for all respondents within a category, 45.01% of respondents report poor health, followed by 32.63% of respondents reporting fair health. Good health, very good health, and excellent health for all respondents were 20.21%, 14.47% and 8.80%, respectively. The remaining three HRQOL-4 measures are captured in days, summarized in this report by weeks. These questions capture the number of days the respondent reports poor mental or physical health as well as days that the respondent experienced both.

2.5 CHRONIC ILLNESS AND COMORBIDITIES

Chronic illnesses are illnesses that persist for more than one year and often impact longer-term health. The underlying causes of these medical conditions can be caused by various social determinants of health as well as individual lifestyle choices or behaviors that persist over time. Studies have documented a significant correlation

between chronic illness, comorbidities, and mental health. Results of this study indicate a relationship between the occurrence of chronic illness, comorbidity, and age. Tables 6 and 7 summarize (relative to this study population) findings for chronic illness as well as comorbidities in the respondents with depressive disorder. Arthritis and hypertension are the two most common chronic illnesses, reporting 47.18% and 28.08%, respectively. Diabetes and COPD were reported as 17.62% and 12.63% confirmed chronic illness diagnoses, with pre-diabetes, heart disease, and renal disease reporting 7.11%, 7.88%, and 6.16% confirmed diagnoses. In total, approximately 27.42% (112,819 of 411,417) of the respondents with depressive disorder reported one chronic illness, with 61.57% reported by respondents over 45 years of age. For comorbidities, approximately 21.63% of respondents with depressive disorder (89,003 of 411,417) reported two chronic illnesses with 79.70% reported by respondents over 45 years of age. Approximately 13.92% of respondents reported three chronic illnesses (57,263 of 411,417) with 88.40% reported by respondents over 45 years of age. For all respondents, 30.56% of those in the 26yrs-34yrs age range have at least one comorbidity and approximately 33.98% percent of all female respondents have at least one comorbidity. The Alaskan/Native American race category reported 25.57% of respondents with at least one comorbidity, followed by Hispanic/Latino respondents, white respondents, Black/African American respondents, and Asian respondents, reporting 22.61%, 22.02%, 18.38%, and 1.75% respective respondents having at least one comorbidity.

Table 6

CHRONIC CONDITIONS AND ILLNESSES AS INDICATORS OF DEPRESSIVE DISORDER

Chronic Conditions/Illnesses and Depressive Disorder Prevalence					
	Total Survey Responses		Prevalence of Depressive Disorder (DD)		
Variable/Category	Frequency (n)	Percentage (%)	Frequency (n)	Percentage of DD (%)	Percentage of Category (%)
Hypertension					
Yes	522,865	24.36%	115,520	28.08%	22.09%
Yes, with Pregnancy	9,869	0.46%	2,689	0.65%	27.25%
No	756,699	35.25%	132,585	32.23%	17.52%
Borderline	12,661	0.59%	2,226	0.54%	17.58%
Refused/Unknown	844,277	39.34%	158,397	38.50%	18.76%
	2,146,371	100.00%	411,417	100.00%	
Diabetes					
Yes	288,254	13.43%	72,472	17.62%	25.14%
Yes, with Pregnancy	18,104	0.84%	4,820	1.17%	26.62%
No	1,791,518	83.47%	322,224	78.32%	17.99%
Borderline	44,198	2.06%	11,084	2.69%	25.08%
Refused/Unknown	4,297	0.20%	817	0.20%	19.01%
	2,146,371	100.00%	411,417	100.00%	
Pre-Diabetes					
Yes	116,822	5.44%	29,272	7.11%	25.06%
Yes, with Pregnancy	10,219	0.48%	2,742	0.67%	26.83%
No	809,460	37.71%	139,018	33.79%	17.17%
Refused/Unknown	1,209,870	56.37%	240,385	58.43%	19.87%
	2,146,371	100.00%	411,417	100.00%	

Chronic Conditions/Illnesses and Depressive Disorder Prevalence					
Heart Disease					
Yes	120,430	5.61%	32,406	7.88%	26.91%
No	2,006,774	93.50%	374,170	90.95%	18.65%
Refused/Unknown	19,167	0.89%	4,841	1.18%	25.26%
	2,146,371	100.00%	411,417	100.00%	
Pulmonary Disease (COPD)					
Yes	138,616	6.46%	51,976	12.63%	37.50%
No	1,561,683	72.76%	275,189	66.89%	17.62%
Refused/Unknown	446,072	20.78%	84,252	20.48%	18.89%
	2,146,371	100.00%	411,417	100.00%	
Renal/Kidney Disease					
Yes	82,586	3.85%	25,357	6.16%	30.70%
No	2,055,584	95.77%	383,852	93.30%	18.67%
Refused/Unknown	8,201	0.38%	2,208	0.54%	26.92%
	2,146,371	100.00%	411,417	100.00%	
Arthritis					
Yes	703,625	32.78%	194,112	47.18%	27.59%
No	1,429,674	66.61%	214,429	52.12%	15.00%
Refused/Unknown	13,072	0.61%	2,876	0.70%	22.00%
	2,146,371	100.00%	411,417	100.00%	

Table 7

COMORBIDITY SUMMARY TOTAL RESPONDENTS AND PREVALENCE OF DEPRESSIVE DISORDER

Comorbidities Summary											
	Total Responses (n=2,146,371)					Depressive Disorder Prevalence (n=411,417)					
Variable/Category	No Diagnosed Chronic Illness	One Diagnosed Chronic Illness	Two Diagnosed Chronic Illnesses	Three Diagnosed Chronic Illnesses	Greater Than Three Chronic Illnesses	No Diagnosed Chronic Illness	One Diagnosed Chronic Illness	Two Diagnosed Chronic Illnesses	Three Diagnosed Chronic Illnesses	Greater Than Three Chronic Illnesses	Percentage of Category with at Least One Chronic Illness
Age Range											
18yrs-25yrs	103,742	35,832	7,962	1,880	704	19,814	10,322	2,459	542	171	29.10%
26yrs-34yrs	133,480	51,195	16,260	5,143	2,355	24,001	14,745	5,751	1,754	659	30.56%
35yrs-44yrs	143,491	71,336	30,174	12,161	7,606	21,282	18,284	9,862	4,347	2,487	28.84%
45yrs-54yrs	128,801	94,362	54,331	28,192	23,137	15,497	20,672	15,991	9,259	7,281	26.60%
55yrs-64yrs	107,522	119,211	91,063	57,024	57,354	11,767	24,169	24,131	16,774	15,358	24.77%
65yrs+	105,895	176,767	180,227	139,619	159,545	8,867	24,627	30,809	24,587	25,148	16.03%
Total	722,931	548,703	380,017	244,019	250,701	101,228	112,819	89,003	57,263	51,104	21.79%
(% of n)	33.68%	25.56%	17.71%	11.37%	11.68%	24.60%	27.42%	21.63%	13.92%	12.42%	
Respondent Sex											
Male	369,175	301,550	215,289	139,142	146,080	37,058	37,771	27,876	17,401	16,057	12.36%
Female	353,155	246,779	164,503	104,768	104,533	64,101	74,973	61,066	39,830	35,016	33.98%
Refused/Unknown	601	374	225	109	88	69	75	61	32	31	25.00%
Respondent Race											
White	512,507	419,530	300,321	194,738	202,320	78,689	89,236	70,762	45,366	40,625	22.02%

Comorbidities Summary											
Black/African American	54,609	42,155	30,243	20,182	20,710	5,530	6,920	6,026	4,188	3,694	18.38%
Asian	28,293	12,368	6,097	3,101	2,084	1,814	1,224	738	348	232	10.75%
Alaskan/Native American	12,472	9,355	6,599	4,545	5,121	1,631	2,073	1,835	1,338	1,305	25.57%
Hispanic/Latino	89,270	46,801	25,175	14,002	11,927	9,607	9,025	6,371	3,802	2,938	22.61%
Other	25,780	18,494	11,582	7,451	8,539	3,957	4,341	3,271	2,221	2,310	26.36%

2.6 NEIGHBORHOOD AND BUILT ENVIRONMENT

Health and well-being have proven associations with safe neighborhoods and the built environment. Green space, air quality, and workplace conditions may impact health and safety, indicators for overall quality of life. Crime/violence and unsafe neighborhoods disproportionately affect minorities and those with low income, often living in urban areas. This environment directly impacts the ability for outdoor activities such as walking, playing, or other exercise (impacting both physical and mental health). The built environment includes buildings (residential and commercial), transportation, and support systems such as food sources and quality of food, clean water/sewage, air quality, etc. Issues with these tend to occur in more densely populated areas or in areas with commercial environmental hazards (emissions, chemical byproduct run-off, etc.). Hazards in the workplace contribute to the built environment and include physical risk (heavy equipment or machinery for example) as well as other factors such as noise, chemicals, second-hand smoke, which serve as indirect influences on well-being. While all the factors included in neighborhood and built environment can impact anyone, research has shown clearly delineated impacts based on various demographic and social characteristics. Table 8 reflects the findings as present in the total sample and depressive disorder populations.

Table 8

NEIGHBORHOOD AND ENVIRONMENTAL RESPONSES AS INDICATORS OF DEPRESSIVE DISORDER

Neighborhood and Environment and Depressive Disorder Prevalence					
	Total Survey Responses		Prevalence of Depressive Disorder (DD)		
Variable/Category	Frequency (n)	Percentage (%)	Frequency (n)	Percentage of DD (%)	Percentage of Category (%)
Neighborhood Type					
Urban	1,417,899	66.06%	272,199	66.16%	19.20%
Rural	249,330	11.62%	45,540	11.07%	18.26%
Refused/Unknown	479,142	22.32%	93,678	22.77%	19.55%
	2,146,371	100.00%	411,417	100.00%	
Home Ownership					
Own	1,507,046	70.21%	243,650	59.22%	16.17%
Rent	516,166	24.05%	137,795	33.49%	26.70%
Other Arrangement	105,600	4.92%	27,628	6.72%	26.16%
Refused/Unknown	17,559	0.82%	2,344	0.57%	13.35%
	2,146,371	100.00%	411,417	100.00%	

2.7 BRFSS DATA ANALYSIS RESULTS – WHAT TO CONSIDER IN THE SAMHSA ANALYSIS

Regression analyses of the BRFSS data indicate that demographic factors as well as SDOH are significant predictors for mental health and associated outcomes. Using level of significance (p-value) of .05, all major categories examined from the BRFSS data apart from Veteran Status, indicate correlation to mental health outcomes. The various components of these factors will be further analyzed to determine prevalence in the SAMHSA CLD and TEDS datasets, as related to mortality during treatment. Table 9 summarizes the regression results for the BRFSS dataset by category, with the full regression model showing all variables presented in Appendix A.

