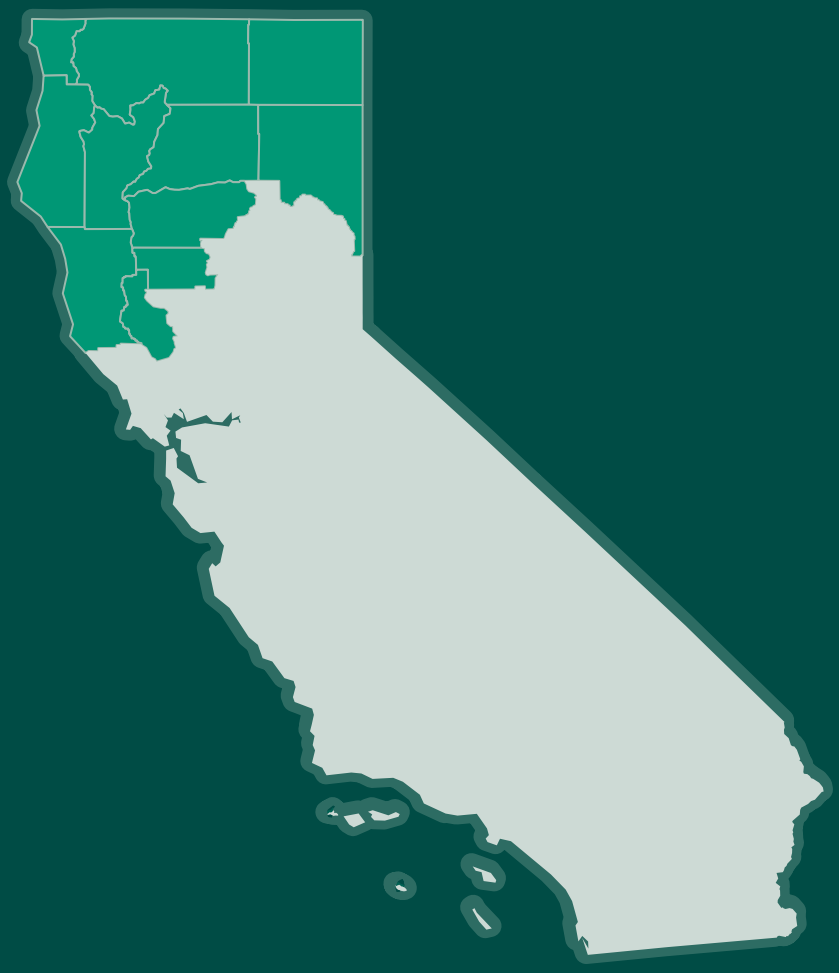
California's Rural North
Exploring the Roots of Health Disparities



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The California Center for Rural Policy at Cal Poly Humboldt is a research and policy center committed to informing policy, building community, and promoting the health and well-being of rural people and environments.

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EXECUTIVE SUMMARY

The population of California's Rural Association of Northern California Health Officers (RANCHO) region faces many challenges including striking health disparities compared to the whole of California[1]. These health disparities include elevated premature death, rates of disability, and behavioral risk factors. This report aims to identify high-impact health determinants contributing to these health disparities between the RANCHO region and the state, and to provide targeted policy recommendations for closing these gaps.

Multiple data sources suggest that these disparities in health outcomes primarily stem from elevated tobacco use, substance use, and mental health challenges. The consequences of these disparities include elevated lung cancer, respiratory diseases, motor vehicle deaths, drug-induced and liver diseases, and suicides.

The region has a higher proportion of populations at risk for tobacco use, substance use and mental health challenges, including those living in poverty, individuals experiencing homelessness, people with lower levels of educational attainment, people living alone, and those who have experienced multiple Adverse Childhood Experiences (ACEs). While these challenges are experienced broadly in the RANCHO region, people of color, disabled groups, and lesbian, gay, and bisexual individuals face particularly pronounced health and socioeconomic challenges.

The region's healthcare system does not appear to meet the substance use and mental health needs of the region. Data suggests that there is a substantial unmet need for substance use treatment and the entirety of the region is a mental health provider shortage area. Those with low or moderate income appear most impacted by the region's shortage of healthcare providers.

In light of these findings, this report underscores three policy focus areas, with a particular focus on serving the at-risk populations:

1. Smoking Prevention, Education, and Cessation
2. Substance Use Prevention and Treatment
3. Suicide Prevention and Access to Mental Health Care

Addressing these concerns in the RANCHO region is imperative to bridge healthcare disparities and enhance the overall well-being of its residents.

[1] The RANCHO region consists of California's most rural and northernmost counties including: Humboldt, Del Norte, Mendocino, Lake, Shasta, Siskiyou, Glenn, Modoc, Lassen, Trinity, and Tehama counties.

DATA SOURCES AND METHODS

This report draws from a wide array of data sources, as detailed below. In this section, we offer a brief overview of the primary data methods and constraints, while a more extensive examination can be found in Appendix A.

Data Sources

- U.S. Census Bureau American Community Survey (ACS)
- The California Health Information Survey (CHIS)
- County Health Rankings & Roadmaps (CHRR)
- U.S. Health Resources & Services Administration (HRSA)
- Center for Disease Control (CDC) PLACES Data
- California School Climate, Health, and Learning Surveys (CalSCHLS)
- Kidsdata.org
- California Department of Public Health (CDPH), County Health Status Profiles
- CDPH, Overdose Surveillance Dashboard
- CDPH, Chronic Hepatitis C California Surveillance Report
- CDPH, California Blood Lead Data, 2021
- Cal Fire Wildfire Perimeters and Prescribed Burns (Cal Fire)
- California Office of Traffic Safety (OTS)
- UC Berkeley Transportation Injury Mapping System (TIMS)
- National Survey on Drug Use and Health (NSDUH)
- CalEnviroScreen 4.0

Key Data Methods and Limitations

- 95% confidence intervals are presented wherever the necessary information is available. Generally, these are illustrated with horizontal bars. Wide confidence intervals indicate a greater level of uncertainty.
- Some data points are not shown either because they have been suppressed by the data provider or because of high levels of statistical uncertainty[2].
- Data that are generated using statistical modeling (i.e. small area estimation techniques) are denoted as SAE. SAE data is limited and should not be used to measure impacts of local area policy interventions.
- California Health Information Survey (CHIS) data include three additional counties outside the RANCHO region. This broader region is referred to as RANCHO+. These three additional counties constitute only 6% of this broader region's population. Therefore, the RANCHO+ data is highly indicative of the RANCHO region.
- The word "significant" is used deliberately throughout this report to indicate a statistically significant difference.

[2] Usually because of extremely wide confidence intervals (e.g. a sample proportion that includes 0 or 100%) or because the data provider denotes the estimate as statistically unstable.

Section 01

CONCEPTUAL FRAMEWORK

The conceptual framework of this report takes inspiration from Bay Area Regional Health Inequities Initiative (BARHII) framework, which posits a flow from upstream factors such as social, living environment, and institutional inequities to downstream factors such as health behaviors, diseases, and ultimately mortality rates (BARHII).

Figure 1.1 Conceptual Framework

To maintain focus on the most salient health determinants, this report works backwards from these upstream disparities in health outcomes, looking first at regional disparities in mortality rates, diseases, and disabilities to identify where disparities exist between the region and state averages, such as for example disparities in lung cancer rates (see "Overview of Health Outcomes"). This analysis produces a set of health outcomes where there is significant and adverse disparity between the region and the state to provide a focused approach to identify immediate or 'proximate' downstream factors contributing to these disparities, such as health behaviors including tobacco use (see "Proximate Risk Factors").

Subsequently, the report looks further upstream to identify the institutional, economic, and/or social factors that may contribute to these disparities in proximate risk factors, such as the role of poverty in tobacco use, as well as considering the potential for direct relationships with these deeper factors on health such as the link between poverty and chronic stress (see "Institutional, Economic, and Social Factors"). Because of the potentially vast array of such factors, focus is maintained on those factors commonly raised in the region's community health assessments.

The report further examines the health consequences from environmental factors, such as wildfires (see "Environmental Factors").

By identifying health factors displaying substantial and adverse disparities between the RANCHO region and the state, the aim of this report is to uncover opportunities for directing focus and allocating resources towards high-priority and impactful health determinants. The report concludes by presenting a list of policy focus areas and corresponding resources based on the most compelling and high-impact disparities in health factors.

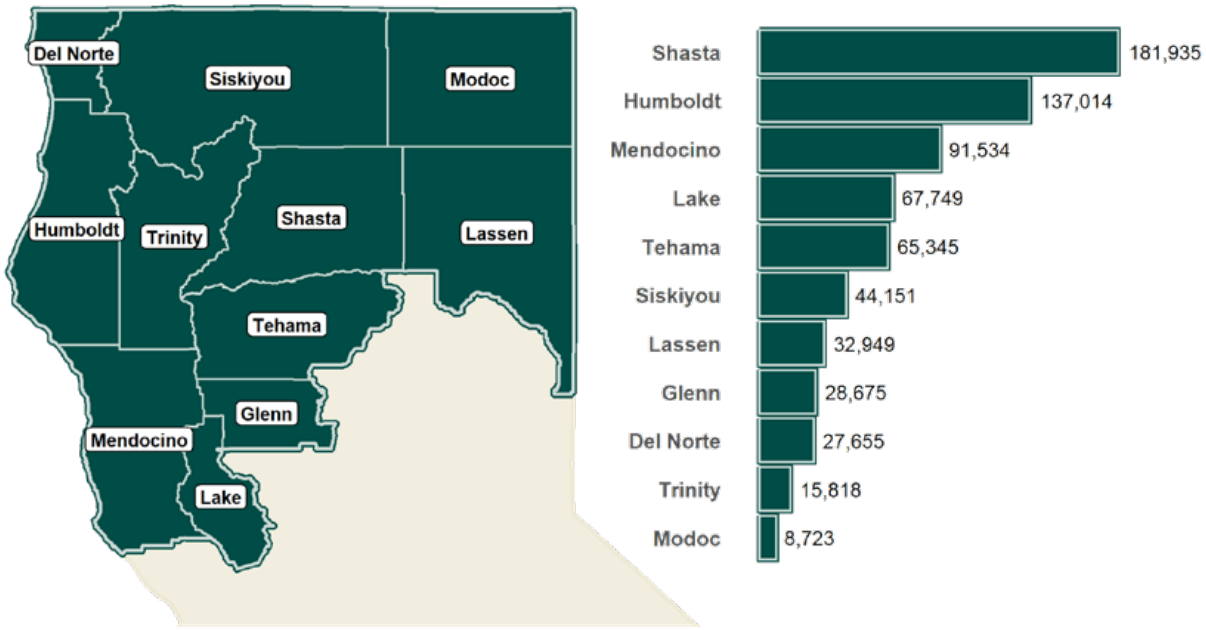
Section 02

OVERVIEW OF THE REGION

The RANCHO region is an eleven county consortium consisting of Public Health and Health Services Department Directors, Assistant Directors, Health Officers, and Deputy Health Officers. The RANCHO region, located in the northernmost region of California, consists of California's eleven most remote and rural counties (*see figure below*). Public Health leaders from each county meet on a weekly to bi-weekly basis to collaborate as a region towards the goal of improving the health of all communities within rural northern California. RANCHO meetings offer a space for county-level peer learning and are well attended by the eleven counties (Arledge and Flynn, 2023).

Despite covering an expansive 22.8% of California's geographical area, the total population of the RANCHO region is relatively small with only 701,548 residents, accounting for 1.8% of the state's overall population. The population varies significantly by county, ranging from 181,935 in Shasta County to 8,723 in Modoc County.

Figure 2.1 RANCHO Region Population (2017 - 2021)



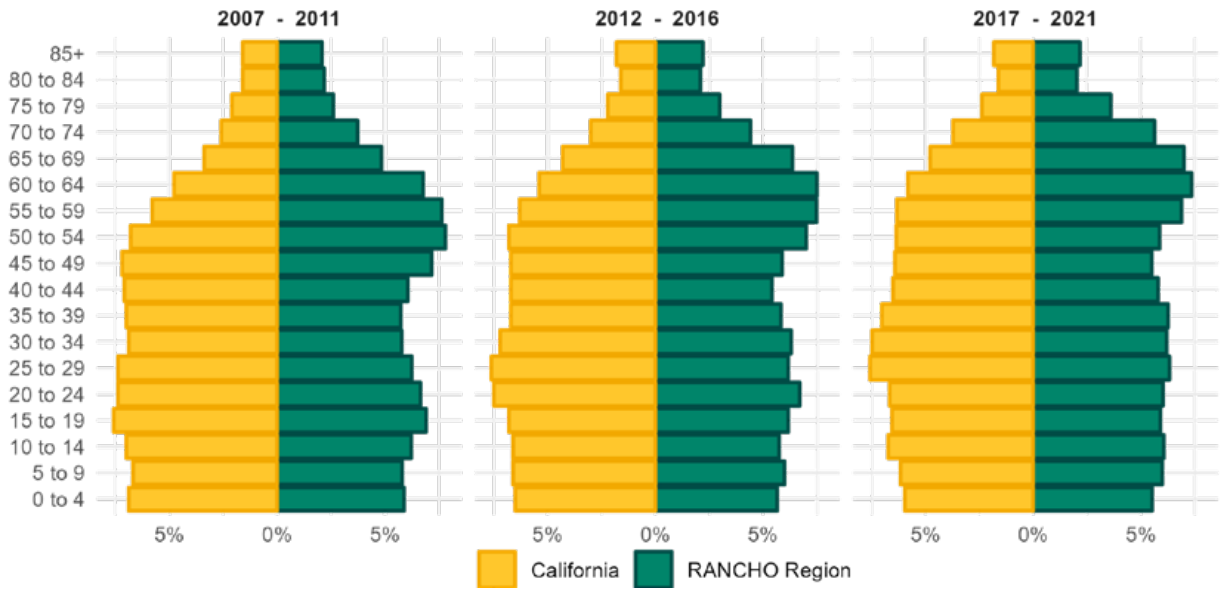
Note. Data sourced from the ACS.

Population Dynamics

The RANCHO region's population is considerably older compared to the state average. In the majority of the region, the median age in the region is significantly higher than the state median (see Appendix B), with the majority of counties having a median age of 40 or greater. The higher median age in the RANCHO region is primarily influenced by a significant and sizable group of older residents advancing in age. From 2007 to 2011, this cohort ranged from 45 to 64 years old, and more recently,

between 2017 and 2021, their age range shifted to 55 to 74 years old. Such a population distribution exerts downward pressure on population growth among other implications such as additional strain on healthcare resources.

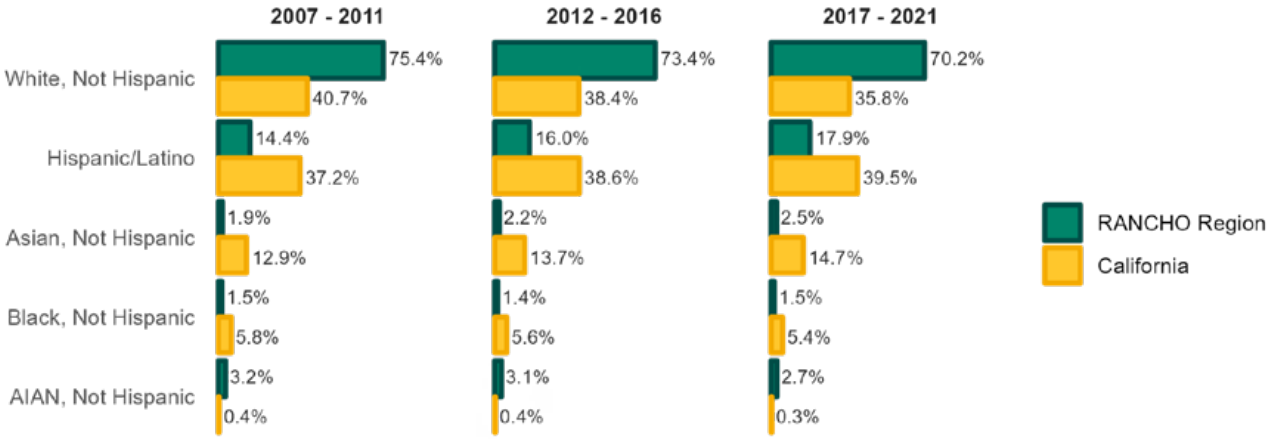
Figure 2.2 Age Distribution (2007 - 2021)



Note. Data sourced from the ACS.

As shown below, the region is primarily populated by white, non-Hispanic individuals, who constitute 70.2% of the total regional population— almost double the statewide proportion of 35.8% for this group. Hispanic or Latino individuals constitute a further 17.9% of the population, a share that is growing but small relative to the state population. While other minority groups are underrepresented compared to the state population, the American Indian Alaskan Native (AIAN) population is proportionately higher than the state population, representing 2.7% of the RANCHO population as opposed to only 0.3% of the statewide population.

Figure 2.3 Race and Ethnicity (2007 - 2021)



Note. Data sourced from the ACS.

Takeaways

1. The region's population is significantly older compared to the state. The region's aging population structure has important implications for future population change and healthcare needs.

2. The population is primarily white, non-Hispanic. The population is composed of a relatively small population of people of color or Hispanic populations; however, the AIAN population is larger in the RANCHO region relative to the state population.

Section 03

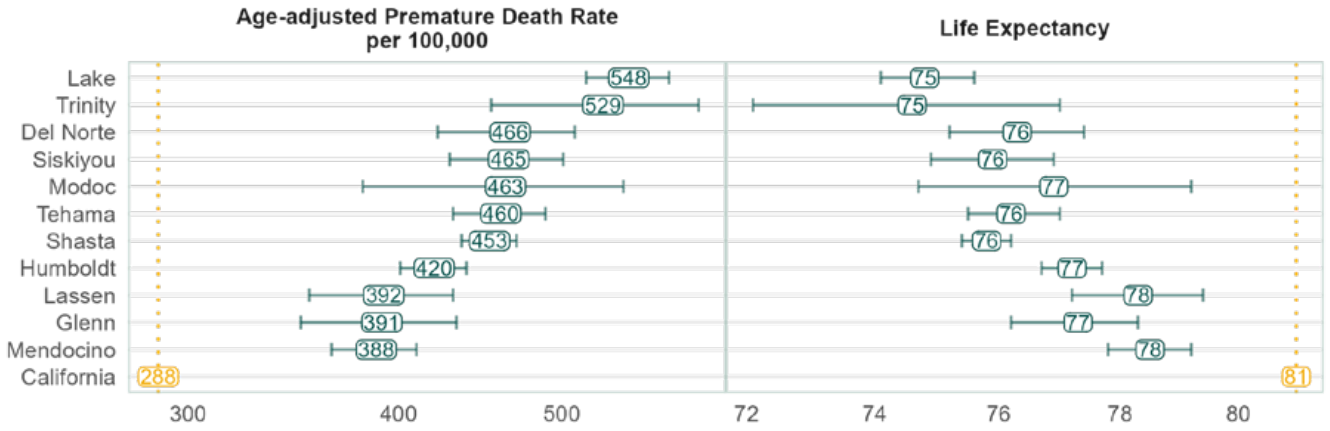
OVERVIEW OF HEALTH OUTCOMES

Life Expectancy and Mortality Rates

Life expectancy is a fundamental metric that reflects a broad spectrum of health factors, indicating the cumulative influence of wide-ranging health determinants. Disparities in life expectancy, therefore, serve as a good starting point for uncovering signals of disparities in health determinants between geographies and populations.

As shown below, life expectancy at birth is significantly lower than the statewide average, and age-adjusted premature deaths per 100,000 are significantly higher in all RANCHO counties.[3] Additional data presented in Appendix B indicate that premature death is elevated among AIAN and Black communities in the RANCHO region. These data also show that premature death is on a long-term upward trajectory in six RANCHO counties, whereas statewide premature deaths are on a long-term downward trajectory.

Figure 3.1 Premature Death and Life Expectancy (2018 - 2020)



Note. Data sourced from CHRR.

Disaggregating mortality rates by cause of death allows for a targeted examination of the determinants of health that specifically contribute to the elevated causes of premature death and lower life expectancy within the region.

As shown below, an analysis of mortality data reveals a clear pattern of higher death rates in several categories, including **unintentional injuries[4], all cancers, chronic lower respiratory disease, motor vehicle traffic crashes, drug-induced deaths, coronary heart disease, lung cancer, chronic liver**

[3] Defined as the number of deaths occurring before age 75 per 100,000 population. This is in distinction to the Years of Potential Life (YPLL) indicator which is presented in Appendix B. YPLL is defined as the number of years of life lost due to deaths prior to age 75. For instance, the death of a 40 year old would amount to 35 YPLL.

[4] Unintentional Injuries include motor vehicle deaths, unintentional drug overdoses, and all other unintentional injury deaths. See Appendix A for International Classification of Disease (ICD-10) codes used for CDPH data.

disease and cirrhosis, suicides, and firearm-related incidents. Since the remaining leading causes of death are similar to or lower than the state rate, these causes of death appear to be the central drivers of the region's elevated premature death rate.

