Tackling Treatment Access for Substance Use Disorders: A Data Visualization Proposal

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1 Introduction and Motivation

Substance use disorder is one of the most pressing public health challenges in the United States. In 2022, more than 1 in 6 Americans aged 12 or older reported experiencing a SUD (CDC). The opioid crisis highlighted the need for effective treatment infrastructure and prevention policies. While many states have expanded treatment access in recent years, significant gaps remain (Tomko et al).

This project proposes using data visualization to bring these challenges to light and support policy recommendations aimed at improving treatment access. We will combine data from multiple sources to fully understand this issue, examining treatment admissions, facility availability, and outcomes. We hope to provide insight on service gaps and highlight geographic areas with unmet need. This integration will provide a complete picture of both the demand for services and the effectiveness of current policy approaches.

The below proposal will focus primarily on the first dataset (Treatment Episode Data Set). This will be supplemented with data from additional datasets as necessary.

2 Data Sources

2.1 Treatment Episode Data Set (TEDS)

Summary

The TEDS system comprises demographic and drug history information about individuals admitted to substance abuse treatment. TEDS data is collected through state administrative systems and reported to SAMHSA (Substance Abuse and Mental Health Services Administration). The dataset can be found here.

Description

The dataset contains 1,625,833 observations across 65 variables. The most relevant variables for this project include:

Demographics / Context

- AGE – age at admission
- SEX – sex
- RACE / ETHNIC – race/ethnicity
- EDUC – education
- EMPLOY – employment status

Treatment access / utilization

- DAYWAIT – days waiting to enter treatment
- NOPRIOR – prior treatment episodes
- SERVICES – type of treatment service/setting
- PSOURCE – referral source
- PRIMPAY / HLTHINS – payment source & insurance
- LIVARAG – living arrangements

Substance use

- SUB1, SUB2, SUB3 – primary, secondary, tertiary substances
- FREQ1, FREQ2, FREQ3 – frequency of use
- FRSTUSE1, FRSTUSE2, FRSTUSE3 – age at first use
- ROUTE1, ROUTE2, ROUTE3 – route of administration

Geography

- STFIPS – state code

Health / social needs

- PSYPROB – co-occurring mental health
- DETCRIM / ARRESTS – criminal justice involvement
- PRIMINC – source of income

Key Variables

For this project, several key variables from the Treatment Episode Data Set (TEDS) are central to understanding the challenge of connecting individuals with substance use disorder (SUD) treatment. First, **SUB1** (Primary Substance at Admission) is critical because it identifies the main drug or alcohol issue that led a person to seek treatment. Different states and regions face very different substance use crises—for example, opioids in some areas versus alcohol or methamphetamine in others. Closely related is **DAYWAIT** (Days Waiting to Enter Treatment), which measures treatment access directly. Wait time is a concrete barrier to care, and visualizing state-level or regional variation can highlight where bottlenecks exist and which populations face the steepest challenges in getting timely help.

Demographic variables are equally important for tailoring interventions. **AGE** and **SEX** help identify which groups are most impacted by substance use and may need tailored treatment approaches. For example, treatment strategies and risk prevention for young adults often differ substantially from those for older adults, and understanding sex differences can reveal disparities in access to care or prevalence of specific substance use patterns. Similarly,

RACE/ETHNIC provides crucial context for addressing inequities: research consistently shows that racial and ethnic minorities face additional barriers to treatment and may experience worse health outcomes.

Finally, **SERVICES** (Type of Treatment Service/Setting) ties the individual-level admission data to the broader treatment infrastructure. This variable captures whether individuals are entering outpatient, inpatient, or residential care, which helps evaluate whether the available treatment settings are appropriate for the needs of the population. By combining this with primary substance and wait time, we can assess whether states are offering enough of the right kinds of services to meet demand.