Table 9

BRFSS REGRESSION RESULTS (SUMMARY)

Multivariate Analysis Results - Depressive Disorder as Outcome Variable				
Predictor Category	Coefficient	Standard Error	P-Value/Significance	95% Confidence Interval
Demographic Characteristics	1.813203	0.0018825	0.000	1.809513 - 1.816892
Economic Stability	1.826738	0.0014669	0.000	1.823863 - 1.829613
Education	1.897403	0.010258	0.000	1.877297 - 1.917508
Healthcare Access/Quality	1.82948	0.0005042	0.000	1.828491 - 1.830468
HRQOL-4 Measures	1.738673	0.0025284	0.000	1.733717 - 1.743628
Chronic Illness/Comorbidities	1.618631	0.5394894	0.003	.5612491 - 2.676014
Neighborhood/Built Environment	1.863128	0.0005695	0.000	1.862011 - 1.864244

Section 3: Mental Health Client-Level Data – SAMHSA CLD Dataset

The Substance Abuse and Mental Health Service Administration (SAMHSA) Mental Health Client-Level Data (MH-CLD) captures sociodemographic, clinical, and outcome data for clients who have received treatment from a state mental health agency over the course of a 12-month reporting period (Ortega, 2022). The MH-CLD data became available in 2013, and public-use files (PUFs) are released annually. The PUFs contain demographic information, national outcome measures, and substance use characteristics for clients receiving mental health services (SAMHSA, n.d.a).

3.1 SAMHSA QUESTION/SAMPLE SELECTION AND RESPONDENT DEMOGRAPHICS

The SAMHSA MH-CLD dataset for this study covers the 2017-2021 survey years. There are 9,825,564 observations. The sample is majority female (52.23%), white (67.27%), and non-veteran (69.93%). 69.18% of the sample have never been married, 11.66% are now married, 4.59% are separated, and 14.58% are divorced or widowed. 83.86% of the sample lived at a private residence at the time of treatment discharge. Only 6.55% of the sample was employed full-time. For the initial data analysis, primary mental health diagnosis was the key variable of interest. Substance use disorder (SUD) diagnosis and serious mental illness/severe emotional disturbance (SMI/SED) status were also examined. Contingency tables were used to analyze relationships between these variables of interest, the survey year, and demographic indicators. The findings from the MH-CLD analysis were used to guide variable selection for the analysis of the Treatment Episode Data Set (TEDS).

3.2 SAMHSA RESULTS (MH-CLD)

Table 10 displays primary mental health diagnoses by year. The prevalence of trauma- and stressor-related disorders, anxiety disorders, pervasive developmental disorders, and alcohol or substance use disorders has increased from 2017 to 2021, while prevalence of conduct disorders, bipolar disorders, and oppositional defiant disorders have decreased. Across the 5-year study period, depressive disorders are the most prevalent primary mental health diagnosis, comprising nearly 30% of all mental health diagnoses. Serious mental illnesses, such as bipolar disorder (ranging from 12.6% to 14.1% of all mental health diagnoses) and schizophrenia (ranging from 13.4% to 14.8% of all mental health diagnoses) are less common.

Tables 11 and 12 display primary mental health diagnoses by gender and veteran status. Depressive and anxiety disorders are more prevalent among women (32.7% and 10.7%, respectively) than men (21.3% and 7.7%, respectively). However, schizophrenia/other psychotic disorders (18.3%) and alcohol/substance use disorders (3.5%) are more prevalent among men than women (10.2% and 2.0%, respectively). Depressive disorders (31.3%), bipolar disorders (14.4%), and schizophrenia/other psychotic disorders (19.0%) are more prevalent among veterans than non-veterans (26.7%, 11.9%, and 13.2%, respectively). However, anxiety disorders (10.0%) are more prevalent among non-veterans than veterans (8.6%). It is interesting to note that trauma- and stressor-related disorders (14.8% vs. 14.7%) and alcohol/substance use disorders (3.1% vs. 3.3%) have similar prevalence among veterans and non-veterans.

Table 10

PRIMARY MENTAL HEALTH PREVALENCE RATES PER 10,000 INDIVIDUALS BY YEAR

Primary Mental Health Diagnosis	2017	2018	2019	2020	2021
Trauma- and stressor-related disorders	1,246.94	1,296.63	1,372.48	1,416.92	1,361.49
Anxiety disorders	846.37	889.26	948.12	945.62	993.80
Attention deficit/hyperactivity disorder (ADHD)	741.12	799.21	730.60	714.96	684.54
Conduct disorders	140.99	134.48	125.79	124.44	106.18
Delirium, dementia	25.55	25.24	23.00	21.98	21.29
Bipolar disorders	1,410.50	1,327.51	1,288.45	1,263.08	1,299.48
Depressive disorders	2,782.21	2,727.15	2,760.49	2,658.38	2,710.15
Oppositional defiant disorder	203.51	198.22	186.19	176.25	164.98
Pervasive developmental disorders	76.02	96.58	95.20	105.51	112.59
Personality disorders	82.53	75.88	79.69	77.22	79.45
Schizophrenia or other psychotic disorders	1,479.00	1,406.69	1,341.43	1,390.88	1,424.57
Alcohol or substance use disorders	224.04	228.59	278.32	299.22	315.12
Other disorders/conditions	741.21	794.55	770.24	805.55	726.36

Table 11

PRIMARY MENTAL HEALTH DIAGNOSES BY GENDER

Primary Mental Health Diagnosis	Male	Female
Trauma- and stressor-related disorders	555,886 (11.84%)	763,081 (14.87%)
Anxiety disorders	360,242 (7.67%)	550,400 (10.73%)
Attention deficit/hyperactivity disorder (ADHD)	512,018 (10.91%)	209,223 (4.08%)
Conduct disorders	88,524 (1.89%)	35,328 (0.69%)
Delirium, dementia	11,360 (0.24%)	11,581 (0.23%)
Bipolar disorders	506,071 (10.78%)	785,482 (15.31%)
Depressive disorders	999,171 (21.29%)	1,678,853 (32.72%)
Oppositional defiant disorder	120,357 (2.56%)	61,758 (1.20%)
Pervasive developmental disorders	76,170 (1.62%)	19,919 (0.39%)
Personality disorders	36,785 (0.78%)	40,666 (0.79%)
Schizophrenia or other psychotic disorders	859,383 (18.31%)	521,961 (10.17%)
Alcohol or substance use disorders	162,207 (3.46%)	103,496 (2.02%)
Other disorders/conditions	405,698 (8.64%)	349,944 (6.82%)
Total	4,693,872 (100.00%)	5,131,592 (100.00%)

Table 12

PRIMARY MENTAL HEALTH DIAGNOSES BY VETERAN STATUS (FREQUENCY AND PERCENT)

Primary Mental Health Diagnosis	Veterans	Non-Veterans
Trauma- and stressor-related disorders	31,259 (14.79%)	1,008,689 (14.68%)
Anxiety disorders	18,068 (8.55%)	691,572 (10.07%)
Attention deficit/hyperactivity disorder (ADHD)	2,949 (1.40%)	461,970 (6.72%)
Conduct disorders	491 (0.23%)	81,860 (1.19%)
Delirium, dementia	1,359 (0.64%)	18,128 (0.26%)
Bipolar disorders	30,354 (14.37%)	818,792 (11.92%)
Depressive disorders	66,097 (31.28%)	1,834,459 (26.70%)
Oppositional defiant disorder	296 (0.14%)	118,933 (1.73%)
Pervasive developmental disorders	412 (0.19%)	79,605 (1.16%)
Personality disorders	1,626 (0.77%)	50,722 (0.74%)
Schizophrenia or other psychotic disorders	40,078 (18.97%)	907,666 (13.21%)
Alcohol or substance use disorders	6,488 (3.07%)	225,468 (3.28%)
Other disorders/conditions	11,815 (5.59%)	572,999 (8.34%)
Total	211,292 (100.00%)	6,870,863 (100.00%)

Table 13 displays SUD diagnoses prevalence rates per 10,000 by year. Alcohol dependence was the most common SUD diagnosis across the study period, increasing from 457.20 cases per 10,000 in 2017 to 656.62 per 10,000 in 2021. The prevalence of cannabis, opioid, and other substance dependence also increased between 2017 and 2021.

Figure 2 and Table 14 display SUD by gender and veteran status. Gender-based differences in SUD prevalence emerged from this sample. Excluding opioid-related disorders, the prevalence across all SUD diagnoses was higher for males than for females. Except for alcohol-related disorders (6.97% among veterans vs. 4.69% among non-veterans), SUD prevalence was similar between the two groups.