Figure 3.2 Age-Adjusted Mortality Rates per 100,000 (2019 - 2021)

	Lake	Shasta	Del Norte	Siskiyou	Tehama	Humboldt	Mendocino	Trinity	Lassen	Modoc	Glenn	CA
Accidents (Unintentional Injuries)	135*	74*	78*	88*	70*	74*	106*	150*	93*	109*	65*	43
All Cancers	170*	162*	182*	176*	171*	173*	160*	113	135	137	146	125
Chronic Lower Respiratory Disease	49*	60*	57*	58*	51*	45*	32	48*	33	47*	43*	26
Motor Vehicle Traffic Crashes	30*	18*	19	30*	22*	16*	29*	72*	25*	34*	15	11
Drug Induced Deaths	78*	32*	30	24	17	37*	56*	40	33*	25	32	21
Coronary Heart Disease	112*	113*	66	79	113*	98*	98*	77	100*	96	85	79
Lung Cancer	41*	36*	48*	37*	39*	33*	31*	32	24	41*	37*	22
Chronic Liver Disease and Cirrhosis	54*	22*	31*	36*	28*	25*	17	22	16	19	15	14
Suicide	24*	27*	26*	29*	21*	20*	24*	26*	26*	4	15	10
Firearm Related Deaths	12	16*	17*	23*	19*	14*	14*	19	14	8	12	8
Cerebrovascular Disease (Stroke)	32	38	41	38	40	98*	35	26	35	46	34	37
Prostate Cancer	19	27*	35*	20	22	29*	24	13	23	24	11	18
Influenza and Pneumonia	11	18*	22*	16	14	8*	12	13	23*	3	13	12
Female Breast Cancer	20	21	21	24	20	26*	19	19	30	12	7*	18
Homicide	7	5	7	6	8	8	9	8	8	8	11	6
Colorectal Cancer	14	12	15	16	20*	13	16*	5	11	8	11	12
Diabetes	15*	24	43*	24	25	22	20	26	12*	32	18	23
Alzheimer's Disease	15*	59*	14*	37	36	14*	13*	10*	10*	15*	31	37

Difference from State (X)

- 90 < X
- 60 < X ≤ 90
- 30 < X ≤ 60
- 5 < X ≤ 30
- 0 < X ≤ 5
- X ≤0

Note. Data sourced from the California Department of Public Health and the California Conference of Local Health's County Health Status Profiles report data. The color scale denotes differences (X) between the region's mortality rate and the corresponding state rate. Gold and yellow indicate higher mortality rates compared to the state. Asterisks (*) denote a statistically significant difference compared to the state rate. None of these causes include deaths where COVID-19 is the underlying cause of death.[5]

An analysis of trends in these mortality rates is available in Appendix C. These data indicated rising drug-induced mortality rates in all 11 RANCHO counties and for most at rates exceeding the statewide increase. Similarly, a majority of RANCHO counties are experiencing rising rates of chronic liver disease and cirrhosis that largely exceed the statewide increase. Conversely, rates of chronic lower respiratory disease and lung cancer mortalities have declined in recent years in a majority of RANCHO counties, consistent with statewide downward trends.

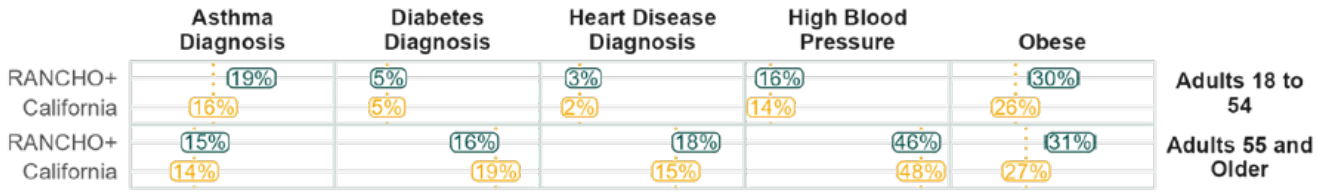
Health Conditions

County-level morbidity data are more limited when compared to mortality data, highlighting data gaps in understanding health disparities in rural areas. To address these limitations, both CHIS and CDC PLACES datasets are employed to identify signals of health disparity.

[5] According to CDPH, "Deaths where COVID-19 was coded as the underlying cause of death are only included for all causes of death and are not included in any of the specific mortality health indicators. However, deaths where COVID-19 was listed as a significant condition contributing to death but not the underlying cause of death may be included for these health indicators" (2022).

As shown below, CHIS data reveals moderately elevated rates of asthma among adults aged 18 to 54, heart disease among those aged 55 and above, and obesity within both age groups. CDC PLACES data presented in Appendix C, although limited to small area estimation (SAE) techniques,[6] suggests elevated age-adjusted rates of chronic obstructive pulmonary disease (COPD), tooth loss, depression, and coronary heart disease in the RANCHO region.[7]

Figure 3.3 Morbidities, Percent of Population (High Blood Pressure 2019-2021, All Other 2011-2021[8]



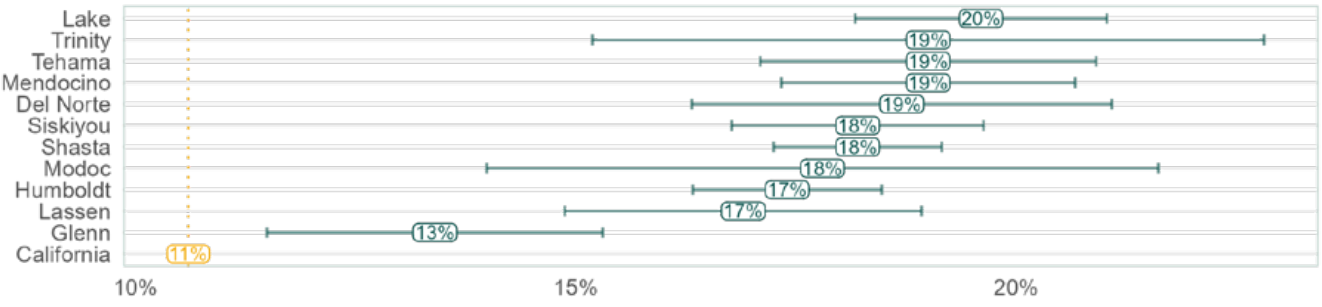
Note. Data sourced from the CHIS.

Both approaches point to a higher prevalence of respiratory diseases, heart disease, obesity, and a relatively low prevalence of diabetes and high blood pressure regionally.

Disability Rates

As shown in the figures below, disability rates in the region are higher in all RANCHO counties compared to the state rate. While the aging population is a contributing factor, it is noteworthy that even among individuals aged 18 to 34, disability rates are significantly higher than the state average in the majority of RANCHO counties (see Appendix C, i.e. all but Modoc, Glenn, and Lassen). This suggests that factors beyond the aging population play a role in the region's elevated disability rates. Potential contributing factors are explored further in the next section.[9]

Figure 3.4 Disability Rates (2017 - 2021)



Note. Data sourced from ACS.

[6] See Appendix A for a discussion on the limitations of these techniques.

[7] And to a lesser extent arthritis and stroke.

[8] See Appendix C for an alternative data source on health conditions produced using Small Area Estimation (SAE) techniques. Though limited, these data suggest elevated levels of all morbidities presented, including those above, except diabetes and high cholesterol.

Takeaways

1. The most substantial adverse health disparities between the region and the state are evident in rates of unintentional injuries, all cancers, chronic lower respiratory disease, motor vehicle traffic crashes, drug-induced deaths, coronary heart disease, lung cancer, chronic liver disease and cirrhosis, suicides, and firearm-related deaths.

2. Rates of disability are much higher than state averages in the region, even among young adults.

[9] Disability rates by race and ethnicity are presented in Appendix C.

Section 04

PROXIMATE RISK FACTORS

This section explores the potential factors contributing to the health disparities between the RANCHO region and the state, as identified in the previous section. The aim is to identify and quantify the proximate risk factors, which are directly linked to these health outcomes, such as the role of smoking in lung cancer. A more comprehensive analysis of the underlying factors (e.g. poverty) potentially related to these proximate risk factors will be explored in the subsequent section. Identifying proximate factors allows for a more focused approach to exploration of deeper factors as well as a more focused approach to policy solutions.

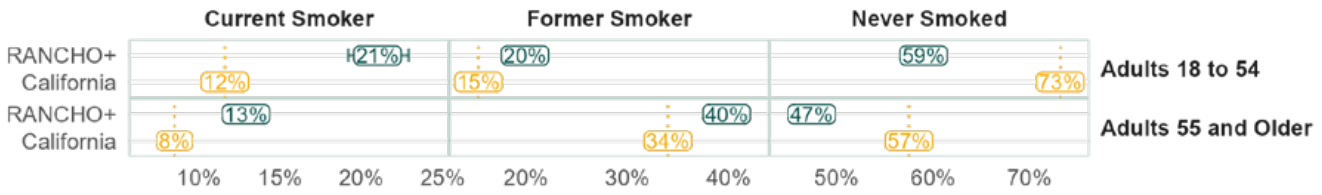
Smoking

As shown in the previous section, evidence demonstrates higher mortality rates from cancer, lung cancer, chronic lower respiratory disease, and heart disease compared to state averages.

Lung Cancer and Chronic Lower Respiratory Disease

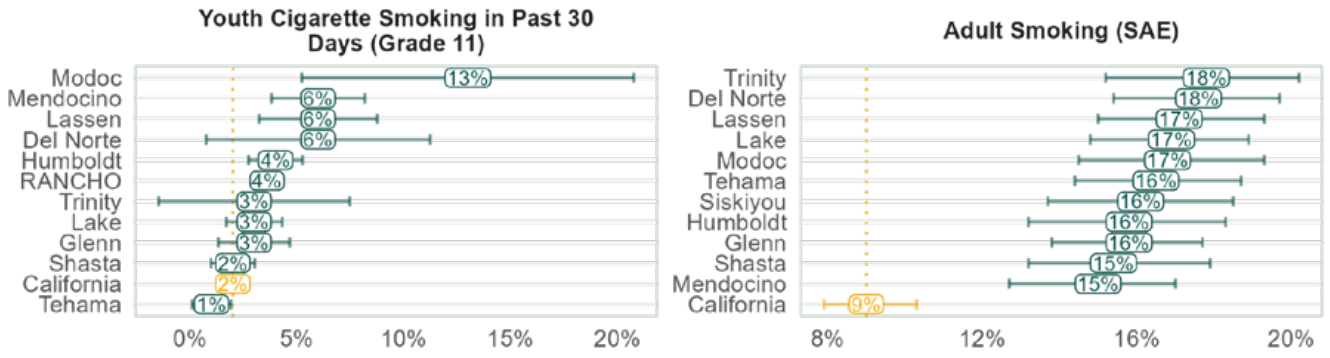
Cigarette smoking is the main cause of lung cancer and COPD— a leading respiratory disease— and a risk factor for asthma (Mayo Clinic: "Lung Cancer;" Mayo Clinic: "COPD;" American Lung Association, "Asthma Causes and Risk Factors"). The data presented below from various sources reveals significantly and substantially higher smoking rates across the region. Notably, the proportion of current smokers among adults aged 18 to 54 in the RANCHO+ region is nearly double the state average. This striking disparity indicates that smoking may play a crucial role in explaining and addressing the region's elevated rates of cancer, lung cancer, and respiratory illnesses.

Figure 4.1 Smoking Rates (2011 - 2021)



Note. Data sourced from the CHIS.

Figure 4.2 Smoking, Percent of Population (Youth Data 2019 - 2021, Adult Estimates 2020)



Note. Estimate adult data sourced from CHRR. Estimated adult smoking data are model-based predictions. Youth smoking data were sourced from CalSCHLS "Secondary Student: Substance Use" data portal.[10]

Heart Disease

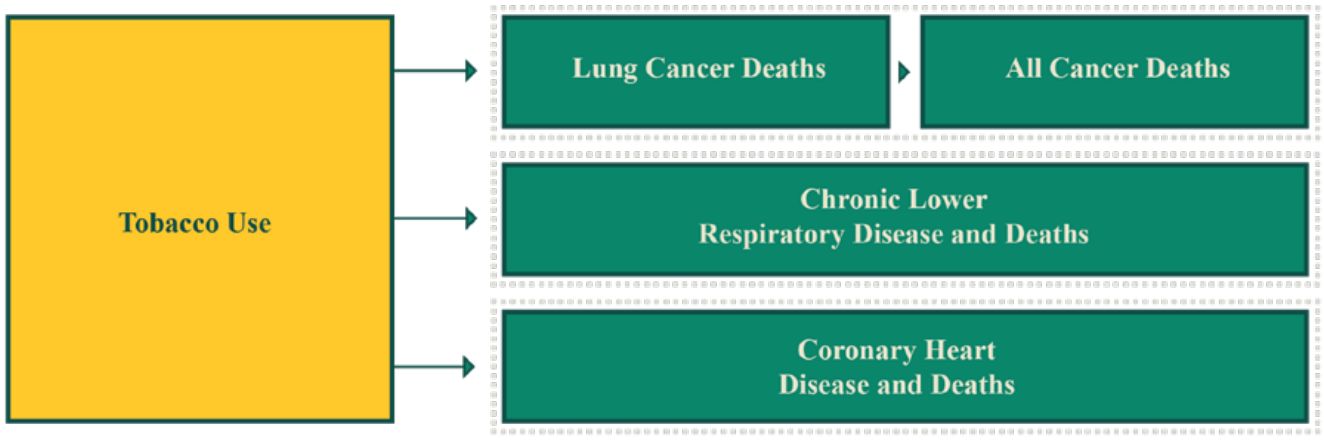
According to the CDC, the primary risk factors for heart disease include high blood pressure, high LDL cholesterol, diabetes, unhealthy diet, physical inactivity, obesity, smoking, and exposure to secondhand smoke ("Heart Disease and Stroke"). As previously shown, the available evidence indicates that rates of high blood pressure, high cholesterol, and diabetes in the region are comparable to state averages (see Appendix C and "Health Conditions"). Additionally, although limited in scope, CHIS data suggest that diets in the region are on par with or, in some cases, better than the statewide average, and indicators of physical activity are similar or superior to statewide averages (see Appendix D). Consequently, this highlights obesity and smoking as key concerns for heart disease in the RANCHO region.

Studies reveal that smoking poses a greater risk for heart disease compared to obesity (Benis, et al., 2016). Furthermore, estimated differences between the region and the state in terms of obesity rates reach a maximum of approximately 1.16 times higher than the state average. In contrast, smoking rates are 1.63 to 1.75 times higher, strongly indicating that smoking is a critical factor contributing to the region's elevated rates of coronary heart disease.

The following diagram depicts these health disparities and the proximate risk factors potentially associated with them. Among these health outcomes, tobacco use stands out as a widely recognized and prominent risk factor and data strongly indicate that rates of smoking are significantly and substantially higher in the region.

[10] Youth smoking data are based on surveys of 11th grade students in participating school districts within each county. Youth smoking is defined as students who responded that they had consumed cigarettes in the past 30 days. Confidence intervals were calculated by the author.

Figure 4.3 Tobacco Use as a Contributing Factor to Disparities in Health Outcomes



Mental Health and Substance Use

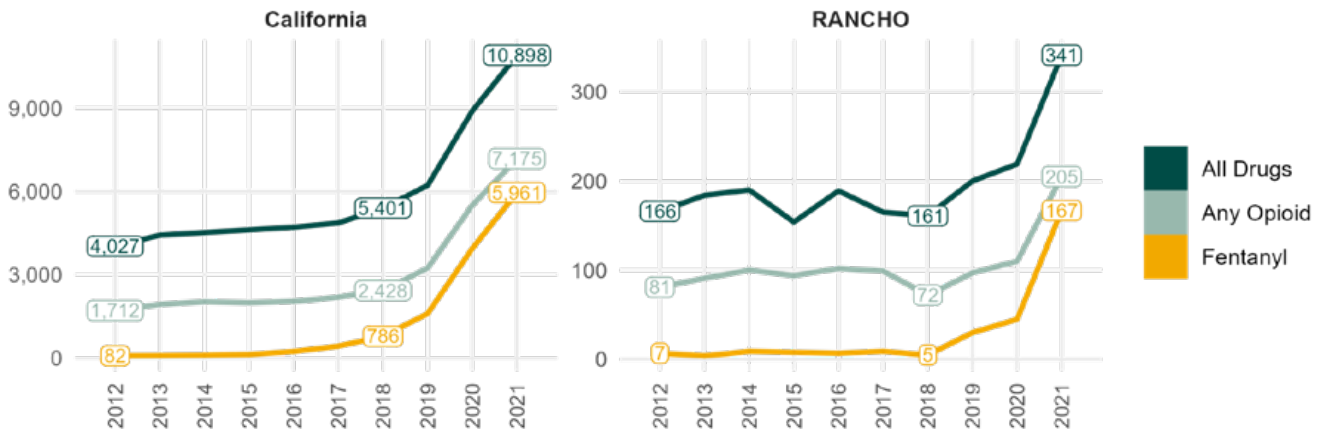
As previously identified, the region exhibits elevated rates of unintentional injuries, drug-induced deaths, motor vehicle accidents, liver disease, suicides, and firearm-related deaths. Further analysis below reveals that these disparities in health outcomes align closely with the heightened prevalence of mental health challenges and substance use-related issues within the region, challenges that may also help to explain the elevated rates of disability observed in the region.

Drug-Induced Deaths

The category of unintentional injuries includes unintentional poisoning or drug overdose, alcohol poisoning, motor vehicle accidents, and other unintentional injuries. Nationally, unintentional poisoning, including drug overdose, has emerged as the leading cause of death within the unintentional injury category, a trend that began in the mid-1990s. However, since the mid-1990s and continuing to the present, unintentional poisoning deaths, particularly from drug overdoses, have risen sharply. As of 2021, nationwide data indicate that poisoning, such as drug overdoses, accounted for more than half of all unintentional injury deaths, followed by motor vehicle accidents (CDC). Consequently, the region's elevated rates of drug-induced and motor vehicle deaths likely contribute substantially to the higher prevalence of unintentional injury deaths within the region.

As shown in Appendix C, drug-induced deaths have risen sharply in the RANCHO region starting around 2017. This rise in overdose deaths has been sharply exacerbated by the fentanyl epidemic in recent years. Statewide, fentanyl deaths have risen exponentially starting around 2017 and now account for over half of statewide overdose deaths. Similarly, fentanyl deaths have also risen exponentially in the RANCHO region and now account for roughly half of all drug overdose deaths.

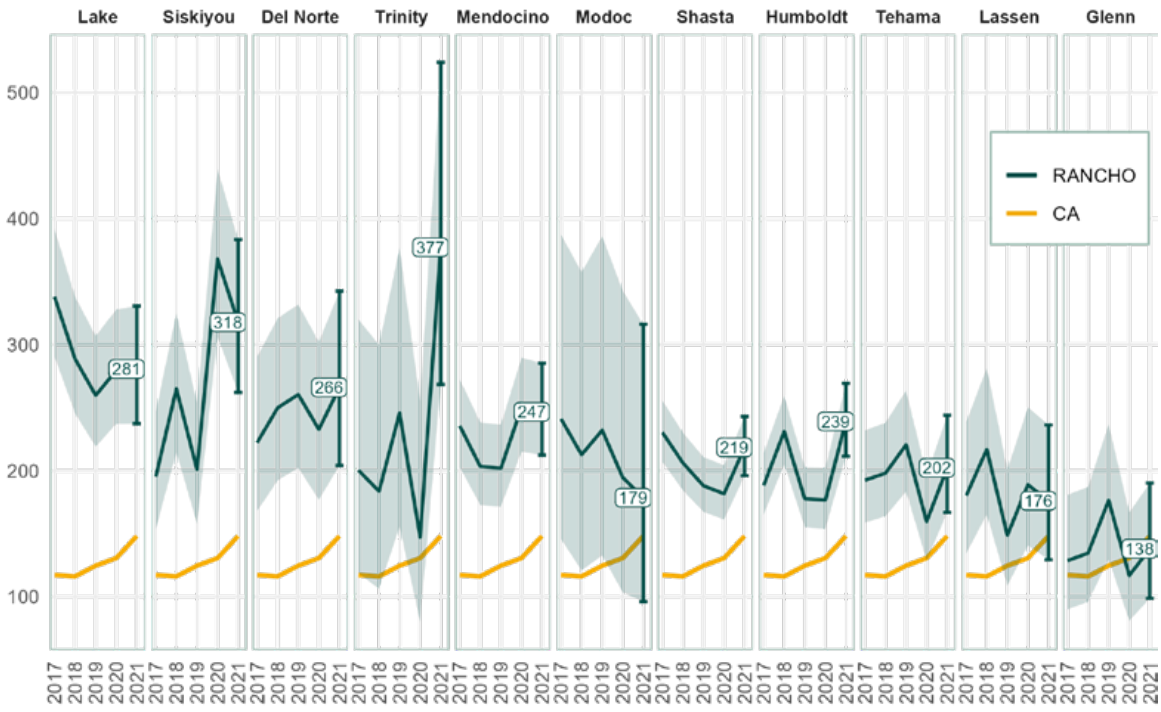
Figure 4.4 Fentanyl Overdose Deaths (2012 - 2021)



Note. Data sourced from the CDPH's "California Overdose Surveillance Dashboard."

While the opioid epidemic is a widespread crisis, the crisis appears to be significantly and substantially worse in the RANCHO region compared to the state. As shown below, drug overdose emergency department (ED) rates are significantly higher than the state rate in most RANCHO counties.

Figure 4.5 Age-Adjusted Drug Emergency Department Visit Rate per 100,000 (2017 - 2021)



Note. Data sourced from the CDPH's "California Overdose Surveillance Dashboard." Shaded regions and bars represent confidence intervals. Confidence intervals were provided by the data source.

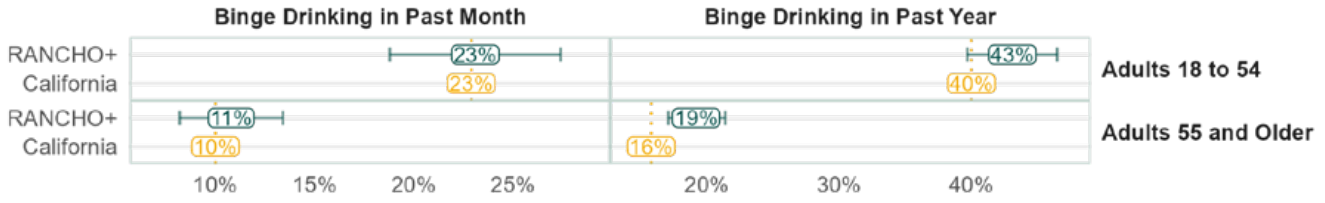
While the above data clearly illustrates the growing fentanyl crisis, an older 2016-2018 NSDUH survey reveals elevated use of illicit drugs including cocaine, methamphetamine, and pain relievers in the broader rural Northern California region (see Appendix D), underscoring that the region's substance use challenges extend beyond fentanyl.[11] These data also indicate a strong unmet need for substance use treatment facilities, with approximately 11% of the broader rural Northern California region indicating need for treatment.