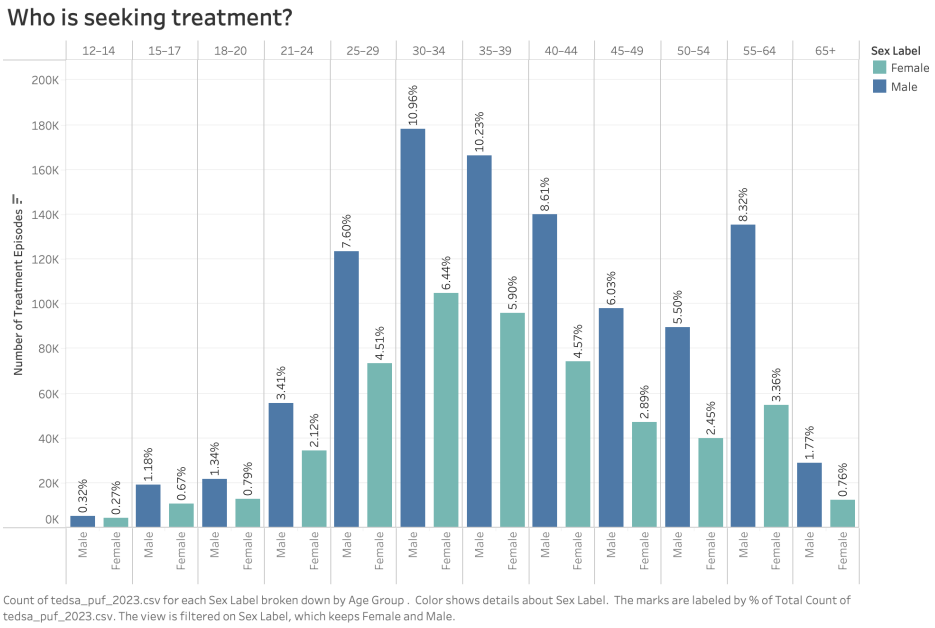
Together, these variables create a multidimensional view: who needs treatment, for what substances, how long they must wait, and what type of care they ultimately access.

Proof of Concept Visualizations

To demonstrate the feasibility of this project and the insights that can be generated from TEDS data, three proof-of-concept visualizations were created in Tableau. These initial charts provide a snapshot of treatment demand, demographic patterns, and geographic disparities in access to care.

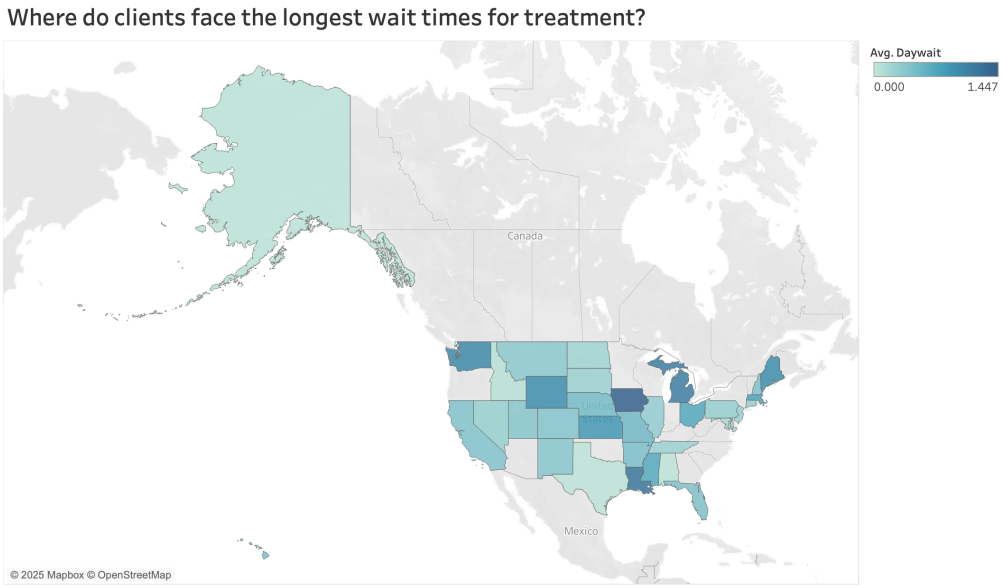
1. Age and Sex Distribution of Treatment Admissions

The first visualization is a grouped bar chart showing treatment admissions by age group and sex. This chart highlights which populations are most frequently entering treatment and allows for quick comparison between males and females across different age ranges. For example, middle-aged males (ages 30-39) represent a significant portion of admissions. This visualization is important because it identifies demographic segments that may require targeted prevention programs or specialized treatment services.