Table 13
SUBSTANCE USE DISORDER (SUD) PREVALENCE RATES PER 10,000 BY YEAR

Substance Use Disorder Diagnosis	2017	2018	2019	2020	2021
Alcohol-related disorders	457.20	479.02	471.20	546.62	656.62
Cocaine-related disorders	99.51	106.30	97.71	93.27	102.01
Cannabis-related disorders	323.32	369.30	362.94	355.93	384.81
Opioid-related disorders	152.44	218.14	238.73	204.09	247.12
Other substance-related disorders	394.89	465.80	394.16	464.54	451.38

Figure 2
SUBSTANCE USE DISORDER (SUD) DIAGNOSES BY GENDER

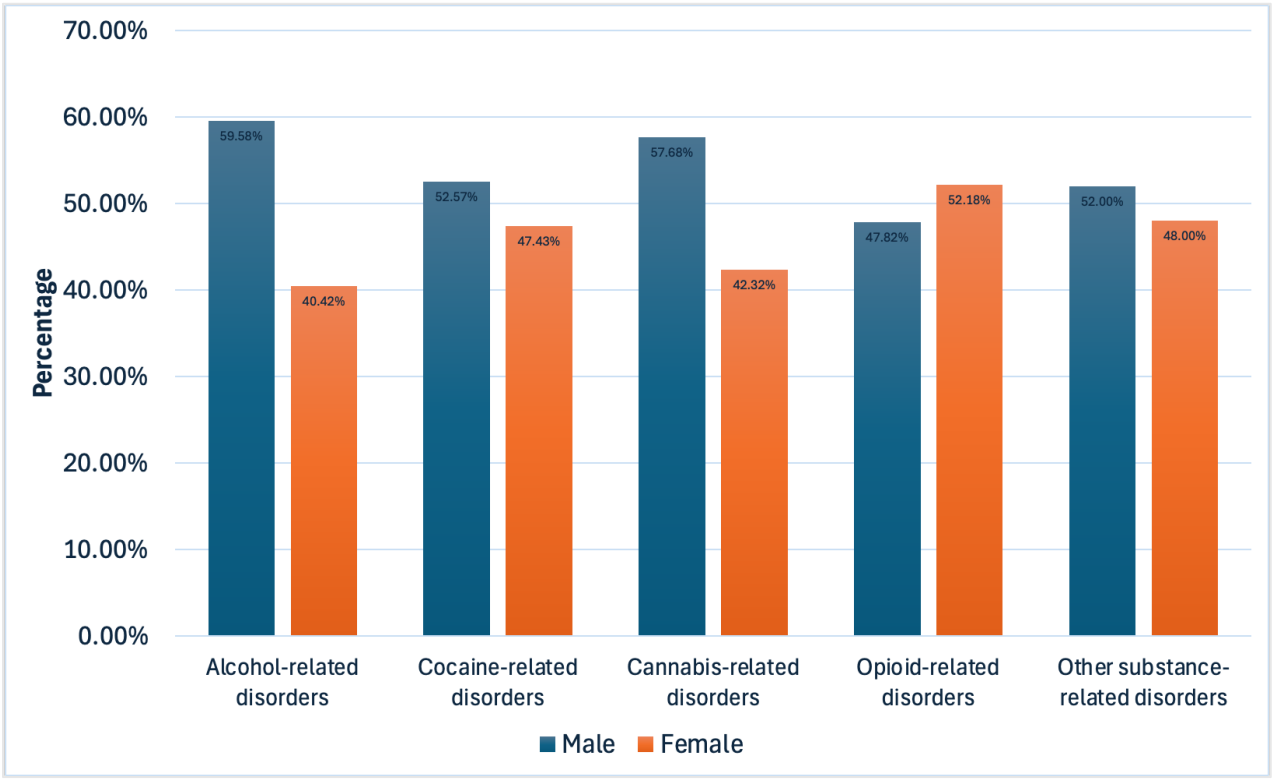


Table 14
SUBSTANCE USE DISORDER (SUD) DIAGNOSES BY VETERAN STATUS

SUD diagnosis	Veterans	Non-Veterans
Alcohol-related disorders	14,721 (6.97%)	322,165 (4.69%)
Opioid-related disorders	2,187 (1.04%)	61,705 (0.90%)
Cocaine-related disorders	4,580 (2.17%)	203,977 (2.97%)
Cannabis-related disorders	4,411 (2.09%)	155,565 (2.26%)
Other substance-related disorders	8,976 (4.25%)	278,826 (4.06%)

Figure 3 displays serious mental illness/severe emotional disturbance (SMI/SED) status by year. Following an increase between 2017 and 2020, the number of SMI cases decreased between 2020 and 2021. The number of SED cases decreased between 2018 and 2021.

Figure 4 and Table 15 display SMI/SED status by gender and veteran status. SMI is more common among females (55.03%) than males (44.97%), but SED is more common among males (55.31% vs. 44.69% for females). With respect to veteran status, SMI is more common among veterans (82.0%) than non-veterans (57.2%), but SED is more common among non-veterans (17.5% vs. 0.9% for veterans).

Figure 3
SERIOUS MENTAL ILLNESS/SEVERE EMOTIONAL DISTURBANCE (SMI/SED) STATUS BY YEAR

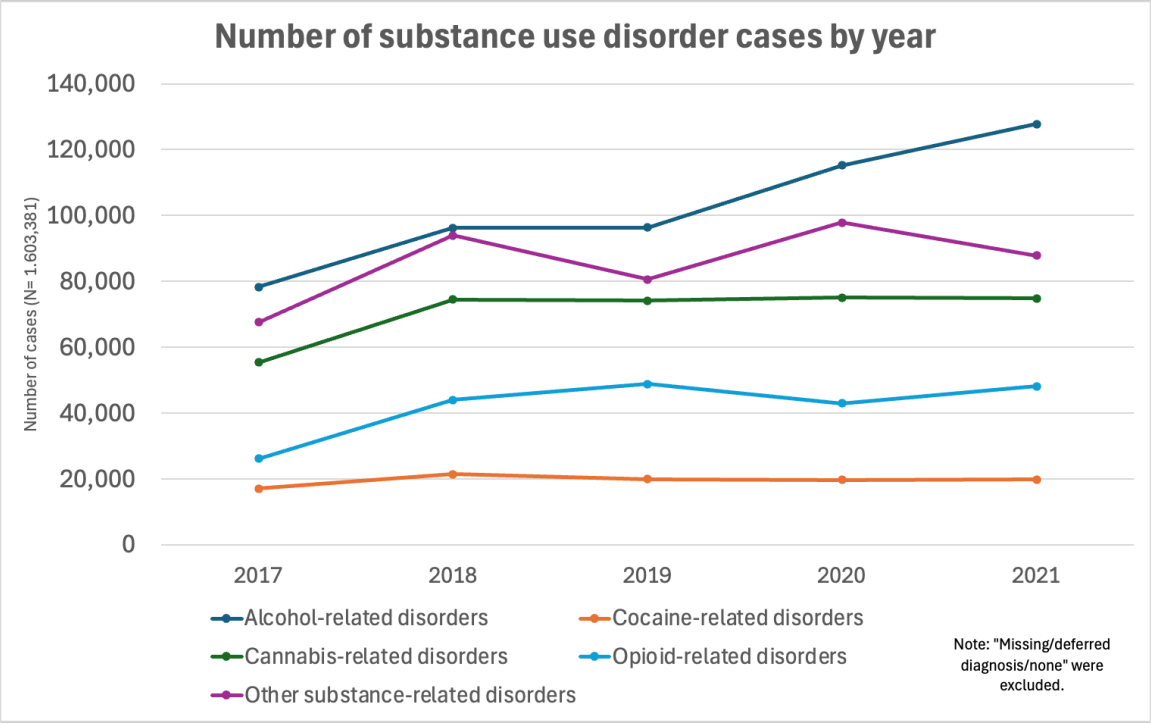


Figure 4
SERIOUS MENTAL ILLNESS/SEVERE EMOTIONAL DISTURBANCE (SMI/SED) STATUS BY GENDER

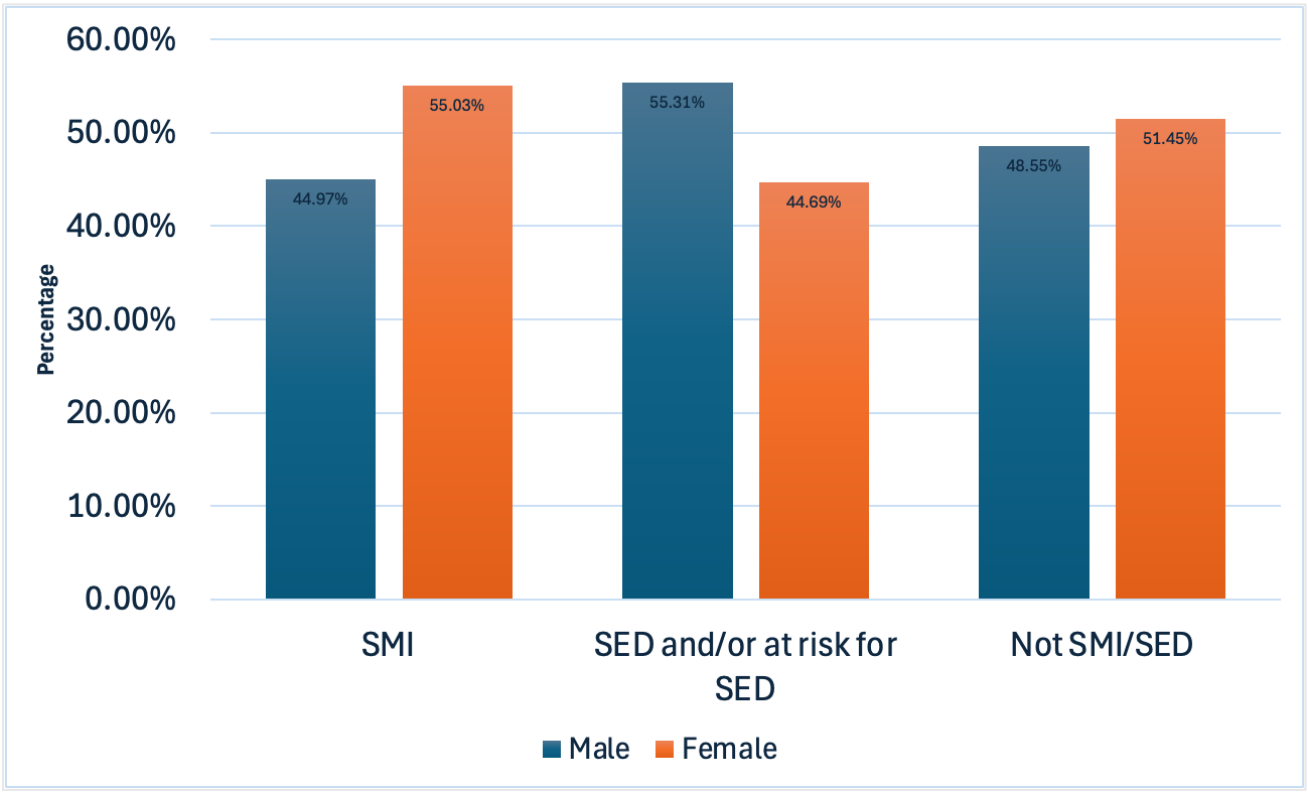


Table 15
SERIOUS MENTAL ILLNESS/SEVERE EMOTIONAL DISTURBANCE (SMI/SED) STATUS BY VETERAN STATUS (FREQUENCY AND PERCENT)