Liver Disease and Cirrhosis

Recent data indicate that nine RANCHO counties experience higher rates of mortality due to chronic liver disease, six of which have significantly higher rates than the state. Moreover, as shown in Appendix C, rates of liver disease mortality have increased in recent years statewide; in the RANCHO region, this increase is occurring faster than the state in six RANCHO counties, highlighting the urgency of addressing this worsening trend.[12]

According to the Mayo Clinic, heavy alcohol consumption is a leading risk factor for liver disease ("Liver Disease"). As shown below, multiple data sources collectively signal higher rates of excessive drinking. While CHIS data indicate only slightly higher rates of binge drinking, binge drinking among youth is sharply and significantly higher than the state average. Moreover, NSDUH data presented in Appendix D indicate a high level of unmet need for treatment of alcohol use disorder as well as a relatively low perceived risk of weekly binge drinking in rural Northern California.

Figure 4.6 Binge Drinking in Past Year (Left 2021, Right 2011 - 2015)

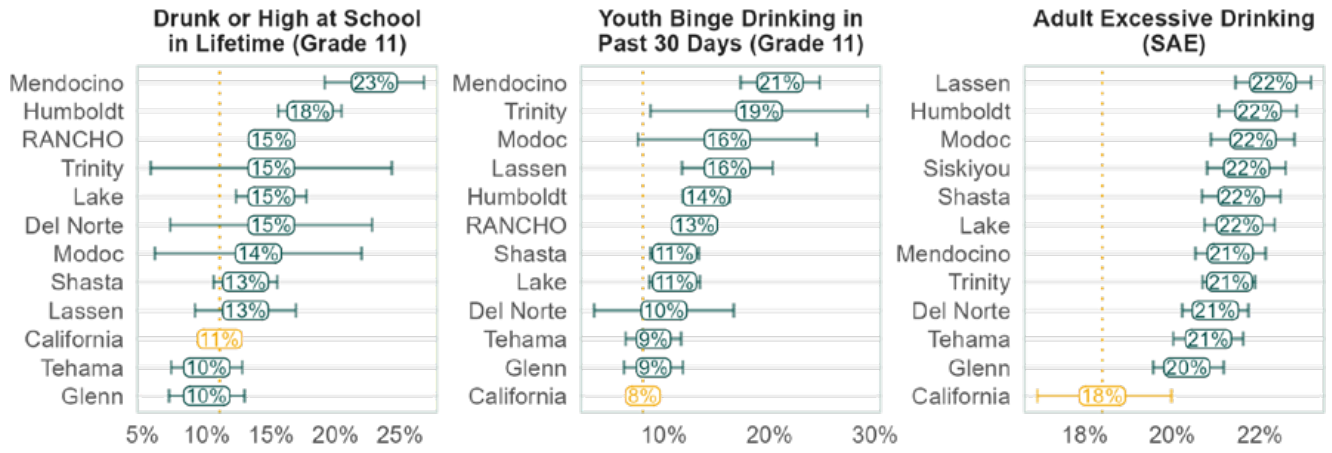


Note. Data sourced from the CHIS. The proportion of adults who had at least one episode of binge drinking in the past year. Binge drinking is defined as five or more drinks for males and four or more for females within two hours.

[11] See Appendix A for a discussion on the limitations of these data. The region covered in this dataset includes all RANCHO counties in addition to Butte, Colusa, Plumas, and Sierra counties.

[12] The 2021-2019 CDPH data release compared to the 2019-2017.

Figure 4.7 Alcohol Use Indicators (Adult Excessive Drinking 2020, Youth Data 2017 - 2019)



Note. Estimate adult data sourced from CHRR. Estimated adult binge drinking data are model-based predictions. Youth binge drinking data were sourced from CalSCHLS "Secondary Student: Substance Use" data portal.[13]

Another critical risk factor for liver disease results from hepatic infections from injection drug use (Mayo Clinic: "Liver Disease"). Hepatitis C is primarily transmitted through sharing needles, and a 2018 report from the CDPH reveals that rates of hepatitis C in the RANCHO region are far higher than the state rate (see Appendix C). While higher rates of injection drug use cannot be established per se from the existing data, as shown in Appendix D, NSDUH data suggest there is higher heroin use in the RANCHO region compared to the state (although moderate use by national comparison).[14]

Substance Use and Motor Vehicle Deaths

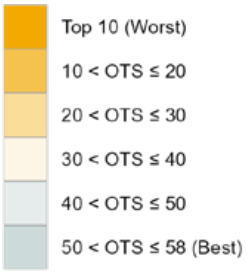
As shown previously, motor vehicle mortality rates are sharply elevated across the region. Traffic safety ranking data from the California Office of Traffic Safety (OTS) reveal factors potentially contributing to the region's elevated rates of motor vehicle traffic fatalities (2023). These data reveal a clear trend toward a higher risk of pedestrian, hit-and-run, nighttime, and alcohol-involved fatal and injury traffic accidents in a majority of RANCHO counties, particularly among those counties with worse overall rankings.

[13] Youth binge drinking data are based on surveys of 11th grade students in participating school districts within each county. Youth binge drinking is defined as five or more drinks during a period of "few hours". Confidence intervals were calculated by the author.

[14] Notably, statewide the perceived risk of trying heroin is low, including in rural Northern California.

Figure 4.8 OTS Crash Risk Rankings, 2017 - 2020 Average[15]

	Trinity	Lake	Del Norte	Humboldt	Shasta	Mendocino	Modoc	Tehama	Siskiyou	Glenn	Lassen	RANCHO Avg.
Total Fatal and Injury	17.5	28.2	28.8	37.8	38.5	38.5	42.2	43.5	50.0	50.8	54.5	39.1
Pedestrians	23.8	22.8	26.5	2.0	17.5	17.2	38.2	26.8	25.8	24.0	49.2	24.9
Hit and Run	13.5	25.0	17.2	12.0	40.8	20.2	24.0	23.5	29.2	22.8	46.8	25.0
Nighttime	9.5	25.0	25.5	16.5	38.0	20.8	29.2	37.2	26.8	35.0	42.8	27.8
Alcohol Involved	15.2	14.2	34.2	21.2	30.0	8.8	44.0	30.0	34.0	40.5	51.2	29.4
Motorcycles	10.5	26.5	27.8	23.8	23.8	30.5	53.2	41.8	48.2	57.2	48.2	35.6
Bicyclists	38.8	46.5	18.8	15.5	36.5	44.0	37.8	30.0	38.0	44.2	52.5	36.6
Speed Related	25.0	39.0	22.5	52.8	40.0	35.8	31.8	51.2	37.0	54.5	39.5	39.0

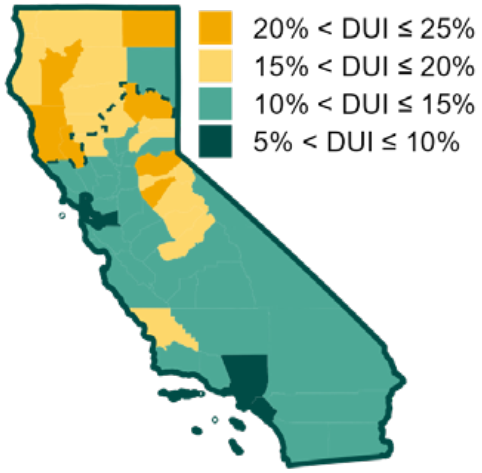


Note. Data sourced from the OTS. The OTS ranks each California county from 1 (worst) to 58 (best) for each criteria above. Gold and yellow indicate higher risk. These rankings are averaged over the four years of data available from the OTS from 2017 through 2020. Nighttime is defined as occurring between 9pm and 2:59am.

Two additional data sources highlight the role of substance use in traffic safety in the RANCHO region. As shown below, driving under the influence (DUI) crashes account for a greater proportion of all vehicle crashes (including those without injury) compared to the majority of the state. Furthermore, in most RANCHO counties a greater proportion of fatal crashes involve alcohol.

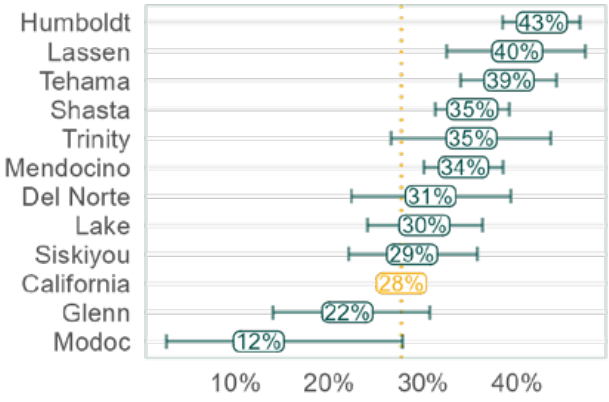
Figure 4.9

Drug and/or Alcohol DUI as a Percent of All Crashes (2012 - 2021)



Note. Data sourced from TIMS. Includes both alcohol and drug DUIs.

Percent of Driving Deaths Involving Alcohol (2016 - 2020)



Note. Data sourced from CHRR.

[15] Lassen County is ranked lower risk by the OTS (data years = 2017-2020), however, CHRR data (data years = 2016-2020) indicate a higher proportion of alcohol-impaired driving deaths than the state. While differences in methodologies (CHRR only looks at deaths) may account for this apparent discrepancy, some of the difference appears to be explained by the difference in time period and wide year-to-year fluctuations in the data due to the county's small population. CHRR data indicate that 60% of driving fatalities involved alcohol, while in 2017 and 2019, 0% of driving deaths involved alcohol.

A national study suggests a clustering of pedestrian, hit-and-run, and nighttime accidents around a common risk factor: late night alcohol use. This study also reveals that nearly one-fifth of pedestrian traffic fatalities in the United States are the result of a hit-and-run, and that fatal pedestrian hit-and-runs are far more likely to occur during the evening and involve alcohol use (Arnold et al., 2010).

Therefore, substance use appears to play a critical role in the region's elevated motor vehicle deaths and— along with drug-induced deaths— unintentional injuries deaths as well.[16,17]

Suicide Ideation, Suicides, and Firearm-Related Deaths:

The previous section revealed data that strongly signal higher rates of both suicides and firearm-related deaths in the region. On a national scale, suicides constitute more than half of firearm deaths, followed by homicide, whereas less than three percent of firearm deaths are unintentional (Gramlich, 2023). Consequently, the region's heightened firearm-related deaths may be largely influenced by its elevated suicide rate.

As shown below, multiple data sources also strongly signal higher risk factors for suicide. Both youth and adults are more likely to report having considered suicide, and youth in the region are more likely to have reported feelings of sadness in a majority of counties. Studies have shown a strong link between suicide ideation and completion (Dekkers, et al., 2018); therefore, suicide ideation provides a proximate explanation for both the region's elevated suicide rate and elevated firearm-related deaths.

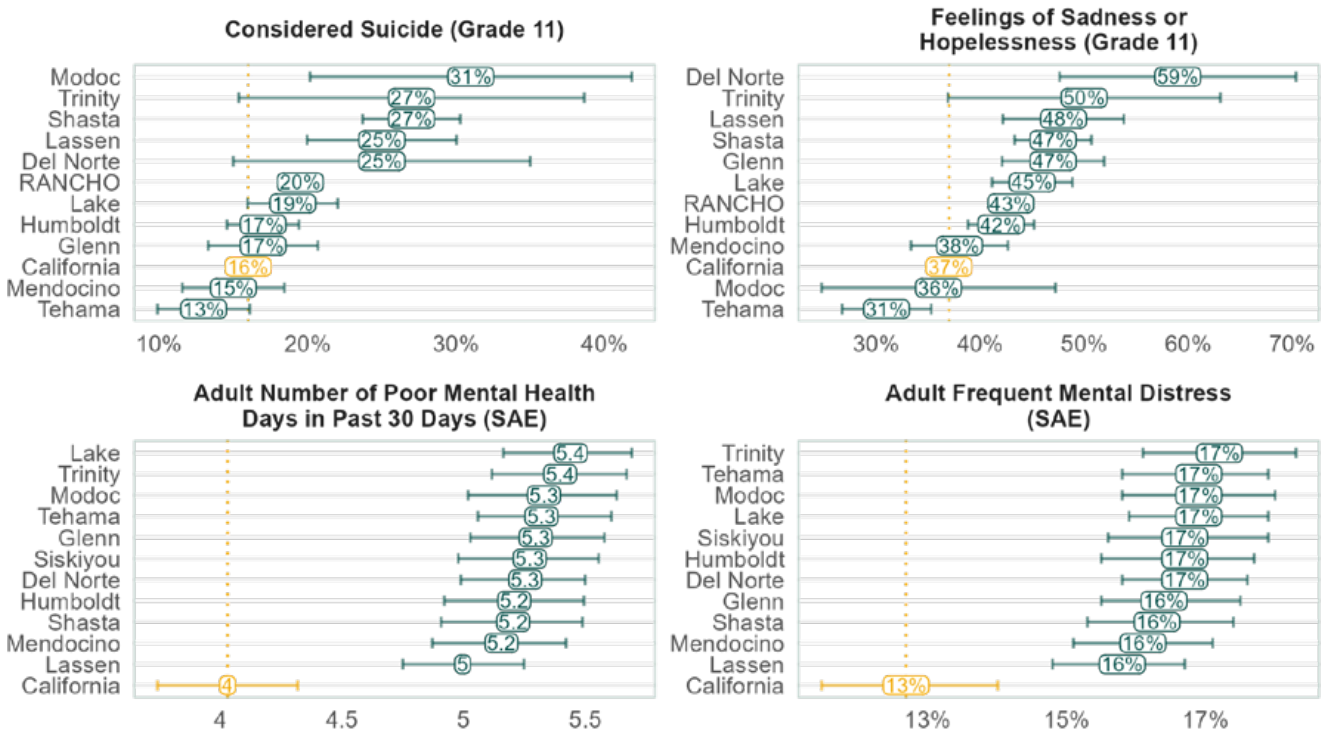
Figure 4.10 Have you ever seriously thought about committing suicide? (2012 - 2021)

Note. Data sourced from the CHIS.

[16] Another factor not captured above, but particularly salient in the rural RANCHO context, is emergency medical response (EMS) times. EMS response times are significantly associated with motor vehicle mortality rates (Byrne et al., 2019). Research indicates a 1.46 times greater risk of mortality for an EMS response time of 12 or more minutes compared to seven or fewer. A national study found that the median EMS response time is six minutes in urban or suburban regions and 13 minutes in rural areas. This study also found that 10% of EMS response times were 26 minutes or longer in rural areas (Carr et al., 2017).

[17] Motor vehicle deaths are included in unintentional injury deaths.

Figure 4.11 Mental Health Indicators (Adult Estimates 2020, Youth Data 2017 - 2019)

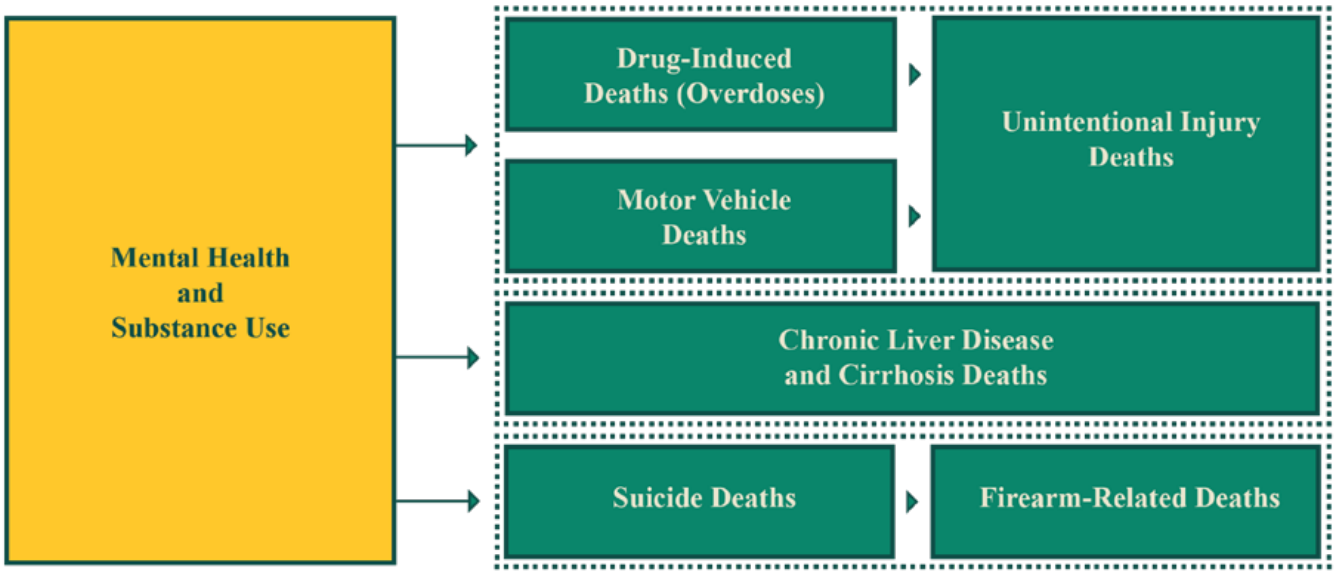


Note. Estimate adult data sourced from CHRR. Youth data were sourced from CalSCHLS "Secondary Student: Substance Use" data portal.

It may be that mental health and substance use are also factors contributing to the region's elevated rates of disability, particularly among adults 18 to 34. Both mental health and substance use disorders are leading causes of disability and *the* dominant causes of disability among adults younger than 35, accounting for over 35% of years lived with disability nationwide (National Center for Complementary and Integrative Health). See Appendix C for further analysis of disability rates.

The figure below illustrates the health outcomes, proximate factors, and relationships explored in relation to mental health and substance use. Amongst the leading causes of illness and death, mental health and substance use appear to play either a direct or indirect role in contributing to many of the disparities in health outcomes in the region. Along with the analysis of tobacco use illustrated previously, those health outcomes with the strongest disparity between the RANCHO region and the state appear to be strongly influenced by tobacco use, substance use, and mental health factors.

Figure 4.12 Mental Health and Substance Use are Contributing Factors to Disparities in Health Outcomes



Takeaways

1. The evidence indicates that rates of mental illness, substance use, and tobacco use are elevated relative to the state.

2. Health outcome disparities between the region and the state are largely consistent with these elevated mental and behavioral health challenges.

Section 05

ECONOMIC, SOCIAL, AND INSTITUTIONAL FACTORS

The Social Determinants of Health (SDOH) is a popular framework for conceptualizing non-medical factors that influence health outcomes. This framework typically encompasses five key themes: economic stability, educational access, health access, neighborhood environment, and the social context (Healthy People 2030). The following section analyzes factors drawn from this framework and also considers related factors that are broadly discussed in the region's community health assessments.

While this study does not attempt to establish direct cause-and-effect relationships between these factors and the proximate risk factors or health outcomes discussed earlier, it does investigate the connections between these factors and the proximate determinants and health outcomes.

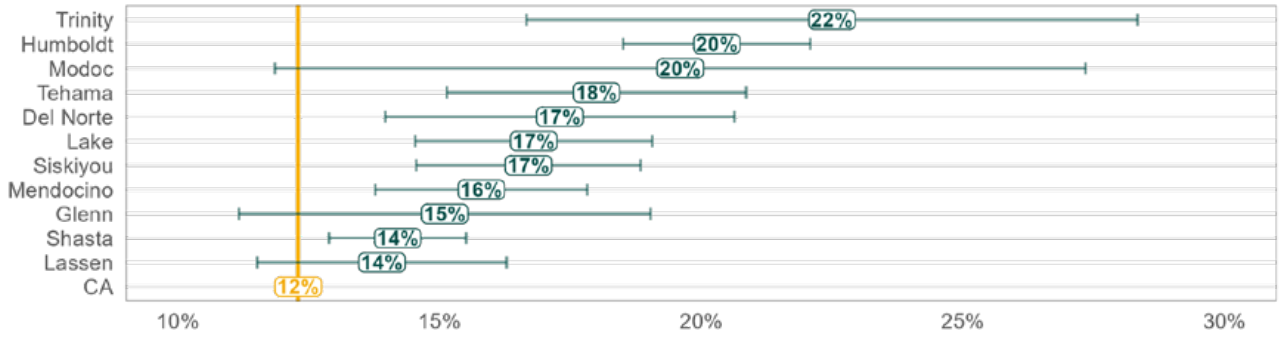
This inquiry serves a dual purpose: firstly, to ascertain whether substantial disparities exist between the state and the region for each factor addressed below, and to, secondly, where data allows, quantify the strength of the association between these risk factors and the health behaviors and outcomes previously examined. This serves the overarching goal of not only identifying potential adverse disparities but also, by assessing the strength of these relationships, determining populations that are most at risk.

Poverty

Economic conditions strongly influence health disparities. Poverty is linked to lower life expectancy and increased health risks related to obesity, smoking, substance use, and chronic stress (Healthy People 2030). Child poverty is particularly detrimental to health and well-being. Children raised in low-income households face multiple adverse conditions that harm their health and contribute to a cycle of economic disadvantage. These conditions include impaired early childhood brain development, obstacles to learning and social functioning, and increased behavioral problems (Damon). Children in poverty are also more likely to suffer from lead poisoning, experience abuse, neglect, hunger, drop out of high school, or become teenage parents (Aber et al., 2012).

As shown below, poverty rates are sharply higher in the RANCHO region compared to the state rate. Furthermore, data presented in Appendix E show that poverty rates are elevated among children and youth as well as Black, Asian, AIAN, and Hispanic populations in the RANCHO region.