2. Average Wait Time by State

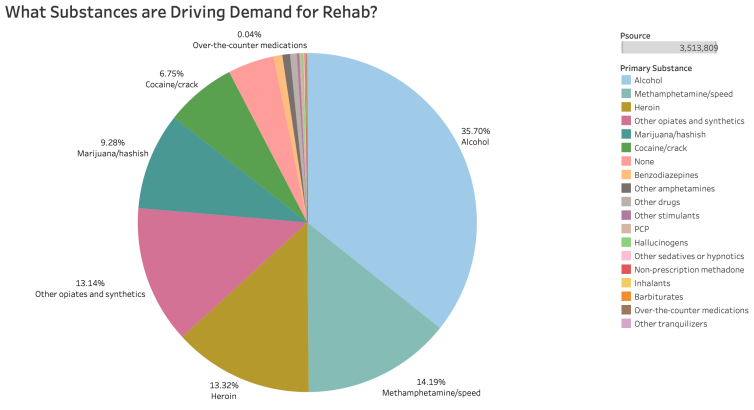
The second visualization is a choropleth map displaying the average wait time (DAYWAIT) for treatment admissions across states. The map reveals substantial variation in access to cares. This visualization demonstrates geographic inequities in treatment availability and highlights areas where policy interventions or resource allocation could reduce delays in care. It's important to note that the units are not in days, but rather in a scale from 1-7.



Map based on Longitude (generated) and Latitude (generated). Color shows average of Daywait. Details are shown for State. The data is filtered on Days Wait for Admission, which keeps 0, 1-7, 15-30, 31 or more and 8-14.

3. Most Common Primary Substances

The third chart is a pie chart of the most common primary substances (SUB1) reported at admission. This visualization allows for a quick understanding of the distribution of common substances that are leading to entrance into treatment. Alcohol, opioids, and methamphetamine emerge as the leading substances driving treatment admissions. Understanding which substances dominate treatment demand is critical for designing state-specific prevention strategies, tailoring treatment programs, and anticipating resource needs.



% of Total Count of tedsa_puf_2023.csv and Primary Substance. Color shows details about Primary Substance. Size shows sum of Psource. The marks are labeled by % of Total Count of tedsa_puf_2023.csv and Primary Substance. The view is filtered on Primary Substance, which excludes Null.

2.2 2) N-SUMHSS: Facility-Level Substance Use Treatment Data

The National Survey of Substance Abuse Treatment Services (N-SUMHSS) provides detailed information on treatment facilities across the U.S. While not a primary source for individual-level data, it is critical for understanding the availability and capacity of services. This dataset contains 29,113 observations over 891 variables.

Key variables include:

- **LOCATIONSTATE** – facility state (can link with TEDS)
- Services Offered (Outpatient, Inpatient, Residential, Detox, Methadone)
- **OWNERSHP** – context for resource distribution
- Capacity Metrics (**HOSPBED**, **B_NUM**) – number of beds, clients served

Visualizing these variables alongside TEDS admission data enables identification of service gaps and geographic disparities, helping policymakers understand where new facilities or programs are most needed. Mapping facility locations relative to average wait times and high admission rates can highlight underserved areas.

3 Conclusion

This proposal demonstrates that the TEDS dataset provides a robust foundation for understanding treatment access for substance use disorders. The proof-of-concept visualizations highlight key demographic patterns, geographic disparities, and substance-specific demand, offering a clear picture of who is entering treatment and where bottlenecks exist. While TEDS data alone allows for valuable insights into treatment demand and access, it can be supplemented with N-SUMHSS facility-level data to provide additional context on the availability and capacity of treatment services. Together, these datasets can inform policy and resource allocation to improve access to care for individuals with substance use disorders.