SMI/SED Status	Veterans	Non-Veterans
SMI	173,343 (82.04%)	3,927,315 (57.16%)
SED	1,979 (0.94%)	1,199,198 (17.45%)
Not SMI/SED	35,970 (17.02%)	1,744,350 (25.39%)

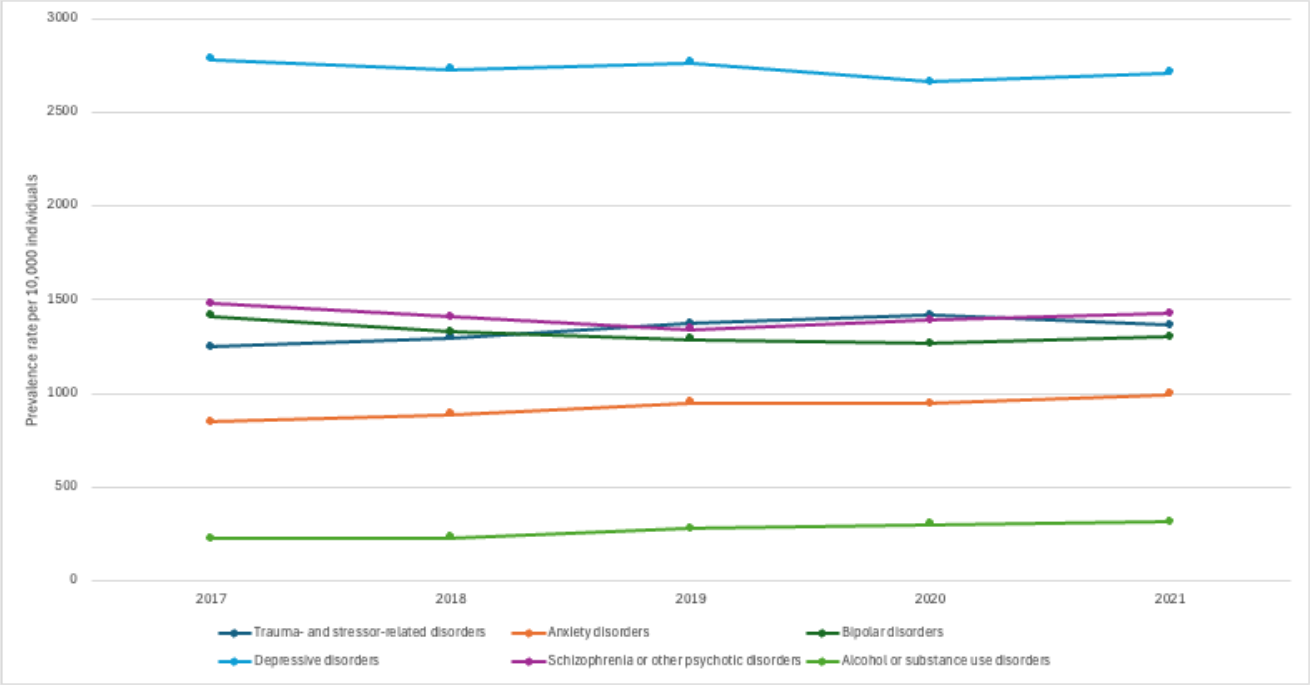
Figure 5 displays the prevalence rates (per 10,000) of the following conditions over the 5-year study period: depressive disorders, schizophrenia or other psychotic disorders, bipolar disorders, trauma- and stressor-related disorders, anxiety disorders, and alcohol or substance use disorders. (Personality disorders, behavioral disorders, and delirium/dementia were excluded from the data visualization to align with the predominant conditions in the Treatment Episode Data Set, which is the dataset used in the next phase of the analysis.) The trend lines show that depressive disorder prevalence (light blue) remained relatively stable across the study period, while bipolar disorder prevalence (dark green) declined. There was a decline in the schizophrenia/other psychotic disorder prevalence (purple) from 2017 to 2019, but prevalence rates increased in 2020 and 2021. Prevalence rates for trauma- and stressor-related disorders (dark blue) increased from 2017 to 2020, but there was a slight decline in 2021. Prevalence rates for anxiety disorders (orange) and alcohol or substance use disorders (light green) increased during the study period. These trends could be explained, in part, by the COVID-19 pandemic. Chacon et al. (2021) highlight the impact of COVID-19 on substance abuse prevalence rates, reporting a 23% increase in alcohol abuse and a 16% increase in drug abuse for individuals with a history of substance use before the pandemic. Furthermore, lockdown, quarantine, and self-isolation measures have been associated with psychological distress, which may have

contributed to both the increase in anxiety disorders and the consumption of substances to cope with uncertainty (Chacon et al., 2021; Vahratian et al., 2021).

The analysis of the MH-CLD (2017-2021) revealed important trends in mental health and substance use disorder prevalence over the 5-year study period. Additionally, differences in disorder prevalence among various groups emerged, prompting further exploration. In the next stage of the analysis, predictors of mortality among clients receiving treatment for mental health and/or substance use disorders are identified.

Figure 5

PREVALENCE OF DEPRESSIVE, SCHIZOPHRENIA & OTHER PSYCHOTIC, BIPOLAR, ANXIETY, TRAUMA- AND STRESSOR-RELATED, AND ALCOHOL/OTHER SUBSTANCE USE DISORDERS, 2017-2021.



Section 4. Substance Abuse Treatment Episode Data – SAMHSA TEDS Dataset

The SAMHSA Treatment Episode Data Set (TEDS) captures mental health and substance use treatment data that states routinely collect to monitor treatment systems. The datasets include items selected from states' administrative records, which are standardized to ensure a consistent format across all states (SAMHSA, n.d.b). The TEDS data system encompasses both admission (TEDS-A) and discharge (TEDS-D) data. TEDS-A data were first reported in 1992; TEDS-D data were first reported in 2000. The TEDS-A datasets include demographic information; substances used by the client (primary, secondary, and tertiary), route of administration, frequency of use, and age at first use; referral sources for treatment; number of prior treatment episodes, and service type. In addition to the listed data fields, the TEDS-D datasets capture the service type at discharge, length of stay, and reason for discharge or service discontinuation. *Death* is listed as one of the reasons for discharge (other reasons include treatment completion; dropping out of treatment; termination by the facility; transfer to another treatment program or facility; incarceration, and other. The breakdown of reasons for treatment discharge or discontinuance is displayed in Appendix B.) This data field was used to create a binary variable ("Death"), which indicates whether the client died during treatment (0 = no, 1 = yes).

The TEDS-D datasets for survey years 2017-2021 were used to determine potential predictors of mortality. Logistic regression analyses were conducted to examine the impact of demographic (i.e., race, gender, veteran status, marital status), socioeconomic (i.e., primary source of payment for treatment, source of income, employment status, education level, living arrangements), and health-related and other SDOH-related indicators (i.e., substance use type, co-occurring mental health and substance use disorders, frequency of attendance at substance use self-help groups, number of previous substance use treatment episodes, and number of days waiting to enter treatment). We interpreted odds ratios (OR) to determine how various demographic, socioeconomic, and health-related exposures influence the likelihood of mortality. The Actuarial Life Table demonstrates that, among men and women, the probability of mortality increases as individuals age (Social Security Administration, n. d.). Taking this point into consideration, age was controlled for age in each logistic regression model (demographic, socioeconomic, SDOH, and the full model) to gain more accurate insights into the effects of other predictors on mortality likelihood.

4.1 SAMHSA QUESTION/SAMPLE SELECTION AND RESPONDENT DEMOGRAPHICS

There are 2,199,658 observations across the 5-year study period. The sample is predominantly male (62.41%), white (74.60%), and non-veteran (97.10%). 62.73% have never been married; 13.80% are now married; 6.81% are separated, and 16.67% are divorced or widowed. 43.21% of the sample are Medicaid beneficiaries; 40.79% reported as having no income; 41.14% were unemployed, and 64% lived independently.

4.2 SAMHSA RESULTS (TEDS-D)

4.2.1 DEMOGRAPHIC INDICATORS

The findings for the total population are presented here. Among this group, race, age, and marital status emerged as significant predictors of mortality (Table 16). Specifically, Asian/Native Hawaiian/Pacific Islander (OR = 0.65, p< .01) and Native American/Alaska Native (OR = 0.42, p< .01) clients had lower odds of mortality than white clients, while clients identified as "Other" had higher odds of mortality (OR = 1.33, p< .01). The odds of mortality were higher for all age categories than for the "Under 18" group (p< .01). Additionally, the odds ratios increased from 2.034 (18-24 years old) to 13.82 (65 years and older). Compared to clients who never married, the odds of mortality were lower for clients who are currently married (OR = 0.79, p< .01) or separated (OR = 0.83, p< .01). Gender and veteran status were not significant predictors of mortality.