Figure 5.1 Poverty Rates (2017 - 2021)



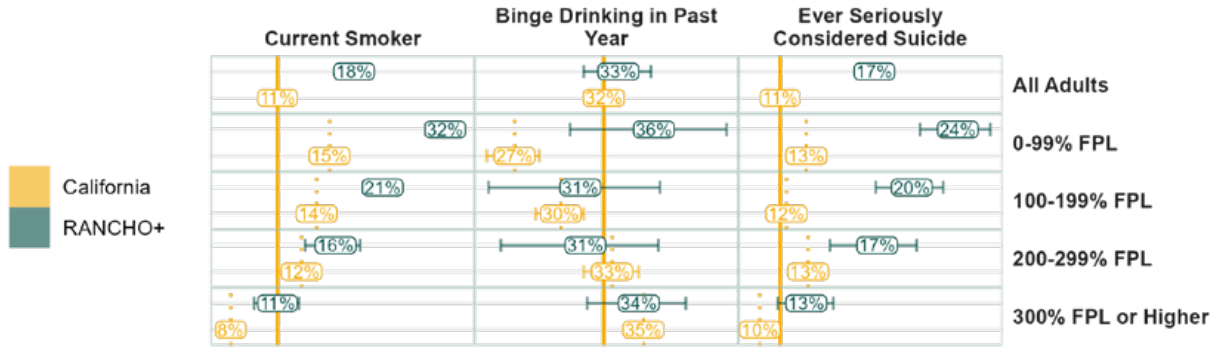
Note. Data sourced from the ACS.

As shown below, poverty appears to be positively correlated with two proximate risk factors including smoking and suicide ideation. While smoking is associated with poverty status statewide, the region exhibits an even stronger link between poverty and smoking. Nearly, one out of three people living below the poverty line in the region are current smokers compared to just 15% statewide.

Statewide, CHIS data do not indicate a clear pattern between poverty and suicide ideation. The RANCHO+ region, however, exhibits a clear pattern between lower income and higher risk of suicide ideation. Nearly, one out of four people living below the poverty line in the region have seriously considered suicide compared to just 13% statewide.

Statewide, recent binge drinking is *positively* associated with income, a finding that is not uncommon of studies linking socioeconomic status to heavy drinking (Collins, 2016). Regionally, those with incomes above the poverty line have rates of binge drinking consistent with state rates, however among those below the poverty line, rates of binge drinking are significantly higher.

Figure 5.2 Proximate Risk Factors by Income Range (2011 - 2021, Binge Drinking 2011 - 2015)



Note. Data sourced from the CHIS. FPL refers to the federal poverty line.

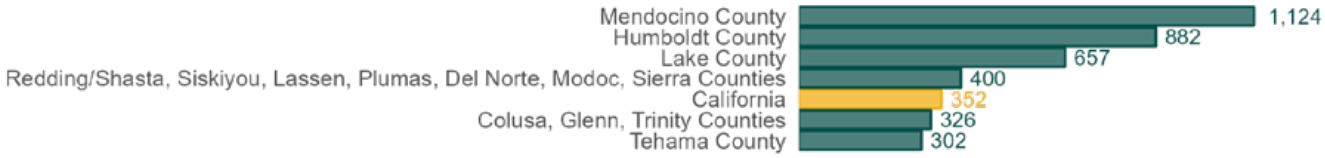
While a causal mechanism, if any, between smoking, suicide ideation and poverty is unclear, those with low or moderate incomes are at much greater risk of these risk factors in the RANCHO+ region. Therefore, policies intended to address these risk factors should have a focus on these income groups.

Homelessness

People experiencing homelessness face a significantly higher risk of premature death, chronic disease, depression, and substance use (Collins 2016). While the data presented below indicate an elevated level of homelessness in the RANCHO region, it is important to acknowledge that tracking and measuring homelessness is a complex task, leading to limitations and uncertainties in these figures. Nevertheless, these indicators suggest an elevated homelessness rate in much of the region when compared to the rest of California.

As shown below, homeless point-in-Time (PIT) data from the Department of Housing and Urban Development (HUD) reveal that homelessness on a per capita basis in the region exceeds the state average in most of the region.[18]

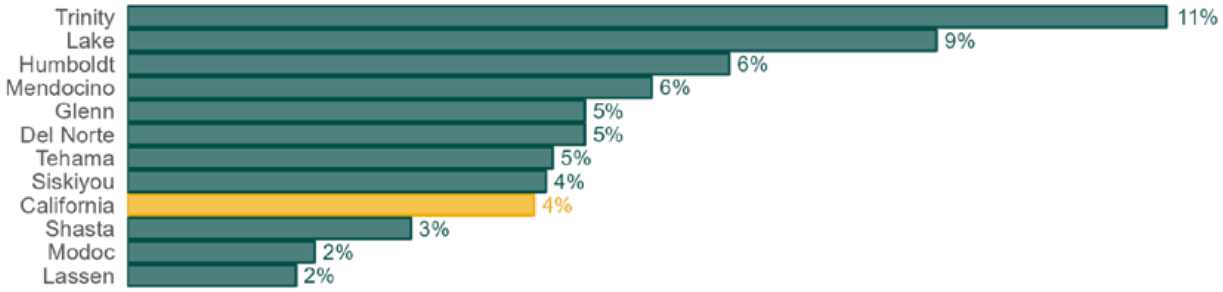
Figure 5.3 Total Counted Homeless per 100,000 Population by Continuum of Care (2016 - 2020)[19]



Note. Data sourced from the U.S. Department of Housing and Urban Development's datasets on Point-in-Time (PIT) estimates, a count of sheltered and unsheltered individuals experiencing homelessness. Data are 5-year averages from 2016 to 2020. Rates calculated by the author using population data are 5-year estimates from the ACS from 2016 to 2020. Population estimates are summed for each CoC service area by county.

Similarly, as shown below, an alternative data source indicates a greater proportion of youth homelessness among public school students in the majority of the RANCHO region.

Figure 5.4 Homeless Public School Children (2011 - 2014 and 2016 - 2018)



Note. Data sourced from Kidsdata.org. Defined as the percentage of public school students recorded as being homeless at any point during the school year. Data for 2015 are not available. Modoc County data is missing for all but 2014.

While local data on the connection between homelessness and health is limited, state-level data reveals that homeless public school students have substantially higher rates of cigarette smoking, substance use, and suicidal thoughts compared to their non-homeless peers (CalSchls). Given the

[18] HUD compiles reported homeless counts gathered by regional participants of the Continuum of Care (CoC) program throughout the U.S. During a 24-hour period in the first ten days of January each year, CoC participants conduct a Point-in-Time (PIT) count of homeless people in their respective regions. These counts include both sheltered homeless as well as people living in areas not meant for habitation.

See Appendix H for a comparison of all Continuums of Care in California. Humboldt and Mendocino CoCs have the highest rates in the state.

[19] The 2021 data, which shows a dubious decline in measured homelessness, are deliberately excluded. These data are not comparable to prior year estimates due the the effects of COVID restrictions. Many shelters, for example, reduced capacity in response to CDC COVID-19 guidelines, reducing the headcount of sheltered homeless (U.S. Department of Housing and Urban Development).

established health risks associated with homelessness, addressing smoking, substance use, and suicide prevention for populations experiencing homelessness is crucial. Such efforts not only benefit individuals experiencing homelessness but also play a vital role in enhancing the overall health of the community.

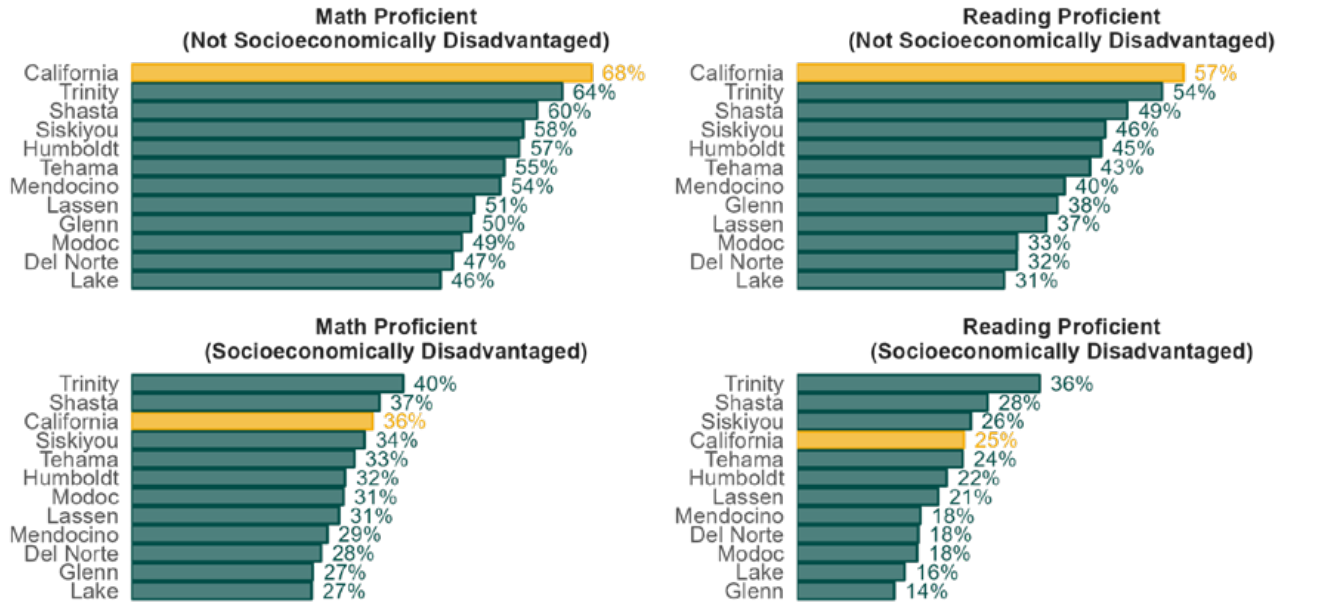
See Appendix J for an assessment of housing affordability and availability. These data indicate that housing affordability is similar to the state average in most RANCHO counties.

Educational Access and Outcomes

Statistically, people with higher levels of education live longer and have lower all-cause mortality rates. While the link between health and education is debated, research suggests that individuals with higher education levels are less prone to certain *preventable* illnesses/mortalities and tend to live longer. Education is strongly linked to mortalities from lung cancer, respiratory diseases, homicides, and certain accidents, whereas the link is less strong for causes of death that are less preventable such as cancers other than lung cancer (Hernandez and Hummer, 2013). In recent decades, smoking has become strongly associated with education levels. In the late 1960s, approximately 40% of college-educated people smoked compared to 45% of people without a college education, but the proportion of college graduates who smoke has fallen faster than that of those without a college degree. More recently, just 6.5% of college graduates smoke compared to 23.1% for those with a high school diploma or less (Cahn et al., 2018). Therefore, factors tied to preventable and behavioral risk appear to influence the relationship between health and education.

According to Healthy People 2030, target objectives for improving educational access include improving high school graduation rates, increasing college enrollment, and improving math and reading proficiencies in K-12 students ("Education Access and Quality"). As shown below, in the RANCHO region, gaps in educational attainment start early, with K-12 students lagging behind their statewide peers on reading and math proficiency.

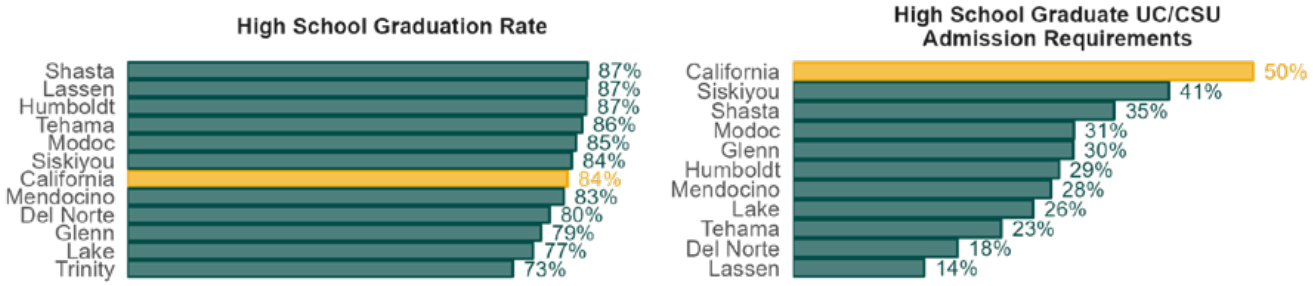
Figure 5.5 K-12 Math and Reading Proficiency by Socioeconomic Status (2017 - 2019)



Note. Data sourced from Kidsdata.org. Includes grades 3, 4, 5, 6, 7, 8, and 11. Based on California Assessment of Student Performance and Progress's 'Smarter Balanced Summative Assessment'.

In the RANCHO region, high school graduation rates are on par with the state rate, but high school graduates in the region are much less prepared for college admission compared to the state average. In all RANCHO counties, fewer high school graduates have completed all course requirements for admission to the University of California (UC) or California State University (CSU) systems (i.e. "A–G courses").

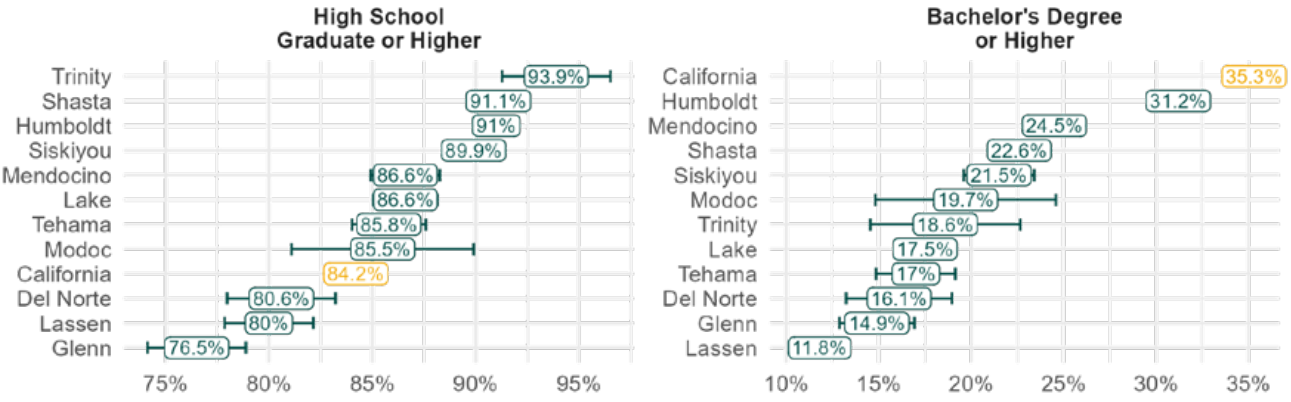
Figure 5.6 High School Graduation Rates and College Preparedness (2017 - 2021)



Note. Data sourced from Kidsdata.org. Admission requirements data including only 2017-2019. Percents are annual averages. High school graduation rate is defined as the percentage of public school students from the graduating class who receive a high school diploma. Admission requirements is defined as the percentage of high school graduates who complete all courses required for UC/CSU admission with a grade of "C" or better.

Correspondingly, the adult population in RANCHO has achieved high school graduation rates that are on par with or even exceed the state average. However, all RANCHO counties lag behind in four-year degree attainment. Therefore, while the region fairs relatively well in terms of high school graduation, it appears that the educational system faces challenges in preparing high school graduates for college.[20]

Figure 5.7 Educational Attainment, Population 25 Years or Older (2017 - 2021)



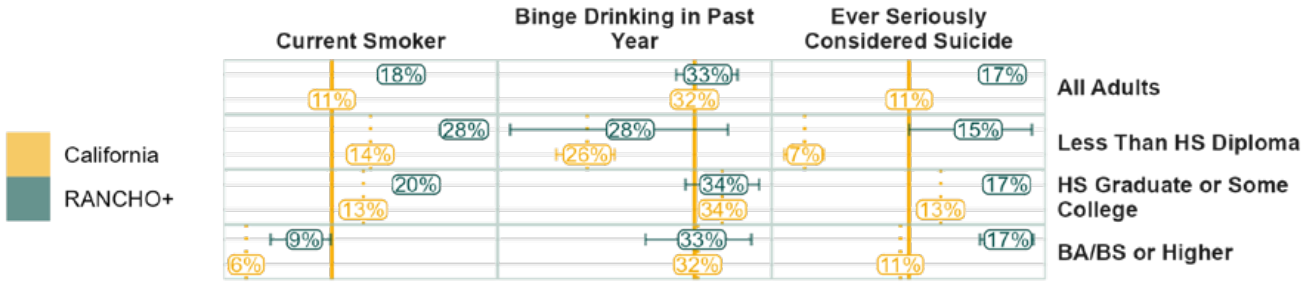
Note. Data sourced from the ACS.

With respect to the health challenges for the region, educational attainment appears to be strongly associated with tobacco use.[21] Both in the region and across the state, smoking rates decrease

[20] Another contributing factor for the gap in higher educational attainment may be a comparative lack of four-year colleges and universities that are geographically accessible for much of the population in the region. The entire RANCHO region has just one four-year public university located in Humboldt County.

significantly as educational attainment increases— however, this relationship is particularly strong in the RANCHO+ region. One in five individuals with less than a four-year college degree is a current smoker in the RANCHO+ region, compared to just 13% statewide. Therefore, to combat tobacco use effectively in the region, it is crucial to focus efforts on adults with lower levels of education and on young people who may be facing academic difficulties. Furthermore, NSDUH data suggest that the perceived risk of smoking is lower compared to the rest of the state, suggesting that there may be room for improvement in tobacco risk awareness education in the region (see Appendix D).

Figure 5.8 Proximate Risk Factors by Education (2011 - 2021, Binge Drinking 2011 - 2015)



Note. Data sourced from the CHIS.

Social Isolation

A recent Surgeon General report brought national attention to health impacts of social isolation and loneliness, raising the issue as urgent and requiring 'immediate awareness and action'. The report documents the health risks of social isolation and loneliness including a wide range of physical and mental health outcomes including cardiovascular disease, hypertension, diabetes, infectious disease, cognitive decline, depression, and anxiety (U.S. Surgeon General, 2023).[22, 23]

Data on loneliness at the local level is scarce. However, as shown below, data from CHIS indicate that loneliness among adults 65 and older is consistent with state averages.

Figure 5.9 Loneliness, 65+ (2019 - 2020)

Note. Data sourced from California Health Information Survey, via AskCHIS.

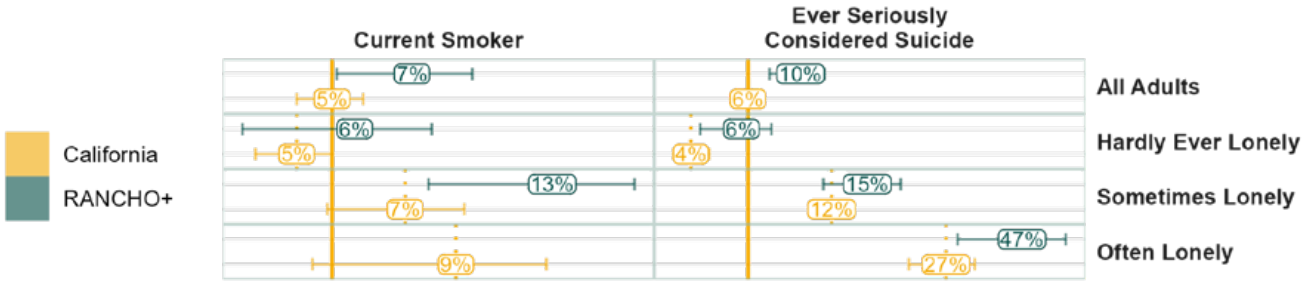
[21] Alcohol use and suicide ideation do not exhibit clear relationships with educational attainment. Rates of both appear to be *lower* among those with less than a high school education.

[22] The Surgeon General defines social isolation as "Objectively having few social relationships, social roles, group memberships, and infrequent social interaction (2023)".

[23] The Surgeon General defines loneliness as "A subjective distressing experience that results from perceived isolation or inadequate meaningful connections, where inadequate refers to the discrepancy or unmet need between an individual's preferred and actual experience (2023)".

While the limited available evidence suggests that the incidence of loneliness among older adults is consistent with state rates, as shown below, older adults who experience loneliness are at higher risk of smoking and suicide ideation. In particular, nearly half of RANCHO+ seniors who report often feeling lonely have seriously considered suicide, significantly and substantially higher than those who report sometimes feeling lonely or hardly ever feeling lonely. Therefore, older RANCHO residents who indicate that they often feel lonely appear to be at high risk for one of the region's most elevated causes of death.

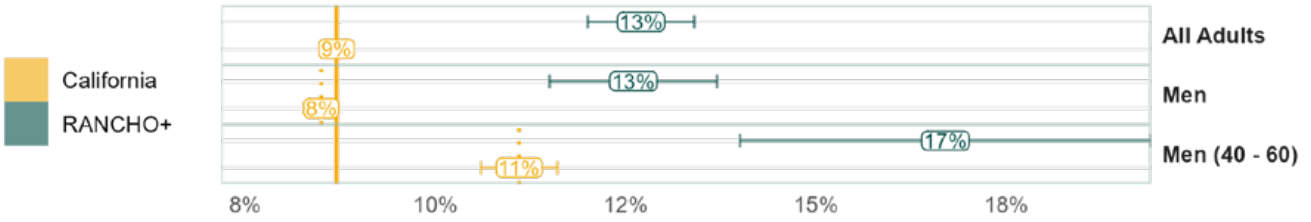
Figure 5.10 Proximate Risk Factors by Loneliness, Age 65+ (2019 - 2020)



Note. Data sourced from the CHIS. Binge drinking data are not available for 2019 and 2020. Smoking data not available for the "Often Lonely" category.

While the reported subjective experience of loneliness is consistent with state averages, as shown in the figures below, significantly more householders live alone in the RANCHO+ region, indicating greater levels of social isolation within the household context.[24] Isolation is a critical risk factor for suicide, particularly among men who are about four times more likely to commit suicide compared to women (CDC, 2023). Men who live alone are at elevated risk for suicide, and middle aged men living alone are two times more likely to die by suicide than men not living alone (U.S. Surgeon General). As shown below, significantly and substantially more men in RANCHO+ live alone, especially middle aged men.