Table 16

LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT - DEMOGRAPHIC INDICATORS

Variable	OR (95% CI)
Reference group: White	---
Black/African American	0.92 (0.86-1.00)
Asian/Native Hawaiian/Pacific Islander	0.65 (0.48-0.87) **
Native American/Alaska Native	0.42 (0.33-0.54) **
Other	1.33 (1.16-1.53) **
Reference group: Male	---
Female	0.98 (0.92-1.05)
Reference group: Under 18	---
Age – 18-24 years old	2.04 (1.49-2.79) **
Age – 25-34 years old	2.57 (1.90-3.46) **
Age – 35-44 years old	3.50 (2.59-4.73) **
Age – 45-54 years old	5.27 (3.90-7.12) **
Age – 55-64 years old	7.83 (5.76-10.60) **
65 years and older	13.82 (9.93-19.22) **
Reference group: Veterans	---
Non-veterans	1.17 (1.00-1.38)
Reference group: Never married	---
Now married	0.79 (0.72-0.87) **
Separated	0.83 (0.74-0.94) **
Divorced, widowed	0.93 (0.85-1.00)

Note: The equation for the demographic model is logit(P(Death)) = β0 +β1 ·Race+β2 ·Gender+β3 ·Age Category+β4 ·Veteran Status+β5 ·Marital Status.

Table 17 contains the logistic regression results for the socioeconomic indicators, controlling for age. Primary source of payment for treatment, source of income, employment status at time of admission, and living arrangements at time of admission predicted the likelihood of mortality. Compared to self-pay clients, the odds of mortality were lower for those who had private insurance (OR= 0.53, p< .01) or other government payments (OR= 0.74, p< .01). On the other hand, the odds of mortality were higher for Medicaid clients (OR= 1.15, p< .01), those who received free care (e.g., charity, special research, or teaching) (OR= 2.07, p< .01), and those with other primary sources of payment (OR= 1.19, p< .01). Individuals whose primary source of income was public assistance (OR= 1.83, p< .01), retirement/pension or disability (OR= 1.80, p< .01), or other (OR = 1.21, p< .01) had higher odds of mortality than individuals whose primary source of income was wages/salary. The odds of mortality were lower for clients who had no primary source of income (OR= 0.87, p< .01). Clients who worked part-time (OR = 1.21, p< .01) or were not in the labor force (OR= 1.31, p< .01) had higher odds of mortality than those who worked full-time. Clients who were living independently (OR= 2.64, p< .01) or in a dependent living setting (OR= 1.69, p< .01) had higher odds of mortality than those experiencing homelessness.

Table 17
LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT - SOCIOECONOMIC INDICATORS

Variable	OR (95% CI)
Reference group: Self-pay	---
Private insurance	0.53 (0.45-0.62) **
Medicare	1.05 (0.83-1.34)
Medicaid	1.15 (1.03-1.28) **
Other government payments	0.74 (0.65-0.83) **
No charge (free, charity, special research)	2.07 (1.78-2.41) **
Other	1.19 (1.03-1.40) **
Reference group: Wages/salary as primary source of income	---
Public assistance	1.83 (1.59-2.11) **
Retirement/pension, disability	1.80 (1.57-2.06) **
Other	1.21 (1.05-1.38) **
None	0.87 (0.77-0.98) **
Reference group: Full-time employment	---
Part-time employment	1.21 (1.06-1.38) **
Unemployed	1.02 (0.90-1.16)
Not in labor force	1.31 (1.15-1.49) **
Reference group: < one school grade, no schooling, nursery school, K-8	---
Grades 9-11	1.07 (0.92-1.25)
Grade 12 or GED	1.09 (0.95-1.26)
1-3 years of college, university, or vocational school	1.11 (0.95-1.29)
4 years of college, university, BA/BS, some postgraduate study, or more	1.03 (0.86-1.24)
Reference group: Experiencing homelessness	---
Dependent living	1.69 (1.47-1.96) **
Independent living	2.64 (2.34-2.98) **
Reference group: Under 18	---
Age – 18-24 years old	1.84 (1.32-2.57) **
Age – 25-34 years old	2.13 (1.55-2.93) **
Age – 35-44 years old	2.70 (1.96-3.71) **
Age – 45-54 years old	3.79 (2.76-5.21) **
Age – 55-64 years old	4.85 (3.51-6.69) **
Age – 65 years and older	6.48 (4.56-9.22) **

Note: The equation for the sociodemographic model is logit(P(Death)) = $\beta 0 + \beta 1 \cdot$Primary Payment Source$+\beta 2 \cdot$Primary Income Source$+\beta 3 \cdot$Employment Status$+\beta 4 \cdot$Education Level$+\beta 5 \cdot$Living Arrangement$+\beta 6 \cdot$Age Category.

4.2.2 HEALTH-RELATED AND OTHER SDOH-RELATED INDICATORS

Table 18 contains the logistic regression results for health-related and SDOH-related indicators, controlling for age. Substance use type, co-occurring mental and substance use disorders, frequency of attendance at self-help groups, number of previous substance use treatment episodes, and number of days waiting to enter treatment predicted the likelihood of mortality. Clients with any form of substance use (alcohol only, other drugs only, or alcohol and other drugs) had higher odds of mortality than those who did not use substances. Clients who did not have co-

occurring mental and substance use disorders had lower odds of mortality (OR= 0.87, p< .01) than those who had co-occurring disorders. Clients who attended substance use self-help groups 30 days before starting treatment (1-3 times and 8-30 times in the past month) had higher odds of mortality than those who did not attend. Those who had one or more prior treatment episodes had higher odds of mortality than those who had not sought treatment previously (OR= 1.19, p< .01). Finally, those who had to wait 1-7 days to enter treatment had higher odds of mortality (OR= 1.24, p< .01) than those with no wait.

Table 18

LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT - HEALTH-RELATED AND OTHER SDOH-RELATED INDICATORS

Variable	OR (95% CI)
Reference group: No substance use	---
Alcohol use only	2.80 (1.05-7.51) **
Other drug use only	7.63 (2.86-20.38) **
Alcohol and other drug use	4.41 (1.65-11.80) **
Reference group: Co-occurring MH and SU disorders	---
No co-occurring MH and SU disorders	0.87 (0.81-0.94) **
Reference group: No attendance at SU self-help groups	---
Attendance at SU self-help groups: 1-3 times in the past month	1.32 (1.17-1.50) **
Attendance at SU self-help groups: 4-7 times in the past month	1.04 (0.88-1.23)
Attendance at SU self-help groups: 8-30 times in the past month	1.24 (1.10-1.39) **
Attendance at SU self-help groups: Some attendance, frequency unknown	1.03 (0.79-1.36)
Reference group: No prior treatment episodes	---
One or more prior treatment episodes	1.19 (1.09-1.30) **
Reference group: No days waiting to enter SU treatment	---
Days waiting to enter SU treatment: 1-7 days	1.24 (1.13-1.35) **
Days waiting to enter SU treatment: 8-14 days	1.02 (0.84-1.22)
Days waiting to enter SU treatment: 15-30 days	1.13 (0.93-1.37)
Days waiting to enter SU treatment: 31 or more	1.20 (0.95-1.50)
Reference group: Under 18	---
Age – 18-24 years old	1.65 (1.13-2.41) **
Age – 25-34 years old	2.14 (1.49-3.07) **
Age – 35-44 years old	2.96 (2.06-4.25) **
Age – 45-54 years old	4.41 (3.07-6.34) **
Age – 55-64 years old	7.10 (4.93-10.24) **
Age – 65 years and older	14.43 (9.74-21.39) **

Note: The equation for the health-related/SDOH model is logit(P(Death)) = β0 +β1 ·Substance Use Type+β2 ·Co-occurring Disorder+β3 ·Self-help Group Attendance+β4 ·Previous Treatment Episodes+β5 ·Days Waiting for Treatment+β6 ·Age Category

The results of the full model are presented in **Appendix C**.

Next, logistic regression analyses were conducted for the adult population (18 years of age and older). Again, age was controlled for in each model. The results are presented in Tables 19, 20, and 21. The full model results for the adult population are presented in **Appendix D**. Similar patterns emerged when compared to the total population.

Table 19

LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT - DEMOGRAPHIC INDICATORS (18 AND OVER ONLY)

Variable	OR (95% CI)
Reference group: White	---
Black/African American	0.93 (0.85-1.00)
Asian/Native Hawaiian/Pacific Islander	0.67 (0.49-0.90) **
Native American/Alaska Native	0.41 (0.32-0.53) **
Other	1.34 (1.17-1.54) **
Reference group: Male	---
Female	0.98 (0.92-1.05)
Reference group: 18-24 years old	---
Age – 25-34 years old	1.25 (1.11-1.43) **
Age – 35-44 years old	1.72 (1.51-1.96) **
Age – 45-54 years old	2.58 (2.26-2.95) **
Age – 55-64 years old	3.84 (3.34-4.41) **
65 years and older	6.77 (5.60-8.19) **
Reference group: Veterans	---
Non-veterans	1.17 (0.99-1.38)
Reference group: Never married	---
Now married	0.79 (0.72-0.87) **
Separated	0.84 (0.74-0.95) **
Divorced, widowed	0.93 (0.85-1.00)

Table 20

LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT - SOCIOECONOMIC INDICATORS (18 YEARS AND OVER ONLY)

Variable	OR (95% CI)
Reference group: Self-pay	---
Private insurance	0.51 (0.43-0.60) **
Medicare	1.05 (0.83-1.34)
Medicaid	1.15 (1.03-1.28) **
Other government payments	0.75 (0.66-0.84) **
No charge (free, charity, special research)	2.07 (1.78-2.41) **
Other	1.19 (1.04-1.37) **
Reference group: Wages/salary as primary source of income	---
Public assistance	1.84 (1.59-2.12) **
Retirement/pension, disability	1.80 (1.57-2.07) **
Other	1.20 (1.05-1.38) **
None	0.87 (0.77-0.98) **
Reference group: Full-time employment	---
Part-time employment	1.20 (1.05-1.37) **
Unemployed	1.02 (0.89-1.16)
Not in labor force	1.31 (1.14-1.50) **
Reference group: < one school grade, no schooling, nursery school, K-8	---
Grades 9-11	1.06 (0.90-1.24)
Grade 12 or GED	1.08 (0.93-1.25)
1-3 years of college, university, or vocational school	1.10 (0.94-1.28)
4 years of college, university, BA/BS, some postgraduate study, or more	1.03 (0.85-1.24)
Reference group: Experiencing homelessness	---
Dependent living	1.69 (1.46-1.95) **
Independent living	2.64 (2.34-2.98) **
Reference group: 18-24 years old	---
Age – 25-34 years old	1.16 (1.01-1.31) **
Age – 35- 44 years old	1.46 (1.28-1.67) **
Age – 45-54 years old	2.05 (1.79-2.35) **
Age – 55-64 years old	2.63 (2.27-3.03) **
Age – 65 years and older	3.50 (2.86-4.29) **