Figure 5.11 Living Alone, Percent of Population (2011 - 2021)



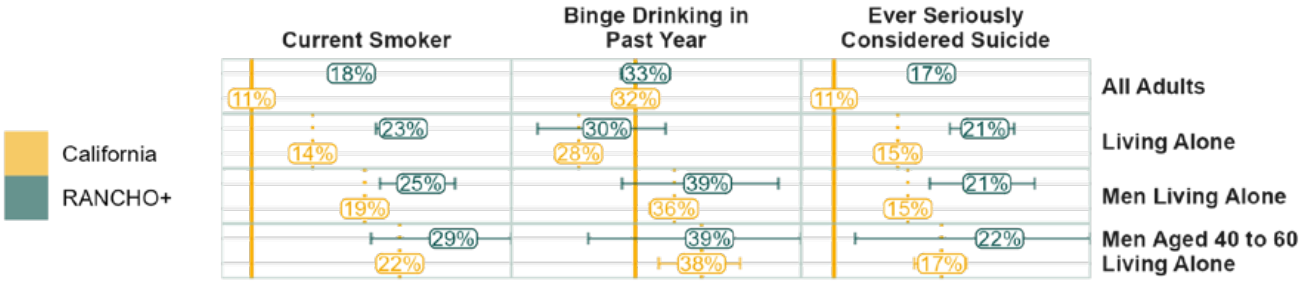
Note. Data sourced from the CHIS.

[24] See Appendix G for county by county breakdown of householders living alone.

As shown below, living alone appears to be positively associated with smoking and suicide ideation, with nearly one out of four people living alone being a current smoker, and more than one out of five people living alone having considered suicide. Conversely, living alone does not appear to be related to recent binge drinking.

While there is only a slightly higher rate of suicide *ideation* among men who live alone (and further still of middle age men), studies show that men tend to be more likely to die from a suicide attempt compared to women, as men tend to choose more lethal means of suicide such as firearms (National Institute of Mental Health). Therefore, while living alone does not appear to have a larger impact on the probability of suicide *ideation* on men compared to women, the impact that it has may be more likely to result in a completed suicide.

Figure 5.12 Proximate Risk Factors by Isolation, Sex, and Age (2011 - 2021)



Note. Data sourced from the CHIS.

Social isolation and loneliness appear to be potential risk factors for the health challenges in the region. Monitoring isolation and loneliness and promoting quality social connection may therefore be effective approaches to improving the health of the region.

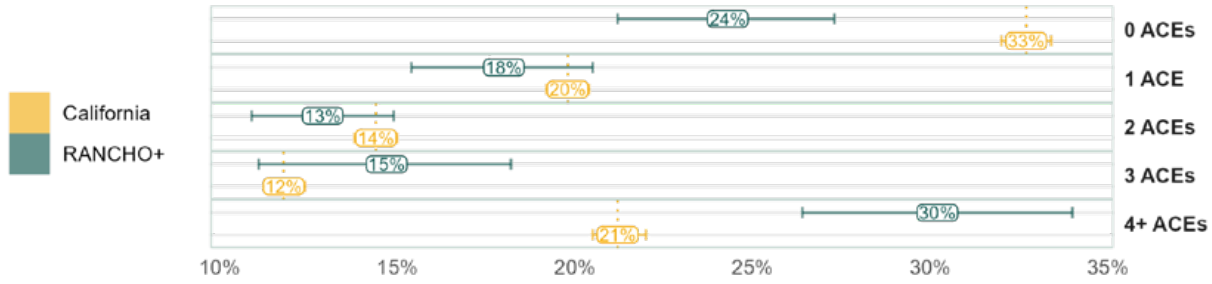
Adverse Childhood Experiences

Research has shown that childhood experiences have profound and lasting effects on health behaviors and outcomes later in life. People who have multiple Adverse Childhood Experiences (ACEs) are at far greater risk of poor health outcomes or behaviors including depression, substance use, and tobacco use (Center on the Developing Child). ACEs include abuse and neglect as well as dysfunction in the household including mental illness, problematic substance use, violence against mothers, or imprisonment of a household member (Anda et al., 1998).

The probability of poor health outcomes increases with the number of ACEs in childhood in a dose-dependent fashion (see Appendix F). For example, an individual with one ACE is approximately 1.3 times more likely to have ever injected drugs compared to an individual with no ACEs. For an individual with four or more ACES, however, this likelihood profoundly rises to 10.3 times. Studies show that ACEs are strongly associated with a higher prevalence of all proximate risk factors identified in this report including tobacco use, substance abuse, and mental health challenges.

The proportion of adults with four or more ACEs is significantly and substantially higher in the RANCHO+ region compared to the state average, while the percentage of adults with zero ACEs is significantly lower. Furthermore, as shown in Appendix F, recent data reveals that rates of domestic violence and child abuse are elevated across the RANCHO region, indicating that the region's youth are at risk for ACEs.

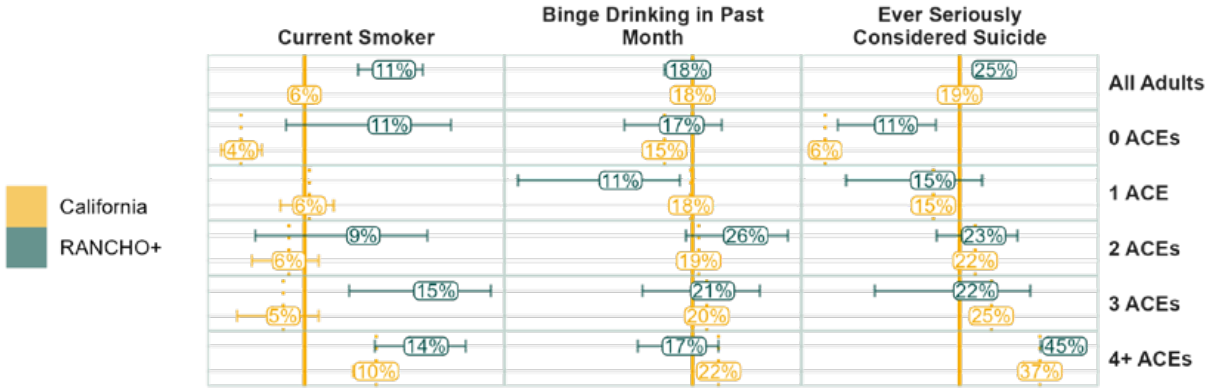
Figure 5.13 Number of ACEs Among Adults, Percent of Population (2021)



Note. Data sourced from the CHIS.

Statewide, smoking, recent binge drinking, and suicide ideation are positively associated with ACEs. Regional estimates, while subject to more statistical variation, indicate a similar trend. In particular, 45% of RANCHO+ adults with four or more ACEs have seriously contemplated suicide during their lives compared to just 11% of RANCHO+ adults with no ACEs and 6% of California adults with no ACEs. Therefore, RANCHO residents indicating multiple ACEs are at high risk for one of the region's most elevated causes of death.

Figure 5.14 Proximate Risk Factors by Number of ACEs (2021)



Note. Data sourced from the CHIS. ACEs data are available only for 2021. To make cross variable comparisons, the data must share a year in common. Binge Drinking in the Past Month is available for the 2021 year whereas Binge Drinking in the Past Year is not. Current Smoker with 1 ACE is statistically unreliable.

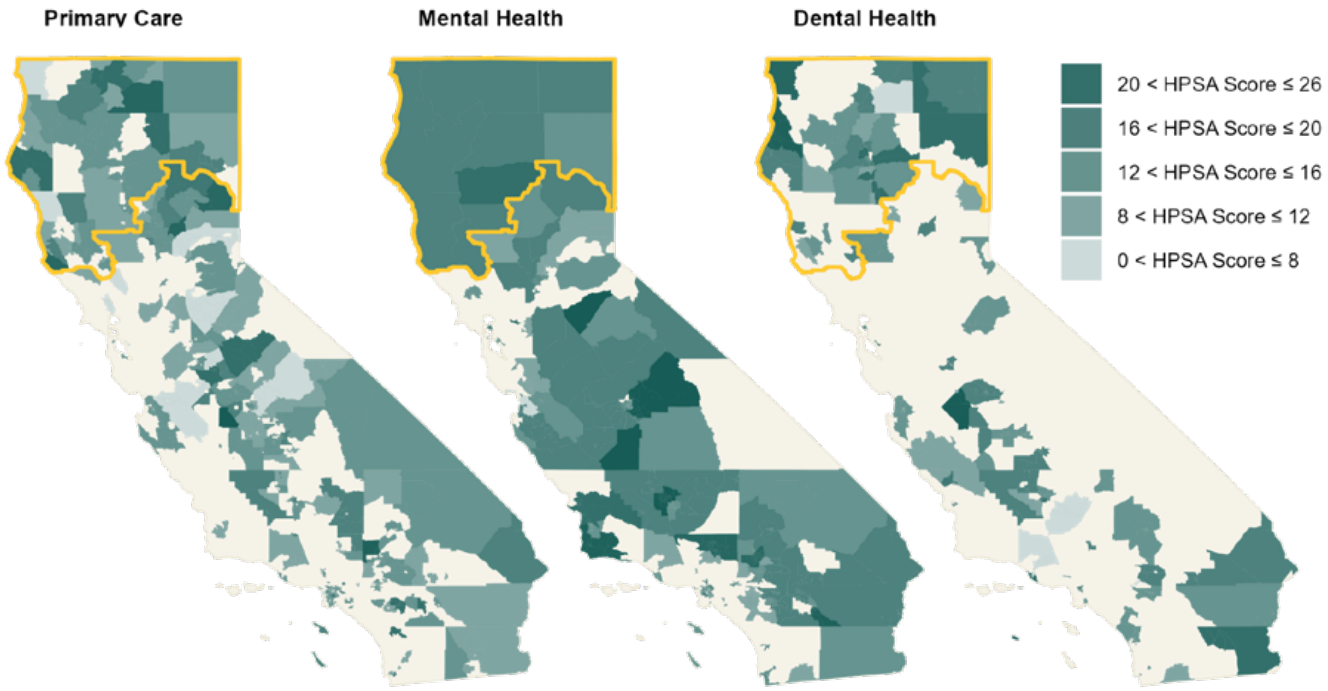
Due to the relationship between ACEs and future health behavior and outcomes endemic in RANCHO, these findings present a potential root factor that may explain some of the region's elevated tobacco, substance use, and suicide risk. Therefore, interrupting the cycle of ACEs and subsequent health consequences may present a powerful opportunity for improving the long-term health of the region. In particular, the CDC estimates that prevention of ACEs has the potential to reduce depression by 44%, smoking rates by 33%, heavy alcohol use by 24% as well as making substantial improvements in corresponding health outcomes such as COPD and improvement in economic well-being (2021).

The Centers for Disease Control (CDC) has identified strategies and approaches to help prevent or reduce the impact of ACEs. These approaches are discussed further in "Findings and Recommendations".

Healthcare Access and Barriers

The majority of the RANCHO region is a designated Health Provider Shortage Area (HPSA): regions or populations identified by the U.S. Department of Health and Human Services (HHS) as having a shortage of primary care, mental health, or dental health providers.[25] As shown below, almost all of the region is a Primary Care HPSA, the entirety of the region is a Mental Health HPSA, and a substantial share is a Dental Health HPSA.[26]

Figure 5.15 Health Professional Shortage Areas and Scores (2023)[27]



Note. Beige areas are not HPSAs. Emerald areas are HPSAs, with darker hues indicating higher HPSA scores (or greater need). The RANCHO region is outlined in gold. Data sourced from the Health Resources and Service Administration's data on shortage areas, measuring HPSA areas in primary care, dental health, and mental health.

Access to timely care can prevent occurrence or exacerbation of disease through the prevention of modifiable risk factors, early detection of illness, and management of existing illness to prevent worsening symptoms (Olsen et al., 2010). Improved access to preventive services, including screenings for tobacco, alcohol, depression, and cancer, can lower mortality rates (Centers for Medicare & Medicaid Services, 2010). Conversely, however, delays in healthcare access have been linked to increased mortality (Pizer and Prentice, 2007).

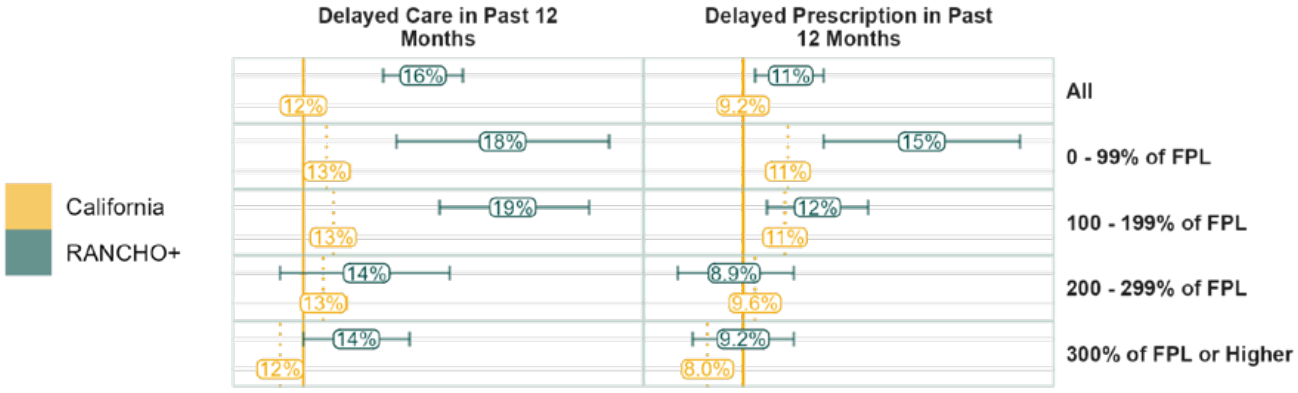
[25] These HPSAs are assigned a score, with scores ranging from 0 to 25 for Primary Care and Mental Health and from 0 to 26 for Dental Health, with higher scores indicating greater need. Factors considered in determining the score include the provider-to-population ratio, poverty rate, travel time to the nearest point of care outside of the region, and other factors relevant to the health field (Health Resources & Services Administration). HPSA scores for Primary Care also take into account indicators of infant health. Dental Health scores take into account water fluoridation status. Mental Health scores take into account the percentages of the population over 65 and under 18, alcohol abuse prevalence, and substance abuse prevalence.

[26] See Appendix F for a map of HHS Medically Underserved Areas and Populations.

[27] See national level maps made by the data provider located here: https://data.hrsa.gov/maps/map-gallery.

As shown below, a significantly larger proportion of the RANCHO+ population has recently experienced delays in accessing healthcare in contrast to the state population. Although the delay in care among individuals with incomes exceeding 200% of the federal poverty line (FPL) is close to state averages, a substantially higher proportion of individuals with lower incomes have reported delaying care. This trend suggests that the scarcity of healthcare resources in the region disproportionately affects those with lower incomes, resulting in a disproportionate impact on their overall health.

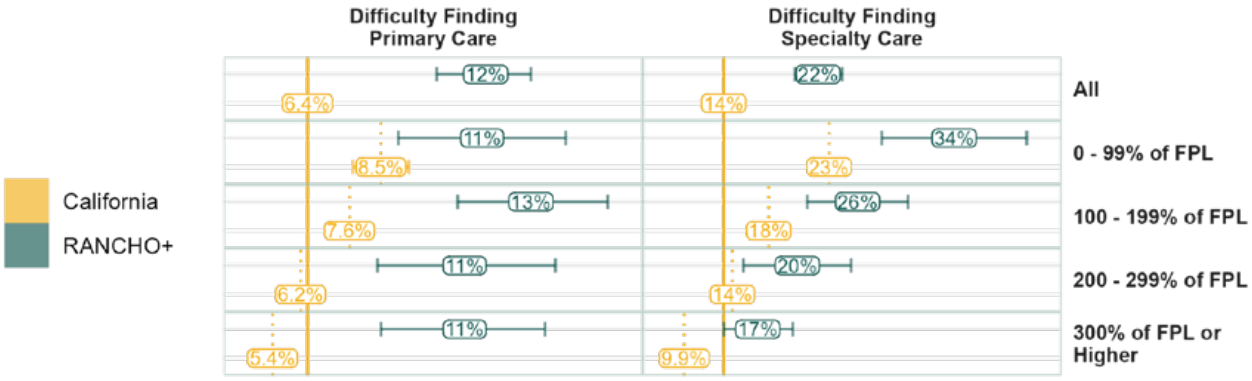
Figure 5.16 Delayed Healthcare, Percent of Total Population (2011 - 2021)



Note. Data sourced from the CHIS.

Similarly, a greater share of the population has experienced difficulty accessing healthcare.[28] However, unlike the delays in care above, all income strata indicate significantly greater incidence of difficulty accessing primary healthcare. This suggests that these difficulties are felt at all levels of household income, but those with higher incomes are less likely to experience delayed primary care as a result.

Figure 5.17 Difficulty Finding Care, Percent of Adult Population (2013-2021)



Note. Data sourced from the CHIS.

[28] Which may or may not have resulted in delays.

In addition to directly impacting health through delayed care and preventative care, regionwide there appears to be an unmet need for substance use treatment facilities. Roughly 11% of the population of a region closely approximating the RANCHO region[29] expresses an unmet need for substance use treatment facilities ranking at the highest level of need compared to national trends (see Appendix D).

Furthermore, CHIS data reveal a stark unmet need for care for those with mental health challenges. Among adults who have seriously considered suicide at some point in their lives, 37.1% (± 3.65%) have delayed care in the past 12 months compared to just 15.8% (± 1.2%) of RANCHO+ adults who have never considered suicide.

See Appendix F for further analysis of the factors contributing to delayed care. These data and analysis suggest that factors such as transportation in addition to cost and insurance issues may be critical.

Takeaways

1. Compared to state averages, the region experiences adverse disparities in rates of poverty, homelessness, educational attainment, household isolation, adverse childhood experiences, and access to healthcare.

2. Populations affected by these disparities are more likely to show two key risk factors linked to the health outcomes examined earlier: current smoking and suicide ideation. Although there is research supporting the connections between these disparities and substance use, the limited available local data on substance use do not provide clear links to these disparities specifically within the RANCHO region.

3. The region faces healthcare shortages and low income households disproportionately experience delays in accessing care. Data also suggest a substantial unmet need for substance use treatment facilities and an unmet need for healthcare among those with a history of mental illness.

[29] See discussion of limitations of NSDUH data in Appendix A.

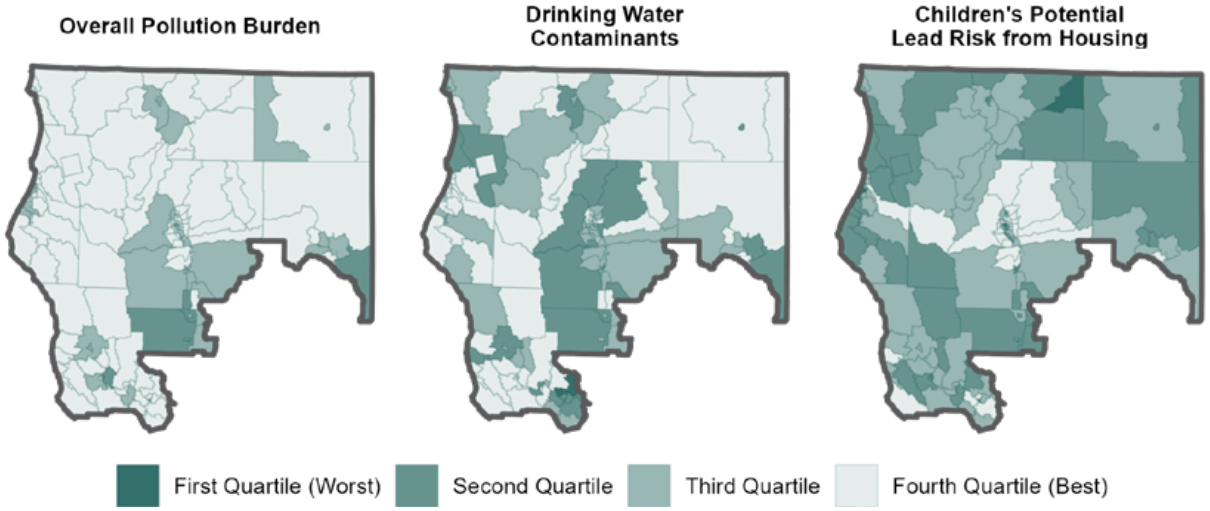
Section 06

ENVIRONMENTAL FACTORS

Environmental Quality Indicators

Environmental pollutants can contribute to respiratory disease, heart disease, and some cancers (Healthy People 2030, "Environmental Health"). As shown below, CalEnviroScreen 4.0 data indicate that overall the region's pollution burden is lower than the statewide estimates (see "Overall Pollution Burden" below). However, certain environmental risks are elevated in some areas of the region, including children's lead risk as well as factors that put water quality at risk. See Appendix K for further analysis of environmental risk factors.

Figure 6.1 CalEnviroScreen 4.0 Risk Factors



Note. Data sourced from CalEnviroScreen 4.0.

Except for these factors, however, CalEnviroScreen data suggest that overall pollution risk does not appear to be a primary factor that can explain the disparities in health outcomes between the region as a whole and the state.

Wildfires

In contrast to man-made pollutants, wildfires and corresponding health risks have in recent years been far more severe in the northern region of the state (as shown below). Smoke from wildfires can impair lung function, contribute to bronchitis, asthma, and heart failure; the region's substantial elderly population are particularly vulnerable to these effects (United States Environmental Agency, 2023). These fires may exacerbate the region's disproportionately high levels of asthma and respiratory illness.