Table 21

LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT - HEALTH-RELATED AND OTHER INDICATORS (18 AND OVER ONLY)

Variable	OR (95% CI)
Reference group: No substance use	---
Alcohol use only	2.75 (1.02-7.37) **
Other drug use only	7.50 (2.81-20.05) **
Alcohol and other drug use	4.36 (1.63-11.66) **
Reference group: Co-occurring MH and SU disorders	---
No co-occurring MH and SU disorders	0.88 (0.81-0.94) **
Reference group: No attendance at SU self-help groups	---
Attendance at SU self-help groups: 1-3 times in the past month	1.31 (1.15-1.48) **
Attendance at SU self-help groups: 4-7 times in the past month	1.04 (0.88-1.23)
Attendance at SU self-help groups: 8-30 times in the past month	1.24 (1.10-1.40) **
Attendance at SU self-help groups: Some attendance, frequency unknown	1.02 (0.77-1.34)
Reference group: No prior treatment episodes	---
One or more prior treatment episodes	1.19 (1.09-1.30) **
Reference group: No days waiting to enter SU treatment	---
Days waiting to enter SU treatment: 1-7 days	1.24 (1.14-1.36) **
Days waiting to enter SU treatment: 8-14 days	1.00 (0.83-1.20)
Days waiting to enter SU treatment: 15-30 days	1.15 (0.95-1.39)
Days waiting to enter SU treatment: 31 or more	1.19 (0.95-1.50)
Reference group: 18-24 Years Old	---
Age – 25-34 years old	1.30 (1.11-152) **
Age – 35-44 years old	1.79 (1.53-2.10) **
Age – 45-54 years old	2.67 (2.27-3.14) **
Age – 55-64 years old	4.31 (3.64-5.09) **
Age – 65 years and older	8.75 (7.01-10.93) **

Section 5: Underwriting and Insurance Applicability

Study findings suggest strong correlation and significant relationships between depressive disorder, general health status, comorbidities, mortality, and some social determinants of health (Bahorik et al, 2017; Crump, 2013). Depressive disorder was reported by respondents between 45yrs and 64yrs at a rate of 39.11%, with the greatest number of comorbidities reported among these ages as well. The greatest number of poor mental health days was one week (26.10%) followed by four weeks (21.51%), indicating that almost half of those with depressive disorder experience notable poor mental health days, even when poor physical health days are not as prevalent. The depressive disorder population is predominantly insured (72.29%) meaning a high probability of impact to insurers and healthcare providers. Proper assessment of health risk allows insurers to not only anticipate costs, but to ensure adequate availability of its products and services. While the standard health risk assessment captures routine health habits and behaviors, adjustments should be made to include indicators/metrics designed to ensure the availability of needed mental health insurance products and services (Gurewich, 2020; Ward, 2022). These adjustments would be implemented at multiple stages of the underwriting process for longer-term operating efficiency while meeting increased demands. Changes for mental health risk assessment would indeed be systemic for both insurers and mental healthcare providers and would begin with the initial patient/client data collection efforts. (Larger insurers would adjust experience ratings methodology, smaller insurers would adjust modified community ratings, both at initial data collection).

5.1 DATA COLLECTION AND PREDICTIVE ANALYTICS

At the onset of the application and subsequent underwriting process, additional information needs to be collected on mental health status and associated physical conditions. Typical clinical review (medical records, prescriptions, physician statements) captures basic information, which should be expanded to capture mental health markers and contributing attributes. Presence of mental health diagnoses (primary, secondary, and tertiary), illnesses and comorbidities, as well as behaviors that exacerbate mental health episodes (i.e., alcohol and substance use) should be considered in risk calculations for premium development and utilization/claims estimates. Social determinants of health (SDOH) may also be indicators and should be included in the data collection process. Predictive analytics would help insurers identify patterns in the mental health population to tailor insurance coverage products/services, supporting decision making efforts throughout the organization (Bharadiya, 2023). Specifically, improved predictive analytics capabilities would directly impact:

- Application, interview, and triage,
- Systems upgrade for analysis and underwriting,
- Automated decision support and modeling.

Initiatives such as these enhance internal underwriting processes by estimating the probability of product purchases and by streamlining the front-end entry into the system. Data collected supports faster and more accurate scoring and the projection of claims volume and costs, cost ratios relative to insurance product or plan, and potential losses relative to providers and/or contractual agreements (Filabi et al., 2021; Jansen et al., 2024). The feasibility of the technological upgrades required to achieve this type of data transformation varies by size of insurer and availability of resources.

5.2 INSURER/ORGANIZATION STRATEGIES

Many larger insurers have already begun the process of legacy systems upgrades and now employ various forms of AI and machine learning for automated risk assessment and accelerated underwriting (Maier et al., 2019; Richie, 2024). The implementation of additional mental health indicators into these advanced systems will enhance risk modeling as well as identifying the likelihood of increased mental health claims and costs. For smaller insurers, technological advancements may require more planning but the improvements to the underwriting process would

still be evident. Coverage for small groups would possibly require changes to community ratings programming to properly identify/predict mental health indicators and characteristics. While systems upgrades do not protect insurers of any size from the risks of moral hazard, upgrades may provide the ability to assess mental health claims risk more effectively, for efficient internal operations and improved client satisfaction (Sutanto et al., 2023). Insurers of all sizes could utilize this information to right-size its network, ensuring the appropriate mix of health providers, facilities and other partners. For life insurers, more complete data on SDOH, lifestyle habits/behaviors, and mental health diagnoses may help with the identification of the appropriate insurance product. Having details on diagnosis and clear treatment history may make the difference between denial of coverage and offering a different insurance policy/plan (term or reduced term policy instead of whole life).

Section 6: Conclusion/Summary Statements and Limitations

The utilization of three different datasets provided insight into characteristics of persons with mental health diagnoses and the likelihood of factors predicting mortality. In all three datasets used for this study (BRFSS, SAMHSA-CLD, and SAMHSA-TEDS-D), depressive disorders were the most prevalent diagnosis among survey respondents/clients reported. The BRFSS dataset reported 19.17% of the survey respondents reported depressive disorder diagnoses, which trends with the national average of approximately 20% in U.S. adults. Depressive disorder diagnoses were most prevalent in women, while men were primarily diagnosed with schizophrenia and other psychotic disorders. Race, age, and marital status emerged as the primary predictors of mortality, across genders and income levels. Likelihood of mortality was highest among white female patients with depressive disorders in the 65 and over age range. Married patients had an overall lower likelihood of mortality than unmarried patients/respondents. Insurance coverage also emerged as an indicator, with most having privately held/employment related plans. Privately insured clients had lower odds of mortality than those with public assistance or free healthcare (retirement and disability included). Alcohol related disorders increased during the study period, serving as a consistent indicator for this study population. Chronic illness also emerged as a strong indicator, with 66.32% of the BRFSS depressive disorder population having at least one chronic illness.

While this study yields useful insights into life insurance underwriting practices, there are limitations that must be acknowledged. First, secondary data were used for the analyses. Despite the richness of the data sources used, some key variables were missing (i.e., the SAMHSA datasets do not contain information related to medical comorbidities or cause of death). Additionally, missing observations were removed during the data cleaning process, resulting in a smaller sample size. Secondly, underwriting practices for most insurers are proprietary in nature, so this research relies solely on the publicly available data from AHIP. Finally, the research was conducted using data specific to the U.S. context. As a result, the findings may be limited to U.S. providers and insurers.

Despite these limitations, the findings of this research provide valuable insights into the connection between mental health and mortality and the social determinants of health that influence this relationship. Furthermore, this work provides evidence-based suggestions on how to improve underwriting practices to foster improved mental health outcomes, as well as practice implications for life insurance. This important work will offer support to future health services researchers, by providing valuable insight into the impacts of social determinants of health on mental health outcomes. The authors appreciate the opportunity to collaborate on this research.

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Section 8: Appendices

APPENDIX A: LOGISTIC REGRESSION MODEL FOR BRFSS INDICATORS – FULL MODEL

Multivariate Analysis Results - Depressive Disorder as Outcome Variable					
Predictor Category	Coefficient	Standard Error	P-Value/ Significance	95% Confidence Interval	
Demographic Characteristics					
Age Range					
26yrs-34yrs	-0.0060295	0.0019173	0.002	-0.0097873	-0.0022717
35yrs-44yrs	0.0077908	0.0018319	0.000	0.0042003	0.0113812
45yrs-54yrs	0.0238784	0.0017726	0.000	0.0204041	0.0273526
55yrs-64yrs	0.0168888	0.0017122	0.000	0.0135329	0.0202447
65yrs+	0.0930741	0.0016377	0.000	0.0898643	0.0962839
Respondent Sex					
Female	-0.110538	0.0008338	0.000	-0.1121723	-0.1089037
Unknown	-0.0225903	0.0272719	0.407	-0.0760422	0.0308616
Refused	0.2383734	0.0184729	0.000	0.2021671	0.2745798
Respondent Race					
Black/African American	0.0581874	0.0014556	0.000	0.0553345	0.0610403
Asian	0.1330504	0.0025402	0.000	0.1280716	0.1380291
Alaskan/Native American	0.0084013	0.0029372	0.004	0.0026445	0.0141582
Hispanic/Latino	0.0498258	0.0014089	0.000	0.0470644	0.0525871
Other	-0.0001666	0.0021648	0.939	-0.0044095	0.0040763
Veteran Status					
No	0.0337113	0.0012717	0.000	0.0312189	0.0362037
Unknown	0.1463544	0.0206079	0.000	0.1059636	0.1867452
Refused	0.6554518	0.0083694	0.000	0.6390482	0.6718555
Economic Stability Indicators					
Employment Status					
Self Employed	0.0316281	0.0014233	0.000	0.0288384	0.0344177
Out of Work > 1Yr	-0.1127747	0.0028543	0.000	-0.1183691	-0.1071802
Out of Work < 1Yr	-0.0818609	0.0026171	0.000	-0.0869904	-0.0767315
Homemaker	-0.0502241	0.0020032	0.000	-0.0541502	-0.046298

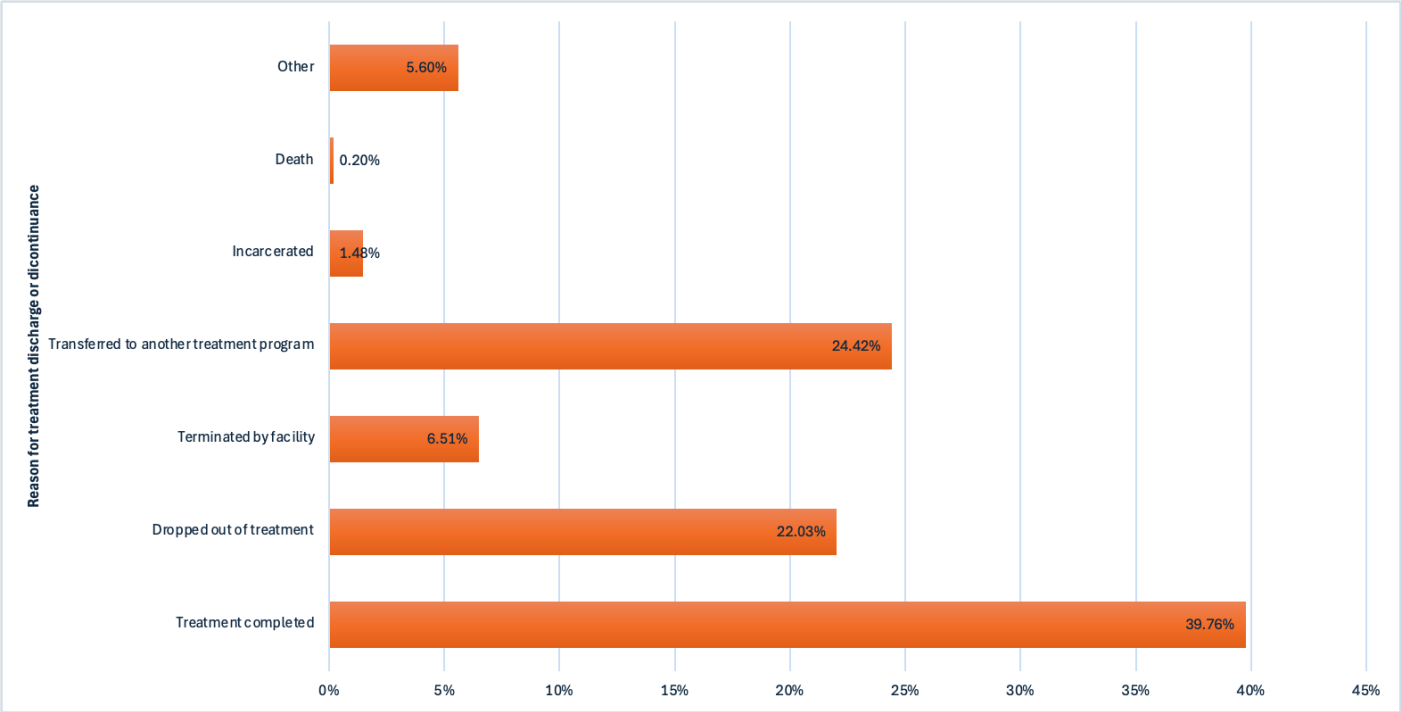
Multivariate Analysis Results - Depressive Disorder as Outcome Variable					
Student	-0.0246383	0.0027	0.000	-0.0299302	-0.0193464
Retired	0.0142756	0.0010216	0.000	0.0122734	0.0162778
Unable to Work	-0.2842375	0.0017553	0.000	-0.2876777	-0.2807972
Refused	0.0706505	0.0057554	0.000	0.05937	0.0819309
Income Range					
$20,000-$49,999	0.0203149	0.0012762	0.000	0.0178136	0.0228163
$50,000-$74,999	0.0330285	0.0015127	0.000	0.0300637	0.0359933
$75,000-$99,999	0.0570838	0.0014295	0.000	0.054282	0.0598856
$100,000-$149,999	0.0358039	0.0026747	0.000	0.0305616	0.0410462
$150,000-$199,999	0.0536747	0.0038832	0.000	0.0460637	0.0612856
$200,000+	0.073394	0.0039594	0.000	0.0656337	0.0811542
Marital Status					
Divorced	-0.0719815	0.0012417	0.000	-0.0744151	-0.0695479
Widowed	0.0019892	0.0014154	0.160	-0.000785	0.0047634
Separated	-0.080911	0.0028022	0.000	-0.0864033	-0.0754187
Never Married	-0.0276663	0.0012007	0.000	-0.0300196	-0.0253129
Unmarried Couple	-0.0649663	0.002109	0.000	-0.0690998	-0.0608329
Refused	0.1080361	0.0062301	0.000	0.0958253	0.1202469
Education Indicator					
Education Level					
Elementary (Grades 1-8)	-0.0506535	-4.780	0.000	-0.0714048	-0.0299023
High School (9th Grade)	-0.113058	-10.850	0.000	-0.133479	-0.0926371
HS Graduate/GED	-0.0617383	-6.000	0.000	-0.0818976	-0.041579
Some College (1-3 Yrs)	-0.0869844	-8.460	0.000	-0.1071418	-0.066827
College Graduate	-0.0404349	-3.930	0.000	-0.0605777	-0.0202922
Refused	0.3760754	31.840	0.000	0.352923	0.3992279
Healthcare Access/Quality Indicators					
Health Insurance					
No	-0.0162632	0.0016455	0.000	-0.0194884	-0.013038
Unknown	0.0902523	0.0082936	0.000	0.0739972	0.1065074
Refused	0.3912031	0.0101529	0.000	0.3713037	0.4111024
Personal Provider					
Yes, Multiple	-0.0225491	0.0016497	0.000	-0.0257825	-0.0193158
No	0.0503244	0.0012206	0.000	0.047932	0.0527167
Unknown	0.1026891	0.0076757	0.000	0.0876449	0.1177332
Refused	0.3893265	0.0122311	0.000	0.3653539	0.4132991

Multivariate Analysis Results - Depressive Disorder as Outcome Variable					
HRQOL-4 Indicators					
Health Status					
Very Good Health	-0.0518208	0.0022152	0.000	-0.0561626	-0.047479
Good Health	-0.0846588	0.002207	0.000	-0.0889845	-0.0803332
Fair Health	-0.1167747	0.0025073	0.000	-0.1216889	-0.1118604
Poor Health	-0.126164	0.003245	0.000	-0.1325241	-0.1198039
Unknown	0.0245673	0.0126801	0.053	-0.0002854	0.0494199
Refused	0.4410261	0.0193701	0.000	0.4030613	0.4789909
Poor Mental Health Days					
Two Weeks (8-14 days)	-0.1162087	0.002464	0.000	-0.121038	-0.1113793
Three Weeks (15-21 days)	-0.1933206	0.0024059	0.000	-0.1980361	-0.1886051
Four Weeks (22-31 days)	-0.2529408	0.0021894	0.000	-0.257232	-0.2486496
Unknown	0.0865005	0.004221	0.000	0.0782276	0.0947735
No Days Missed	0.1861764	0.0017192	0.000	0.1828068	0.189546
Refused	0.5663536	0.0069956	0.000	0.5526424	0.5800648
Poor Physical Health Days					
Two Weeks (8-14 days)	-0.0040515	0.002642	0.125	-0.0092297	0.0011267
Three Weeks (15-21 days)	0.0039968	0.0028274	0.157	-0.0015447	0.0095384
Four Weeks (22-31 days)	0.0147842	0.0023364	0.000	0.0102049	0.0193635
Unknown	0.0481594	0.003694	0.000	0.0409193	0.0553996
No Days Missed	0.0473831	0.0017561	0.000	0.0439413	0.050825
Refused	0.033432	0.0077136	0.000	0.0183136	0.0485504
Poor Mental and Physical Health Days					
8 to 14 days	-0.0389507	0.0030749	0.000	-0.0449775	-0.0329239
15 to 21 days	-0.0668547	0.0030339	0.000	-0.0728009	-0.0609084
22 to 31 days	-0.0307185	0.0028261	0.000	-0.0362576	-0.0251795
Unknown	0.0921654	0.0049943	0.000	0.0823766	0.1019541
No Days Missed	0.0929435	0.0015914	0.000	0.0898243	0.0960626
Refused	0.445183	0.0095138	0.000	0.4265362	0.4638297
Chronic Illness/Comorbidity Indicators					
Hypertension Diagnosis					
Yes, Pregnancy	-0.0806329	0.008505	0.000	-0.0973024	-0.0639633
No	-0.0041692	0.0016547	0.012	-0.0074122	-0.0009261
Borderline	0.0202957	0.0075668	0.007	0.0054651	0.0351263
Unknown	0.1171204	0.015471	0.000	0.0867976	0.1474432