Although not necessarily specific to wildfires, weather-related events do appear to have had an outsized impact on the health of the region compared to the state. Approximately 80% of RANCHO+ residents experienced extreme weather events between 2019 and 2021 compared to just 45% of

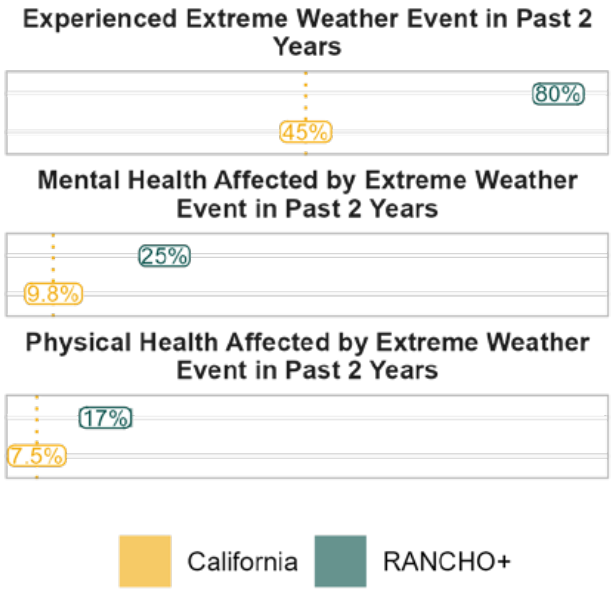
California residents. As shown below, a 2021 survey indicated that significantly and substantially more residents in the region experience adverse mental and physical health impacts due to recent extreme weather-related events compared to the state as a whole.

Figure 6.2

Wildfires, Burned Area (2018 - 2022)

Note. Data sourced from the California Department of Forestry and Fire Protection

Health Effects of Extreme Weather Events, Percent of Population (2021)



Note. Data sourced from the CHIS.

Takeaways

1. Because man-made pollutants do not appear to be worse than the state average, these factors do not appear to be a plausible contributing factor to the adverse health disparities that exist between the region as whole and the state.

2. Wildfire health risks, on the other hand, do appear to be more severe in the RANCHO region and may have had a more severe effect on the region's health compared to the state average.

Section 07

EQUITY ANALYSIS AND AT-RISK POPULATIONS

The following presents a comparative analysis of health factors across different demographic groups within the RANCHO+ region, emphasizing the identification of at-risk populations.

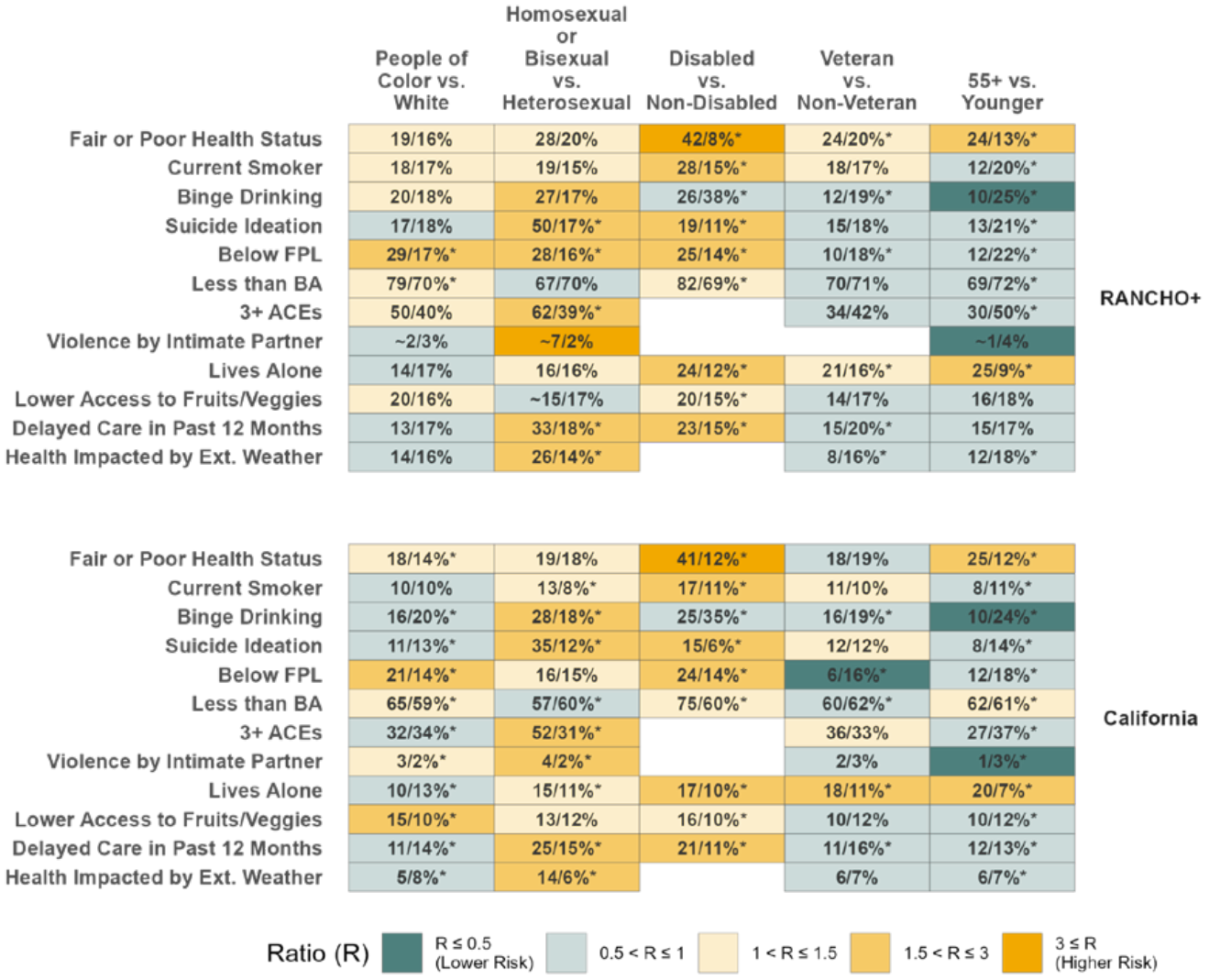
The figure below offers a visual comparison of health outcomes and factors across demographics. Each column illustrates the differences between two populations. As an example, the first column contrasts the health factors of people of color to the white population. Gold shades denote adverse disparities for the primary population relative to the reference group. A specific observation reveals that, in the RANCHO+ region, 29% of people of color live below the poverty line, in contrast to 17% of the white population.[30] From these data, several notable trends emerge further highlighting populations at risk in the RANCHO region:

- People of color show higher poverty levels, lower educational attainment, limited access to nutritious foods, and increased rates of ACEs.
- Lesbian, gay, and bisexual communities within the RANCHO region face numerous disparities: elevated levels of poor health, increased smoking and heavy alcohol consumption, suicidal thoughts, higher poverty rates, significantly elevated ACEs rates, domestic violence, deferred medical care, and adverse weather-related health impacts. Alarmingly, half of this community has seriously contemplated suicide.
- People with disabilities in the region experience higher rates of poor health, increased smoking, suicidal thoughts, poverty, lower educational attainment, living alone, restricted access to healthy food, and deferred medical care.
- The 55+ demographic in the region tends to live solitarily. As expected, a higher percentage report fair or poor health, but this group generally has fewer risk factors. The health trends of the veteran population resemble these patterns, possibly due to a significant age overlap in these two groups within the region.[31]

[30] Non-white Hispanics are included in people of color category and white Hispanics are included in the white group.

[31] In the RANCHO+ region 19.1% of adults 55 and older have served in the military compared to just 5.3% for adults 18 to 54 (2011 - 2022 CHIS data).

Figure 7.1 Comparative Analysis of Demographic Disparities in Health Factors (2011 - 2022)



Note. Data sourced from the CHIS. (*) denote statistically significant differences and (~) denote unstable estimates. It is possible that an estimate can be unstable and simultaneously significantly different. Missing values not shown. Years are selected based on all available years from 2011 on. Binge drinking is either "Binge Drinking in Past Month" or "Binge Drinking in Past Year" depending on data availability.

Section 08

POLICY FOCUS AREAS AND RECOMMENDATIONS

While the health challenges and disparities revealed in this report may not come as a surprise to local health officers and stakeholders. By uncovering health outcomes and risk factors that exhibit adverse disparity with state averages, the report's intention is to promote a clear understanding of the region's shared health challenges and at-risk populations, which, in turn, can guide prioritization and collaborative efforts to address these challenges. The following categorizes the report's findings into three policy areas. The focus is not to detail every challenge and potential solution but to emphasize and prioritize those that emerge as central and high-priority challenges.

Policy Focus Area 1: Smoking Prevention, Education, and Cessation

Key Findings

- Youth and adult smoking is substantially higher in the region.
- Tobacco-related health outcomes are adversely impacted in the region.
- The regional population appears to have a lower perceived risk of heavy smoking.

At-Risk Populations

Regional data indicate that the following RANCHO populations are at elevated risk for tobacco use:

- Both youth and adults
- People with low income or moderate income
- People with lower educational attainment
- Youth with academic challenges
- People experiencing loneliness or social isolation
- People with multiple ACEs
- Lesbian, gay, and bisexual individuals
- Individuals with disabilities

National SAMHSA data indicate that the AIAN may also be at high risk for tobacco use ("2021 NSDUH Detailed Tables").

Recommendations and Resources

- Make use of evidence-based models for tobacco cessation such as Rural Health Information Hub's *Rural Tobacco Control and Prevention Toolkit*, focusing on at-risk populations and addressing the perceived risk of tobacco use.

Suggested Indicators of Success

- A reduction of Grade 11 smoking rates to rates similar to the state rate as indicated by CalSCHLs data.[32]
- A reduction in the proportion of 'current smokers' to a rate similar to the state rate as indicated by CHIS data.
- Do **not** use smoking data from CHRR, CDC PLACES, or any other SAE data to measure success.[33]

[32] For each toolkit, see "Program Clearinghouse" for examples of promising programs.

[33] See Appendix A for data limitations.

Policy Focus Area 2: Substance Use Prevention and Treatment

Key Findings

- Substance use among youth and adults as well as adverse substance use related health outcomes are elevated in the region.
- Rates of Hepatitis C are the highest in the state.
- DUIs and alcohol-involved driving deaths are elevated.
- The regional population appears to have a lower perceived risk of heavy alcohol use and certain drug use.
- The regional population appears to have a substantial unmet need for substance use treatment facilities.

At-Risk Populations

Data limitations prevent a comprehensive analysis of the regional at-risk populations; however, local data indicate that the following populations are at risk for binge drinking:

- Both youth and adults
- People living alone, especially men
- Lesbian, gay, and bisexual individuals

National SAMHSA data indicate that the following populations may also be at high risk for substance use disorder ("2021 NSDUH Detailed Tables"):

- AIAN
- People of two or more races
- People with low or moderate income

Research also indicates that people with multiple ACEs are at high risk for substance use (Anda et al., 1998).

Recommendations and Resources

- Make use of evidence-based models for substance use prevention and treatment such as Rural Health Information Hub's *Prevention & Treatment of Substance Use Disorders Toolkit*, focusing on at-risk populations and addressing the perceived risks of substance use.
- Research and identify counties within the RANCHO region with the greatest unmet need for substance use treatment facilities.
- To address motor vehicle traffic facilities, consider using the UC Berkeley Transportation Injury Mapping System (TIMS) to monitor and respond to DUI, pedestrian and bicycle injury hotspots in your service area.[34]

Suggested Indicators of Success

- A reduction of Grade 11 students who have been "drunk or high at school" to rates similar to the state rate as indicated by CalSCHLs data.[35]
- A reduction in the proportion of DUI crashes to a rate similar to the state rate as indicated by TIMS data.[36]
- A reduction in "All Drugs" overdose deaths to rates similar to the state rate as indicated by the California Overdose Surveillance Dashboard from CDPH.
- Do **not** use alcohol use data from CHRR, CDC PLACES, or any other SAE data to measure alcohol intervention success.[37]

[34] This tool, for instance, identifies the intersection of 11th Street and H Street in Arcata, CA in Humboldt County as a hotspot. An account is required, but setup is free, easy, and quick.

[35] Binge drinking in the past 30 days may also be a useful indicator.

[36] Alternatively, alcohol involved OTS Crash Rankings or the proportion of alcohol-involved driving deaths from CHRR may be used.

[37] CHRR alcohol driving deaths does not use SAE data so this could function as an indicator of success.

Policy Focus Area 3: Suicide Prevention and Access to Mental Health Care

Key Findings

- Suicides, suicidal ideation, and firearm-related deaths are elevated in the region.
- Of those with 4+ ACES, nearly half have considered suicide in the region.
- The entire region is a mental health provider shortage area.
- People with disabilities and lesbian, gay, and bisexual individuals are significantly more likely to have contemplated suicide and significantly more likely to have recently delayed health care.

At-Risk Populations

Regional data indicate that the following RANCHO populations are at elevated risk for suicide ideation:

- Both youth and adults
- Men
- People with low income or moderate income
- People experiencing loneliness or social isolation
- People with multiple ACEs
- People experiencing suicidal ideation who have access to a firearm
- Lesbian, gay, and bisexual individuals
- Individuals with disabilities

National SAMHSA data indicate that the following populations may also be at high risk for suicide ideation ("2021 NSDUH Detailed Tables"):

- AIAN
- People of two or more races
- Unemployed

The CDC indicates that the following populations at elevated risk of suicide completion ("Preventing Suicide Requires a Comprehensive Approach"):

- Veterans
- AIAN
- Individuals with disabilities
- Lesbian, gay, or bisexual youth
- Middle aged adults (35-64 years of age)
- Men working in high risk occupations

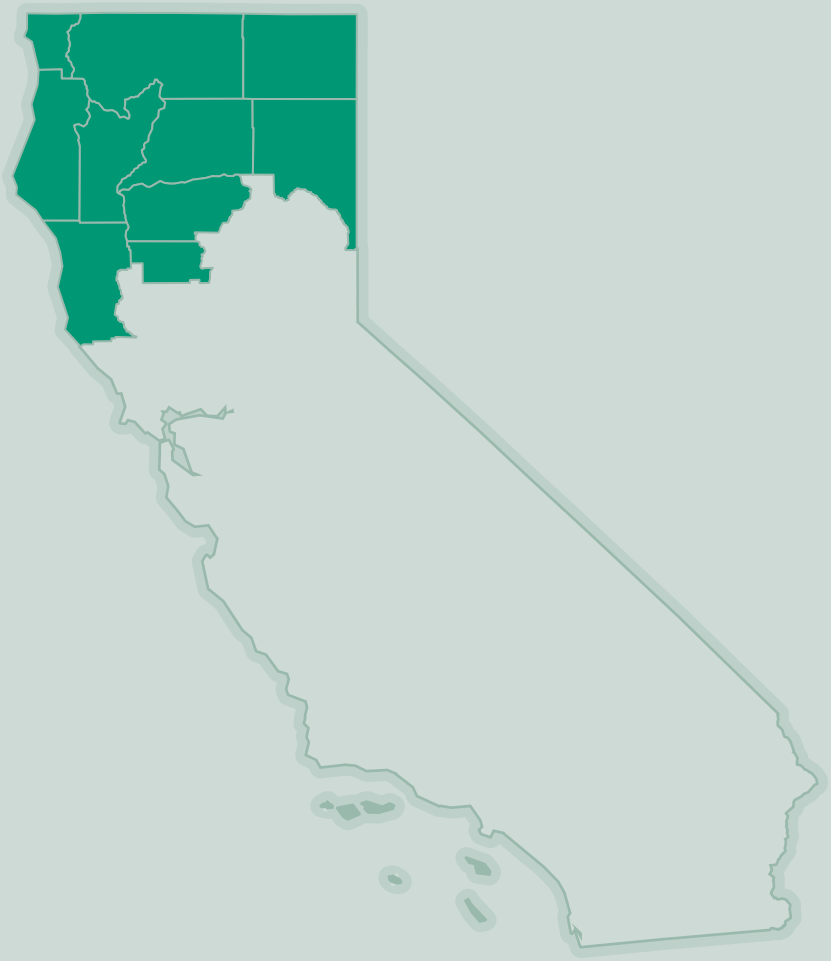
Recommendations and Resources

- Make use of evidence-based models for suicide prevention and health access such as Rural Health Information Hub's *Suicide Prevention Toolkit*, *Rural Care Coordination Toolkit*, *Rural Transportation Toolkit*, and *Rural Telehealth Toolkit* focusing on at-risk populations.
- Work to address underlying risk factors such as child abuse, domestic violence, and ACEs. For instance CDC has prepared a short handbook of tangible evidence-based strategies and approaches to preventing ACEs. Specific recommendations include approaches such as early childhood home visitation, recruiting men and boys as allies in prevention, and mentoring programs.

Suggested Indicators of Success

- A reduction in the suicide mortality rate to rates similar to the state rate as indicated by *County Health Status Profiles* from the CDPH.
- A reduction of Grade 11 students who have "considered suicide" to rates similar to the state rate as indicated by CalSCHLs data.
- A reduction in the proportion of teens and young adult population who have "seriously thought about committing suicide" to rates similar to the state as indicated by CHIS data.
- A reduction in the proportion of teens and young adult population who have had four or more ACEs to rates similar to the state as indicated by CHIS data.
- A reduction of rates of child abuse and domestic violence to rates similar to the state rates as indicated by kidsdata.org.
- A reduction in the proportion of the population with a history of suicide ideation who have "delayed care" to a rate similar to the state (or lower) as indicated by CHIS data.
- Do **not** use mental health SAE data from CHRR, CDC PLACES, or any other SAE data to measure success.

APPENDICES



Appendix A

DATA LIMITATIONS AND METHODOLOGY

Data Limitations

Several data limitations are evident within this report. First, some data points have suppressed data. Most RANCHO counties have inherently small sample sizes due to low populations. In order to protect anonymity/confidentiality, data sources (e.g. CHRR) will omit county-level data when sample sizes are inadequate (e.g. $n < 12$). In the data visualizations throughout this report, missing data will either be suppressed from the visualization with notation, or the missing variable (e.g. county name) will be included in the visualization but without a corresponding value. Frustratingly, this often eliminates the ability to provide estimates for minority populations for counties with low populations.

Wherever feasible, data points include confidence intervals provided by the data source. Unless otherwise stated, all confidence intervals use a 95% level of confidence. In some cases, when necessary variables are available and confidence intervals are not provided by the data source, confidence intervals are calculated with 95% confidence. Because most RANCHO counties have small populations, the resulting small sample sizes often produce point estimates with wide confidence intervals.[38] This is a particular challenge quantifying a condition or event among a small subset of a population. This further narrowing of an already small population increases the statistical uncertainty of the estimate, widening confidence intervals.

Data from the Centers for Disease Control (CDC) and Robert Wood Johnson Foundation PLACES project uses regression techniques to estimate health outcomes and behaviors at the county level based on data from the CDC's Behavioral Risk Factor Surveillance System (BRFSS) and the Census Bureau's ACS and Decennial Census population estimates. While these data are model based predictions, they have been shown to be consistent with BRFSS survey estimates at the county level. In light of these limitations, the data provider cautions against using the estimates to detect effects due to local area interventions, as such effects would not necessarily be reflected in the data used to construct the PLACES data (Centers for Disease Control and Prevention). These limitations also apply to some data from CHRR, as this source includes data derived from the PLACES project data. All data sources that use small area estimation techniques (SAE) are indicated as such throughout the report.

The California Health Information Survey (CHIS) is a rich dataset both in breadth and depth, providing direct survey evidence that in many cases are not available or comparable to other datasets. However, a limitation of these data is the aggregation of small population counties into larger statistical units. Because of this limitation, it is not possible to draw data exclusively from the eleven RANCHO counties. The nearest approximation to the RANCHO region includes 14 counties including all RANCHO counties plus Colusa, Plumas, and Sierra counties. This larger group is referred to throughout the report as RANCHO+. These three additional counties are both small in population and constitute just 6.0% percent of the overall 14 county region.[39] Therefore, the addition of these

[38] As an example, a point estimate for the poverty rate would be the estimated poverty rate (e.g. 20%), and the confidence interval would be a range of values that indicate the reliability of that point estimate. A wide confidence interval indicates that the point estimate is less reliable, whereas the narrow confidence interval indicates that the point estimate is likely close to reality.

[39] Based on 2017-2021 estimates from the American Community Survey.

three counties is unlikely to substantially skew the data, and inferences drawn from data describing the RANCHO+ region are likely indicative of the RANCHO region.

Data from the National Survey on Drug Use and Health (NSDUH) by the Substance Abuse and Mental Health Services Administration (SAMHSA) offer valuable insights into substance and tobacco use that may not be found in other datasets. However, similar to the CHIS data mentioned earlier, these NSDUH data cover a region that does not perfectly align with the RANCHO region. The NSDUH region most closely resembling RANCHO includes all RANCHO counties as well as Butte, Colusa, Plumas, and Sierra counties. It is important to note that, due to Butte County's substantial population (211,632), these additional counties represent a sizable population beyond RANCHO, potentially influencing the data. Consequently, any inferences about these factors within the RANCHO region should be made with caution. Nonetheless, in the absence of other data sources, these NSDUH data can offer valuable insights into substance use and related concerns in the broader rural Northern California region.

Because of these disparate statistical challenges including limited population sizes, imperfect statistical representation of the geographic area, small area estimation (SAE) techniques, wherever possible multiple data sources will be used to bolster the weight of evidence, enabling the identification of trends that emerge from the collective signals conveyed by the data.

Where necessary, a more detailed discussion of data limitations particular to certain data sources is discussed further in their corresponding sections.

Terminology and Technical Methodology

The word "significant" is used deliberately and precisely throughout this report to mean that the difference between a variable and the state average is statistically significant at the level of confidence associated with the confidence interval provided by the data source. A difference between two variables is determined to be statistically significant when their confidence intervals do not intersect. Wide and overlapping confidence intervals should be interpreted as an absence of compelling evidence of difference rather than evidence of similarity between variables. Because of the data limitations above, the data sources used throughout this report may fail to indicate significant differences, when in fact true differences exist.

To facilitate interpretation and comparison of findings, we include the observational period during which the data was gathered in the title of each data visualization. Data publication dates are included in the References page.[40]

All data analysis and visualization in this report was conducted using the R programming language. In this environment, we primarily made use of the Tidyverse suite of R packages. U.S. Census data was drawn from the Census Bureau's application programming interface (API) via the TidyCensus R package. Unless otherwise stated, all maps in this report were made using data drawn from the Census Bureau via the TidyCensus library for R.

[40] When multiple data sources or variables are included, we include the total observational window. For example, if one variable has an observational window of 2015 to 2018 and another has an observational window of 2016 to 2019, 2015 to 2019 will be given in the title.

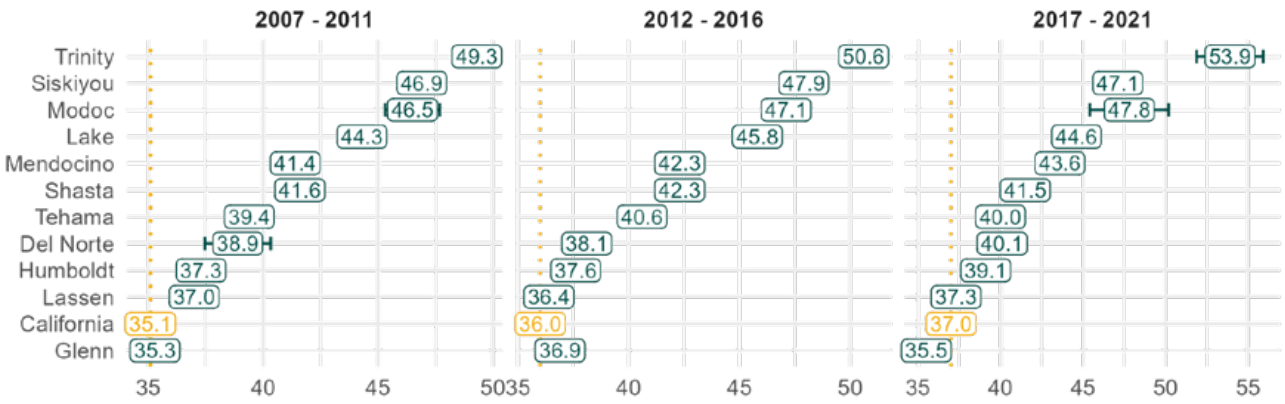
Figure A.1 International Classification of Diseases (ICD-10) Codes

All Cancer Deaths	C00–C97
Colorectal Cancer	C18–C21, C260
Lung Cancer	C34
Female Breast Cancer	C50
Prostate Cancer	C61
Diabetes	E10–E14
Alzheimer's Disease	G30
Coronary Heart Disease	I20–I25
Cerebrovascular Disease (Stroke)	I60–I69
Influenza and Pneumonia	J09–J18
Chronic Lower Respiratory Disease	J40–J47
Chronic Liver Disease and Cirrhosis	K70, K73–K74
Accidents (Unintentional Injuries)	V01–X59, Y85–Y86
Motor Vehicle Traffic Crashes	V02–V04(1, 9), V092, V12–V14(3–9), V19(4–6), V20–V28(3–9), V29–V79(4–9), V80(3–5), V811, V821, V83–V86(0–3), V87(0–8), V892
Suicide	U03, X60–X84, Y870
Homicide	U01–U02, X85–Y09, Y871
Firearm Related Deaths	U014, W32–W34, X72–X74, X93–X95, Y22–Y24, Y350
Drug Overdose Deaths	X40–X44, X60–X64, X85, Y10–Y14

Note. Codes sourced from CDPH County Health Status Profiles 2023.

Appendix B MEDIAN AGE BY COUNTY

Figure B.1 Median Age (2007 - 2021)



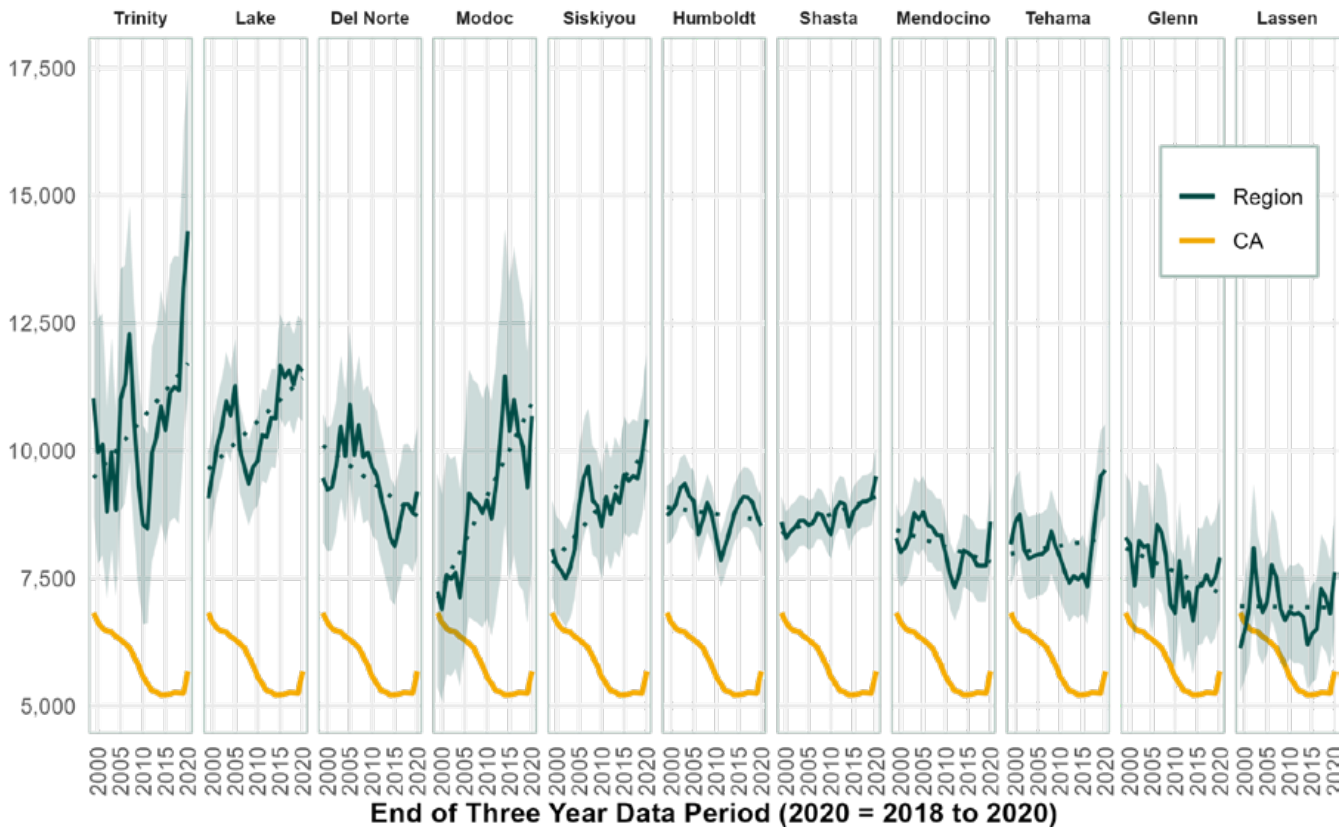
Note. Data sourced from the ACS.

Appendix C

FURTHER ANALYSIS OF HEALTH OUTCOMES

Trends in Mortality Rates and Premature Death

Figure C.1 Years of Potential Life Lost (YPLL) per 100,000 Population (1997 - 2020)



Note. Data sourced from CHRR. YPLL is defined as the number of years of life lost due to deaths prior to age 75. For instance, the death of a 40 year old would amount to 35 YPLL.

Figure C.2 Change in Age-Adjusted Mortality Rate per 100,000 from 2017-2019 Period to 2019-2021 Period

	Modoc	Mendocino	Trinity	Siskiyou	Tehama	Del Norte	Lassen	Shasta	Humboldt	Lake	Glenn	CA
Accidents (Unintentional Injuries)	+24.7	+24.3*	+58.1	+6.3	+8.0	+17.1	+28.1	+10.9	-0.4	+34.4*	+8.4	+9.3*
Drug Induced Deaths	+2.5	+20.2*	+20.8	+6.7	+7.5	+4.5	+11.0	+8.5	+1.0	+23.1	+19.8	+7.1*
Motor Vehicle Traffic Crashes	+19.3	+3.5	+21.0	-1.8	-2.3	+2.2	+10.8	-0.2	-5.1	+7.5	-6.4	+1.0*
Chronic Liver Disease and Cirrhosis	-9.1	+3.7	-7.7	+13.3	+6.8	+7.9	+2.1	+0.5	+1.4	+19.3	-2.3	+1.7*
Coronary Heart Disease	+22.3	+11.1	+5.9	-2.0	-1.0	-27.0	+4.4	-6.2	-1.4	+6.5	+13.9	-1.6*
Female Breast Cancer	-0.7	+1.3	+13.9	+4.7	-0.8	+1.1	+0.4	-2.9	+3.5	-1.5	-2.0	-0.9*
All Cancers	+34.1	+14.5	+9.6	+12.5	+3.5	+5.7	-19.0	-10.0	+6.1	-16.6	-25.7	-6.5*
Prostate Cancer	+8.3	+0.5	-5.6	-3.8	+0.4	+16.9	-1.4	+6.0	+2.6	-2.1	-19.7	-0.1
Cerebrovascular Disease (Stroke)	+16.2	-0.2	-9.7	+1.1	+11.7	-1.3	-3.7	-0.6	+12.8	-12.3	-18.6	+1.3*
Homicide	+0.6	+2.6	-5.7	-2.7	-0.1	-5.7	+4.7	-0.6	+2.6	-3.8	+1.5	+0.9*
Colorectal Cancer	-4.8	-0.1	-4.7	+5.5	+3.4	+4.2	+1.0	-4.8	-1.9	-4.0	-3.7	-0.4
Lung Cancer	+15.4	+2.5	-0.7	-4.7	+0.6	+2.3	-13.6	-1.7	-0.2	-4.5	-7.3	-2.9*
Diabetes	-8.0	+1.4	+8.5	+1.1	+3.0	+11.3	-12.2	+1.0	-6.1	-3.3	-9.4	+1.8*
Suicide	-15.1	+4.5	-11.9	+8.5	+0.9	+8.1	+4.6	-1.3	-1.2	-8.0	-3.4	-0.4*
Firearm Related Deaths	+2.4	-1.7	-9.9	+7.2	-1.3	+1.0	+1.7	-1.0	+0.2	-13.1	-6.3	+0.8*
Alzheimer's Disease	-2.6	-0.1	-7.3	+6.9	-2.4	-0.1	-1.0	+5.8	-5.1	-3.9	-12.2	+1.4*
Influenza and Pneumonia	-8.4	-3.2	+2.1	-1.2	-0.1	-2.0	-0.6	-2.4	-5.3	-5.9	-8.9	-2.2*
Chronic Lower Respiratory Disease	-7.5	-7.3	+11.0	-0.9	-1.1	-2.3	-18.6	-11.4	-5.6	-15.6	-18.0	-3.5*

Increased More Than State | Increased | Decreased | Decreased More Than State

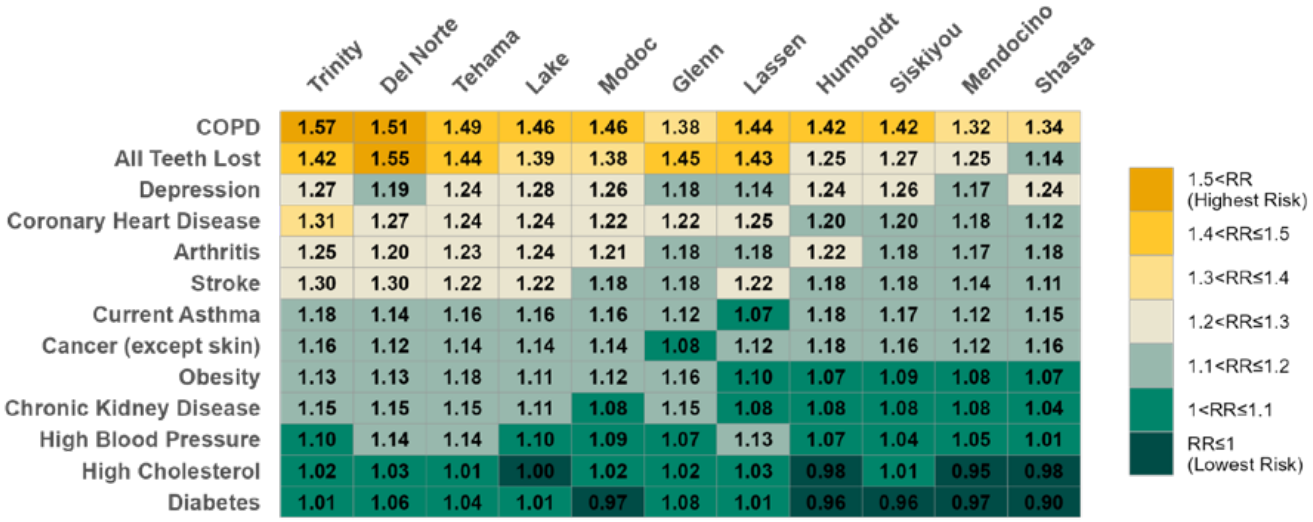
Note. Data sourced from the California Department of Public Health and the California Conference of Local Health's County Health Status Profiles report data. Numerical values indicate change in age-adjusted mortality rates. Asterisks (*) denote a statistically significant change over time.

Health Conditions, SAE Estimation Techniques

A broader understanding of health conditions in the region is derived from data obtained from the Centers for Disease Control (CDC) and the Robert Wood Johnson Foundation PLACES project. However, it is important to note that these data have a critical limitation as they have been generated using small area estimation (SAE) techniques, rather than direct estimation such as surveys.[41] It is possible that the models used to predict these values may omit important local variables such as a local health intervention program and therefore fail to accurately predict health outcomes. Although direct estimates are preferred, SAE techniques can nevertheless offer helpful insights into health outcomes for areas with small populations where directly estimated data is unavailable. As shown below, this SAE model suggests health outcomes similar to state averages for diabetes and high cholesterol, whereas all other conditions are predicted to be higher.

[41] SAE uses multivariate regression techniques to predict values for small geographic areas using the available data such as American Community Survey Data. These data on health outcomes at the county level are based on data from the CDC's Behavioral Risk Factor Surveillance System (BRFSS) and the Census Bureau's ACS and Decennial Census population estimates.

Figure C.3 Estimated Age-Adjusted Illness Risk Ratios (RR), SAE Technique (2019 - 2020)

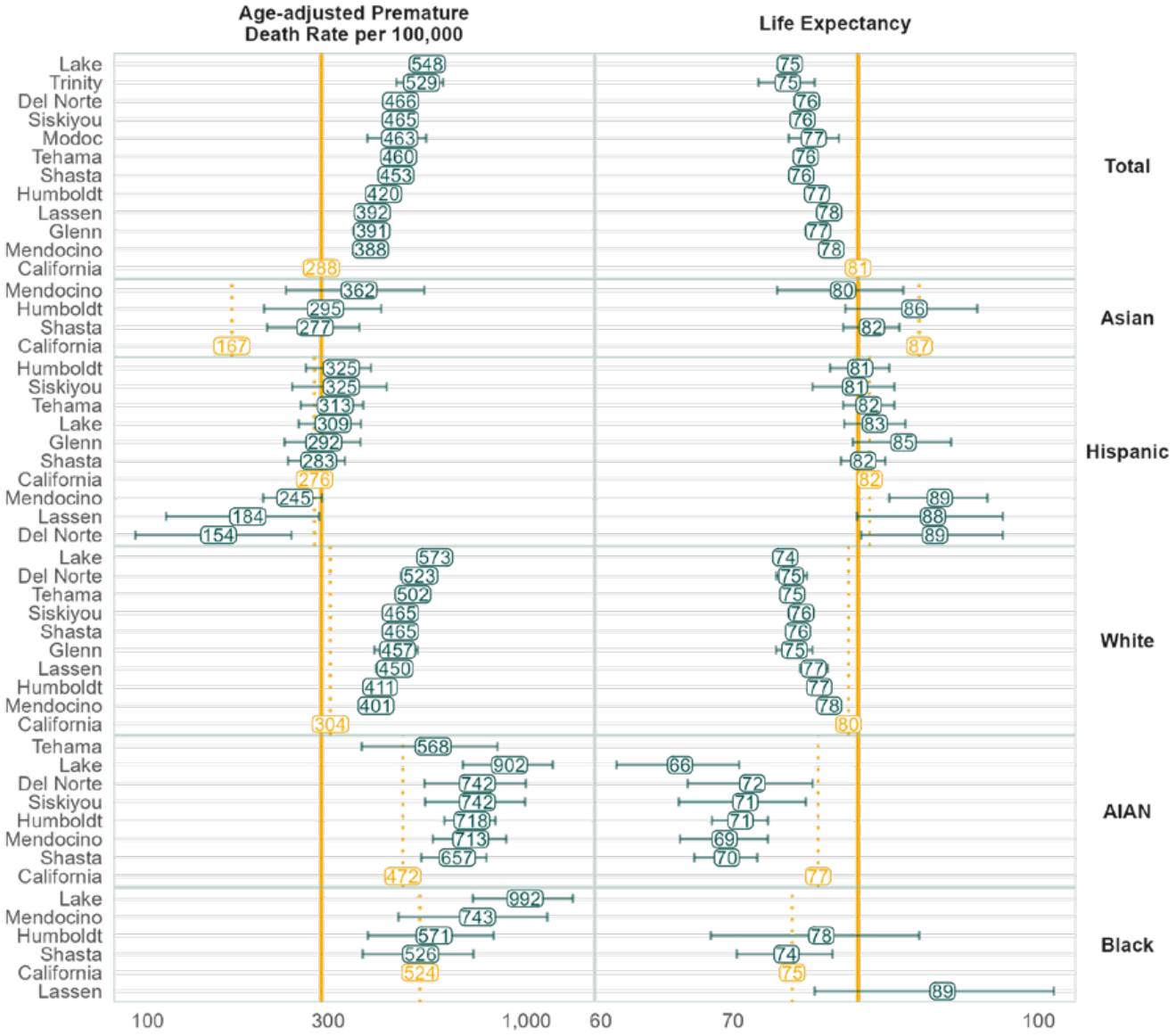


Note. Data sourced from the Centers for Disease Control and Prevention's 2022 release of the PLACES data set, PLACES: Local Data for Better Health, County Data. California estimates and not provided by the data source. California estimates were calculated by the author by taking a population-weighted average of all California counties using the population estimates provided in the dataset. Risk ratios (RR) calculated by taking the ratio of the local rate divided by the state rate. RR > 1 indicates higher risk relative to the state.

Health Outcomes by Race and Ethnicity

As shown below, the available data signal significantly and substantially higher age-adjusted premature death among white, American Indian, and Black populations (see *AIAN* and *Black* rows, compared with dotted vertical lines). Asian populations experience rates of premature death largely consistent with the overall state average but significantly higher than the state averages for their respective populations. On the other hand, the region's Hispanic population experiences rates of premature death and life expectancy consistent with both the state average for this population and the overall state population.

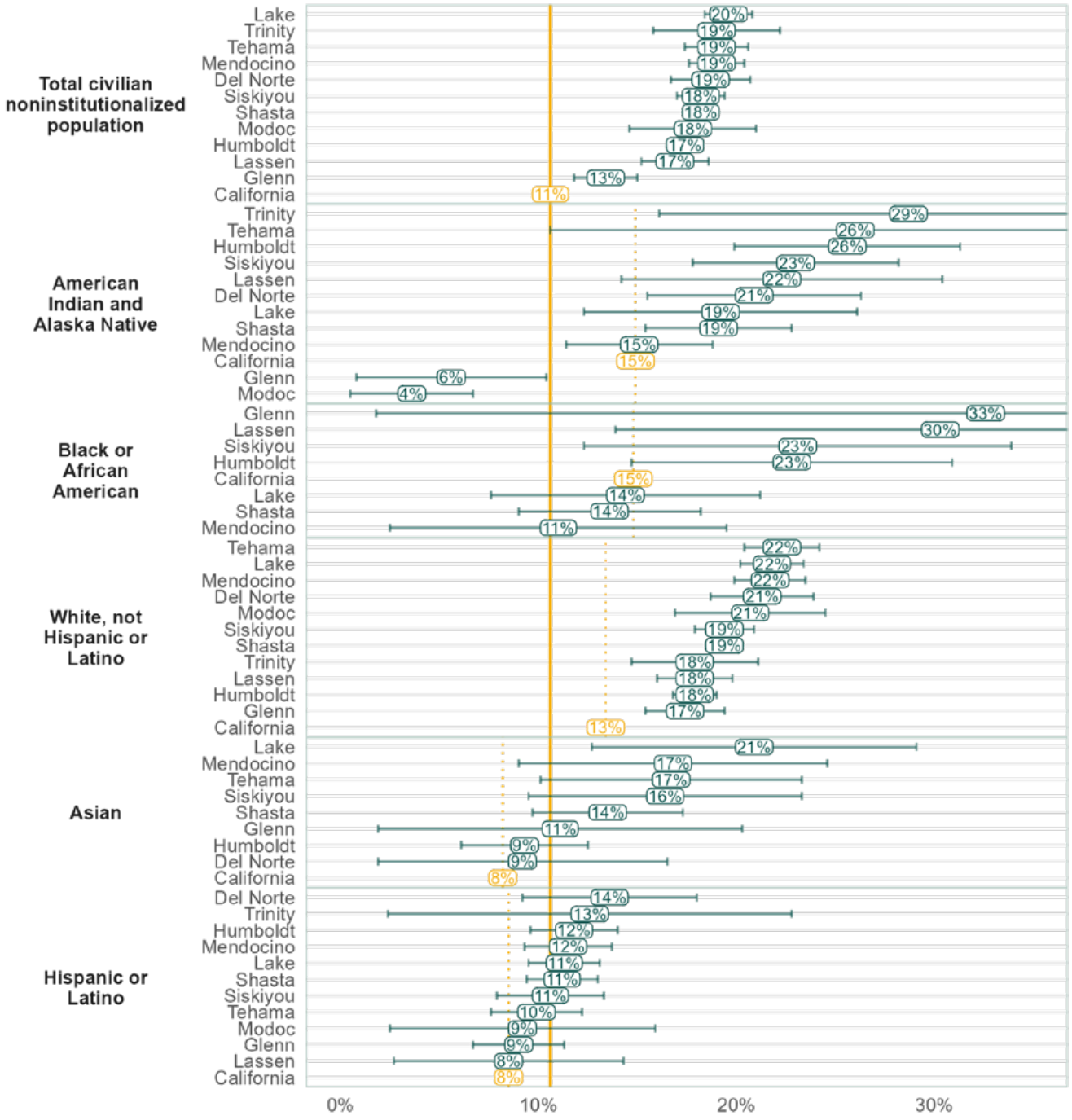
Figure C.4 Premature Death and Life Expectancy by Race and Ethnicity (2018 - 2020)



Note. Data sourced from the CHIS.