Multivariate Analysis Results - Depressive Disorder as Outcome Variable					
Refused	0.3676529	0.0238722	0.000	0.3208642	0.4144416
Diabetes Diagnosis					
Yes, Pregnancy	-0.1693387	0.5395095	0.754	-1.22676	0.888083
No	-0.1124567	0.5394533	0.835	-1.169768	0.9448548
Borderline	-0.1017145	0.5394805	0.850	-1.159079	0.9556503
Unknown	0.1367974	0.5397724	0.800	-0.9211395	1.194734
Refused	1.010014	0.5417577	0.062	-0.0518139	2.071842
Prediabetes Diagnosis					
Yes, Pregnancy	-0.0323253	0.0078123	0.000	-0.0476371	-0.0170135
No	0.0536028	0.0025749	0.000	0.0485561	0.0586496
Unknown	0.1483154	0.0116532	0.000	0.1254756	0.1711552
Refused	0.7041929	0.0435309	0.000	0.6188737	0.7895121
Heart Disease Diagnosis (Reference group: Yes Responses)					
No	0.0098717	0.0037597	0.009	0.0025028	0.0172406
Unknown	0.1276892	0.0094366	0.000	0.1091938	0.1461845
Refused	0.7346185	0.0428701	0.000	0.6505945	0.8186425
COPD Diagnosis (Reference group: Yes Responses)					
No	0.149674	0.0029012	0.000	0.1439877	0.1553604
Unknown	0.2994743	0.0118645	0.000	0.2762203	0.3227283
Refused	1.806067	0.0513208	0.000	1.70548	1.906654
Kidney Disease Diagnosis (Reference group: Yes Responses)					
No	0.0676317	0.0045075	0.000	0.0587971	0.0764662
Unknown	0.2043378	0.0152206	0.000	0.1745059	0.2341696
Refused	1.745456	0.0501613	0.000	1.647141	1.84377
Arthritis Diagnosis (Reference group: Yes Responses)					
No	0.1005885	0.0016956	0.000	0.0972651	0.1039119
Unknown	0.233781	0.0102399	0.000	0.2137111	0.253851
Refused	0.7761231	0.0421523	0.000	0.6935058	0.8587403
Neighborhood and Built Environment					
Location (reference group: Urban Location)					
Rural Location	-.0013668	.0012488	-1.09	0.274	-.0038143

Multivariate Analysis Results - Depressive Disorder as Outcome Variable					
Own	-0.0941278	0.0010516	0.000	-0.0961889	-0.0920666
Rent	-0.0811874	0.00209	0.000	-0.0852838	-0.077091
Other Arrangement	0.0282337	0.0097014	0.004	0.0092194	0.0472481
Refused/Unknown	0.3895616	0.0055304	0.000	0.3787221	0.4004011

APPENDIX B: REASON FOR TREATMENT DISCHARGE OR DISCONTINUANCE (TEDS-D)



APPENDIX C: LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT – FULL MODEL

Variable	OR (95% CI)
Reference group: White	---
Black/African American	0.73 (0.66-0.81) **
Asian/Native Hawaiian/Pacific Islander	0.53 (0.36-0.77) **
Native American/Alaska Native	0.44 (0.32-0.60) **
Other	1.11 (0.92-1.34)
Reference group: Male	---
Female	0.87 (0.80-0.94) **
Reference group: Under 18	---
Age – 18-24 years old	1.48 (0.99-2.20)
Age – 25-34 years old	1.89 (1.29-2.77) **
Age – 35-44 years old	2.55 (1.73-3.74) **
Age – 45-54 years old	3.70 (2.52-5.46) **
Age – 55-64 years old	5.23 (3.53-7.74) **
65 years and older	8.59 (5.61-13.18) **
Reference group: Veterans	---
Non-veterans	1.17 (0.95-1.44)
Reference group: Never married	---
Now married	0.84 (0.74-0.94) **
Separated	0.89 (0.75-1.04)
Divorced, widowed	0.94 (0.85-1.05)
Reference group: Self-pay	---
Private insurance	0.62 (0.50-0.78) **
Medicare	1.12 (0.84-1.51)
Medicaid	1.25 (1.08-1.44) **
Other government payments	0.87 (0.75-1.04)
No charge (free, charity, special research)	1.72 (1.43-2.08) **
Other	1.42 (1.18-1.70) **
Reference group: Wages/salary as primary source of income	---
Public assistance	1.64 (1.36-1.98) **

Variable	OR (95% CI)
Retirement/pension, disability	1.91 (1.60-2.29) **
Other	1.31 (1.10-1.57) **
None	0.87 (0.74-1.02)
Reference group: Full-time employment	---
Part-time employment	1.07 (0.91-1.27)
Unemployed	1.01 (0.85-1.19)
Not in labor force	1.06 (0.89-1.27)
Reference group: < one school grade, no schooling, nursery school, K-8	---
Grades 9-11	0.98 (0.80-1.20)
Grade 12 or GED	0.99 (0.82-1.20)
1-3 years of college, university, or vocational school	1.03 (0.84-1.27)
4 years of college, university, BA/BS, some postgraduate study, or more	1.00 (0.79-1.27)
Reference group: Experiencing homelessness	---
Dependent living	1.72 (1.45-2.04) **
Independent living	2.73 (2.37-3.15) **
Reference group: No substance use	---
Alcohol use only	3.03 (1.13-8.14) **
Other drug use only	7.15 (2.67-19.13) **
Alcohol and other drug use	4.52 (1.69-12.11) **
Reference group: Co-occurring MH and SU disorders	---
No co-occurring MH and SU disorders	0.91 (0.84-0.98) **
Reference group: No attendance at SU self-help groups	---
Attendance at SU self-help groups: 1-3 times in the past month	1.35 (1.17-1.52) **
Attendance at SU self-help groups: 4-7 times in the past month	1.06 (0.89-1.26)
Attendance at SU self-help groups: 8-30 times in the past month	1.27 (1.13-1.44) **
Attendance at SU self-help groups: Some attendance, frequency unknown	1.04 (0.77-1.39)
Reference group: No prior treatment episodes	---
One or more prior treatment episodes	1.17 (1.07-1.28) **
Reference group: No days waiting to enter SU treatment	---
Days waiting to enter SU treatment: 1-7 days	1.15 (1.05-1.26) **
Days waiting to enter SU treatment: 8-14 days	0.94 (0.78-1.14)
Days waiting to enter SU treatment: 15-30 days	1.07 (0.88-1.30)
Days waiting to enter SU treatment: 31 or more	1.10 (0.87-1.39)

APPENDIX D: LOGISTIC REGRESSION MODEL FOR MORTALITY DURING TREATMENT - FULL MODEL (18 YEARS AND OVER ONLY)

Variable	OR (95% CI)
Reference group: White	---
Black/African American	0.74 (0.66-0.82) **
Asian/Native Hawaiian/Pacific Islander	0.54 (0.37-0.79) **
Native American/Alaska Native	0.42 (0.31-0.58) **
Other	1.10 (0.91-1.34)
Reference group: Male	---
Female	0.87 (0.80-0.95) **
Reference group: 18-24 years old	---
Age – 25-34 years old	1.28 (1.08-1.51) **
Age – 35-44 years old	1.72 (1.45-2.05) **
Age – 45-54 years old	2.51 (2.10-3.00) **
Age – 55-64 years old	3.54 (2.92-4.28) **
65 years and older	5.81 (4.50-7.49) **
Reference group: Veterans	---
Non-veterans	1.17 (0.95-1.44)
Reference group: Never married	---
Now married	0.84 (0.75-0.95) **
Separated	0.89 (0.75-1.04) **
Divorced, widowed	0.94 (0.85-1.05)
Reference group: Self-pay	---
Private insurance	0.61 (0.48-0.76) **
Medicare	1.13 (0.84-1.52)
Medicaid	1.24 (1.08-1.44) **
Other government payments	0.88 (0.75-1.03)
No charge (free, charity, special research)	1.72 (1.42-2.08) **
Other	1.42 (1.18-1.71) **
Reference group: Wages/salary as primary source of income	---
Public assistance	1.64 (1.36-1.98) **
Retirement/pension, disability	1.92 (1.60-2.30) **
Other	1.30 (1.09-1.56) **
None	0.87 (0.74-1.03)
Reference group: Full-time employment	---
Part-time employment	1.07 (0.91-1.27)
Unemployed	1.01 (0.85-1.20)
Not in labor force	1.06 (0.89-1.26)
Reference group: < one school grade, no schooling, nursery school, K-8	---
Grades 9-11	0.99 (0.81-1.23)
Grade 12 or GED	1.00 (0.82-1.21)
1-3 years of college, university, or vocational school	1.04 (0.84-1.28)

Variable	OR (95% CI)
4 years of college, university, BA/BS, some postgraduate study, or more	1.01 (0.79-1.29)
Reference group: Experiencing homelessness	---
Dependent living	1.72 (1.45-2.03) **
Independent living	2.73 (2.37-3.14) **
Reference group: No substance use	---
Alcohol use only	2.99 (1.11-8.02) **
Other drug use only	7.04 (2.63-18.84) **
Alcohol and other drug use	4.48 (1.67-12.01) **
Reference group: Co-occurring MH and SU disorders	---
No co-occurring MH and SU disorders	0.91 (0.84-0.98) **
Reference group: No attendance at SU self-help groups	---
Attendance at SU self-help groups: 1-3 times in the past month	1.33 (1.16-1.51) **
Attendance at SU self-help groups: 4-7 times in the past month	1.06 (0.89-1.26)
Attendance at SU self-help groups: 8-30 times in the past month	1.28 (1.13-1.45) **
Attendance at SU self-help groups: Some attendance, frequency unknown	1.02 (0.76-1.37)
Reference group: No prior treatment episodes	---
One or more prior treatment episodes	1.17 (1.07-1.28) **
Reference group: No days waiting to enter SU treatment	---
Days waiting to enter SU treatment: 1-7 days	1.16 (1.06-1.27) **
Days waiting to enter SU treatment: 8-14 days	0.92 (0.76-1.13)
Days waiting to enter SU treatment: 15-30 days	1.08 (0.89-1.31)
Days waiting to enter SU treatment: 31 or more	1.10 (0.87-1.39)

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