It is important to consider differences in disability rates and other health factors by race or ethnicity in the context of age, as differences in disability rates between populations can be strongly influenced by differences in the age structure of the population. Consistent with national and state trends, Latino households are substantially younger compared to the general population. On the other hand, the non-Hispanic, white community is substantially older compared to the general population (CHIS). Therefore, we should expect to see a greater level of age-related disparities in health outcomes for the non-Hispanic white population and a lower level of such disparities in the Hispanic population.

Figure C.5 Disability Rates by Race or Ethnicity (2017 - 2021)



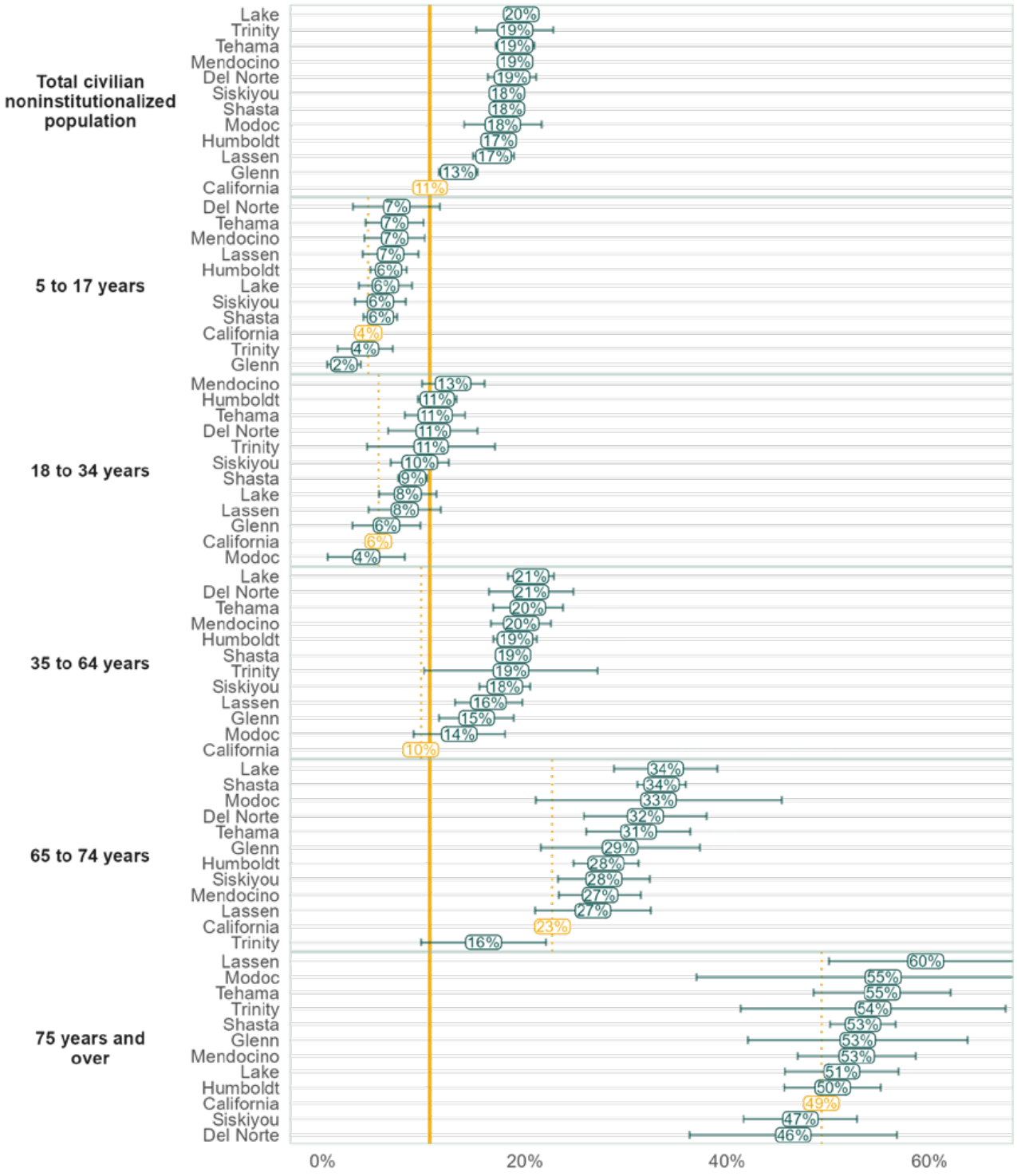
Note. Data sourced from the ACS. Missing data or estimates with confidence intervals that include zero are excluded from the visualization.

Disability Rates by Type and Age

Disability rates are higher in the region, including among those aged 18 to 34 and 35 to 64. Disability rates among this latter cohort are almost certainly impacted by a skewing of the age distribution, as in the RANCHO region, proportionately more adults in this age range are closer to age 64. However, among 18 to 34 year olds, there is less room variation in age, and this population skews younger

than the state population, indicating that age-related disability onset is not likely a factor behind the elevated disability rates among 18 to 34 year olds in the region. Therefore, analysis of this younger cohort may uncover factors other than age that contribute to higher disability rates in the region.

Figure C.6 Disability Rates by Age Range (2017 - 2021)



Note. Data sourced from the ACS.

As shown below, the data signal higher cognitive, independent living, and ambulatory disabilities among this cohort. The American Community Survey (ACS) defines a cognitive disability as a difficulty resulting from a *physical, mental, or emotional* challenge that results in "serious difficulty concentrating, remembering, or making decisions," whereas an independent living disability is defined as a difficulty resulting from a *physical, mental, or emotional* challenge that results in difficulty "doing errands alone such as visiting a doctor's office or shopping".[42] Therefore, two of these disability types that have the strongest signal of disparity have a potential mental health dimension. Both mental health and substance use disorders are leading causes of disability and *the* dominant causes of disability among adults younger than 35, accounting for over 35% of years lived with disability nationwide (National Center for Complementary and Integrative Health).

[42] American Community Survey disability definitions:

Hearing: "deaf or … serious difficulty hearing"

Vision: "blind or … serious difficulty seeing even when wearing glasses"

Cognitive: due to physical, mental, or emotional condition: "serious difficulty concentrating, remembering, or making decisions"

Ambulatory: "serious difficulty walking or climbing stairs"

Self-care: "difficulty dressing or bathing"

Independent living: due to physical, mental, or emotional condition, difficulty: "doing errands alone such as visiting a doctor's office or shopping"

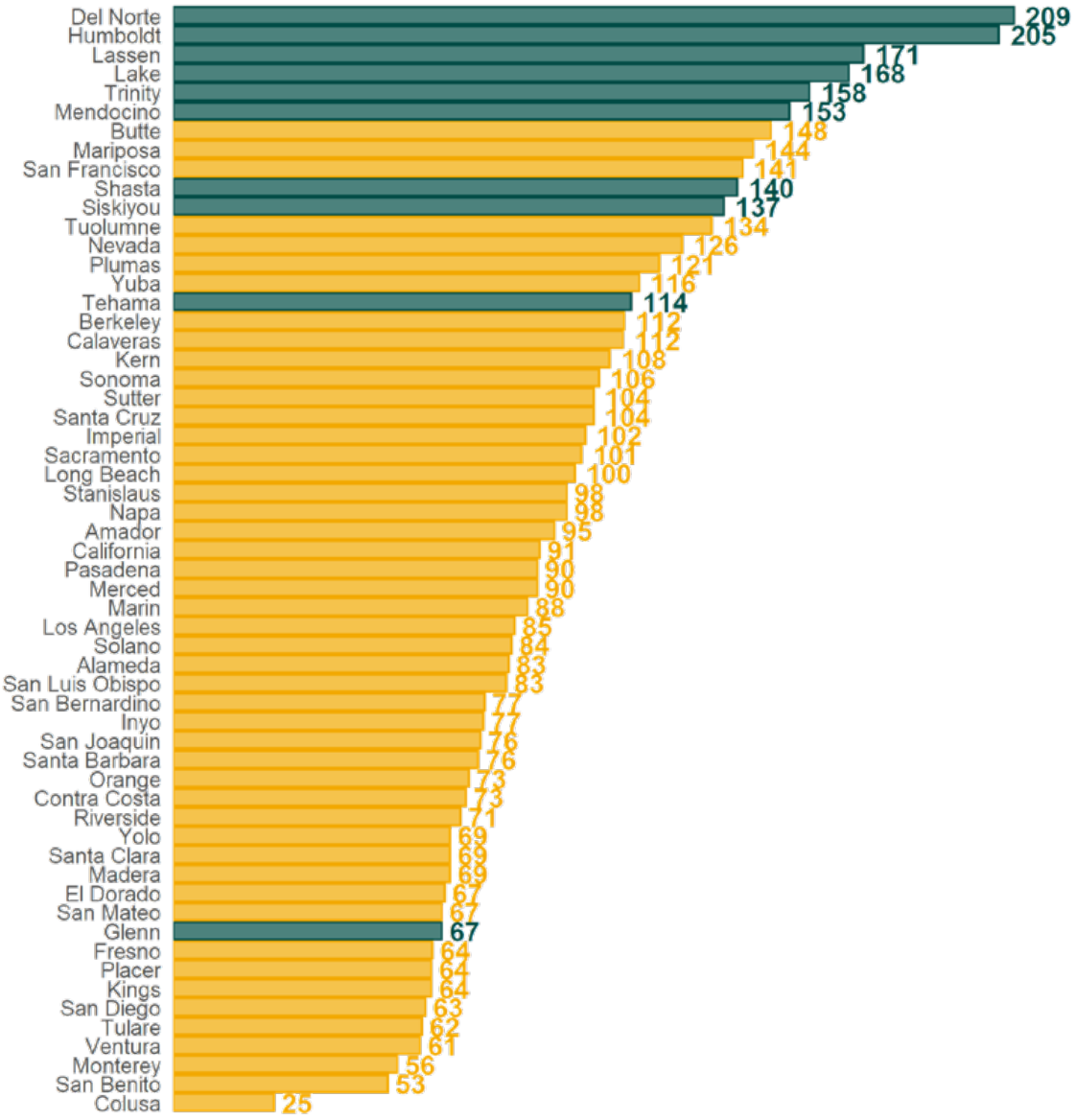
Figure C.7 Disability Rates by Type and Age Range (2017 - 2021)

Note. Data sourced from the ACS. Values that have a lower confidence interval that includes zero are excluded from the visualization.

Given the evidence of mental health and substance use challenges for the region, these proximate factors may be major forces behind the region's disparities in disability rates, at least among adults younger than 35.

Hepatitis C Infections

Figure C.8 Newly Reported Chronic Hepatitis C per 100,000 Population (2014, 2016, and 2018)



Note. Data sourced from the CDPH. Rates are averaged over 2014, 2016, and 2018.

Appendix D

FURTHER ANALYSIS OF HEALTH RISKS

Health Risk Behaviors, SAE Estimation Techniques

Figure D.1 Estimated Health Behaviors Risk Ratios (RR), SAE Technique (2019 - 2020)

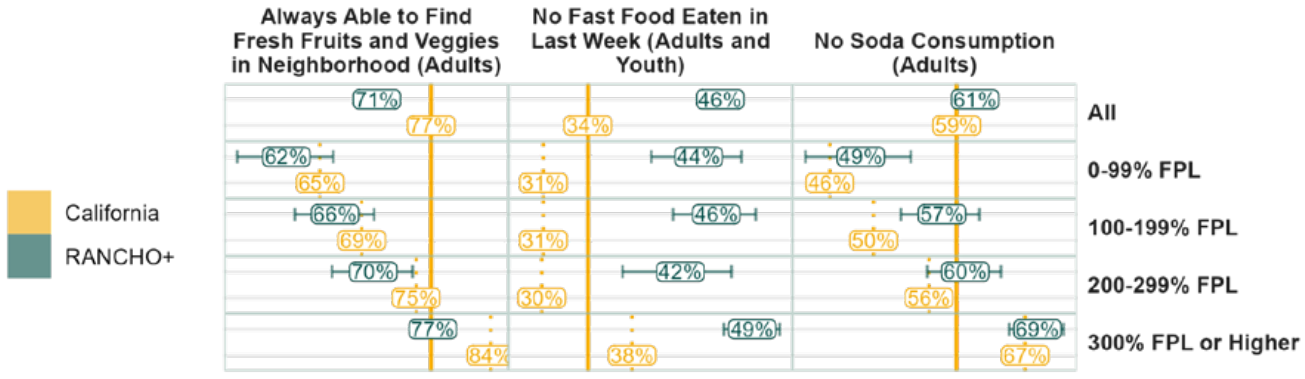
	Del Norte	Lassen	Trinity	Glenn	Lake	Tehama	Modoc	Humboldt	Siskiyou	Shasta	Mendocino
Current Smoking	1.54	1.49	1.55	1.38	1.47	1.44	1.47	1.38	1.40	1.34	1.31
Binge Drinking	1.11	1.18	1.11	1.06	1.11	1.09	1.13	1.14	1.13	1.13	1.09
Physical Inactivity	1.13	1.05	1.02	1.20	1.09	1.10	1.03	0.96	0.98	0.92	0.98
Sleep <7 hours	1.06	1.06	1.04	1.02	0.98	1.02	1.01	1.05	1.00	1.01	0.97

1.5<RR (Highest Risk); 1.4<RR≤1.5; 1.3<RR≤1.4; 1.2<RR≤1.3; 1.1<RR≤1.2; 1<RR≤1.1; RR≤1 (Lowest Risk)

Note. Data sourced from the Centers for Disease Control and Prevention's 2022 release of the PLACES data set, PLACES: Local Data for Better Health, County Data. California estimates and not provided by the data source. California estimates were calculated by the author by taking a population-weighted average of all California counties using the population estimates provided in the dataset. Risk ratios (RR) calculated by taking the ratio of the local rate divided by the state rate. RR > 1 indicates higher risk relative to the state.

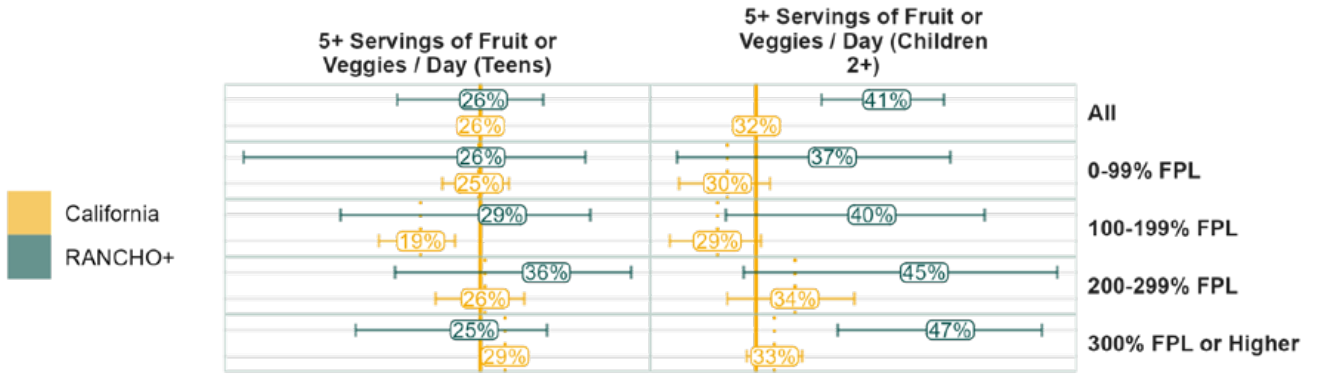
Diet and Physical Activity

Figure D.2 Diet Indicators (2011-2018)



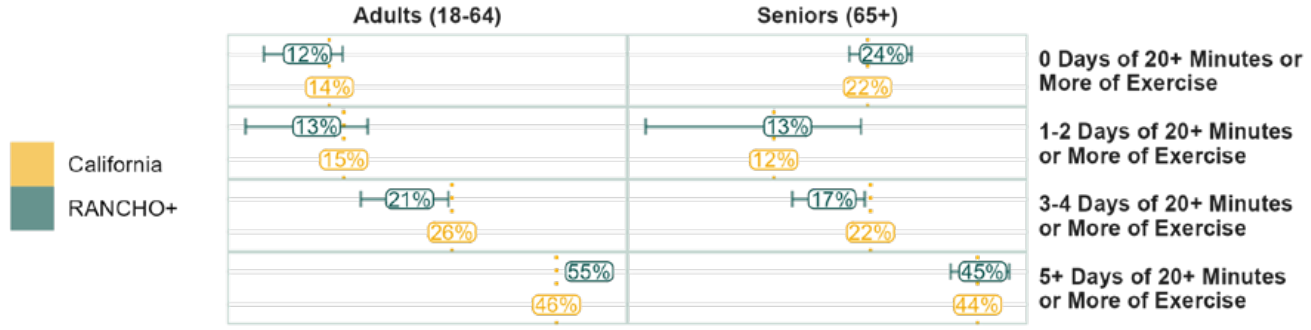
Note. Data sourced from the CHIS. Fast Food data only include 2011-2016. Soda consumption data includes only 2011-2017. FPL = federal poverty line.

Figure D.3 Diet Indicators, Youth (2011-2020)



Note. Data sourced from the CHIS. FPL = federal poverty line.

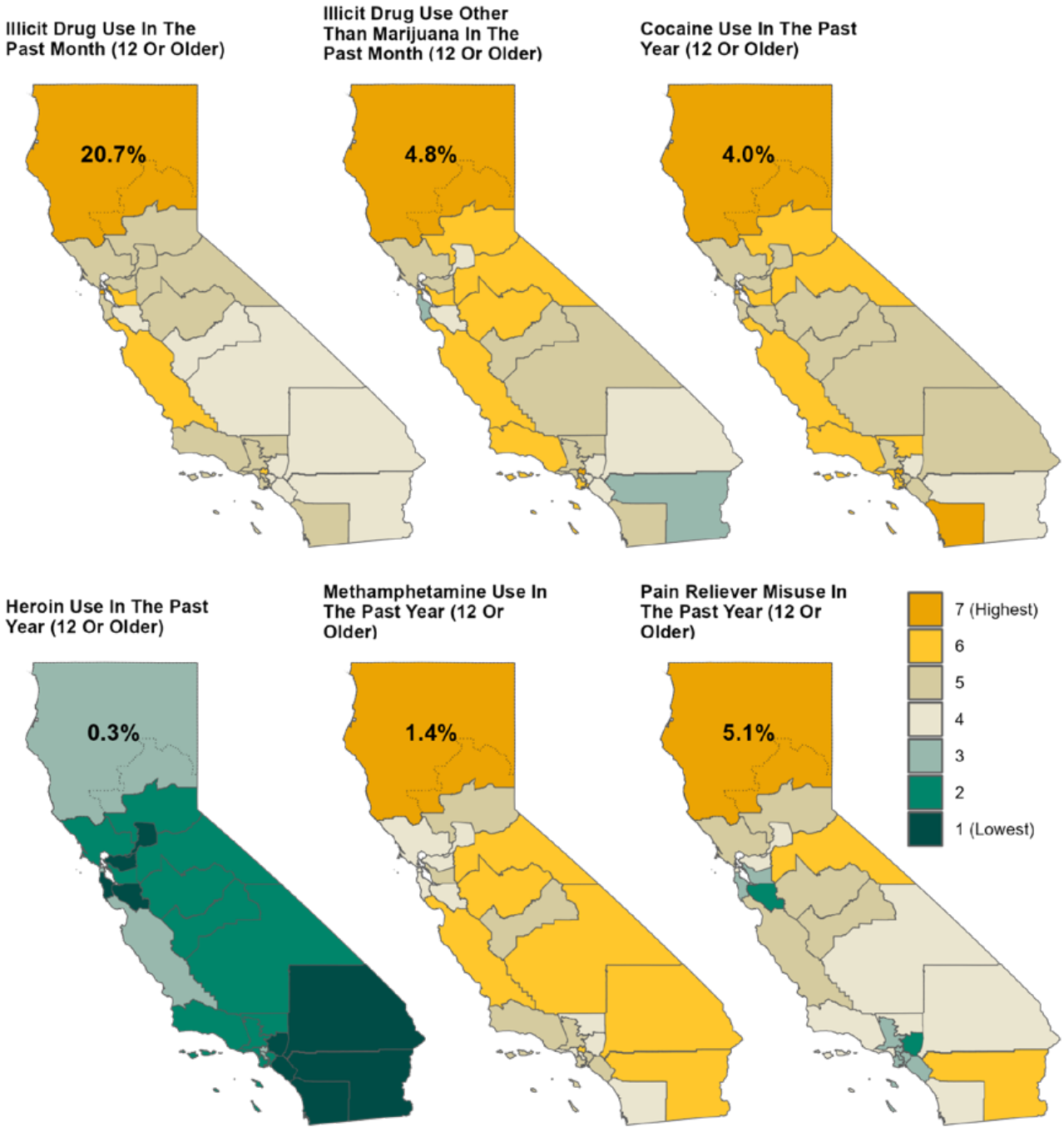
Figure D.4 Physical Activity (2017-2018)



Note. Data sourced from the CHIS.

Substance Use Rates (NSDUH)

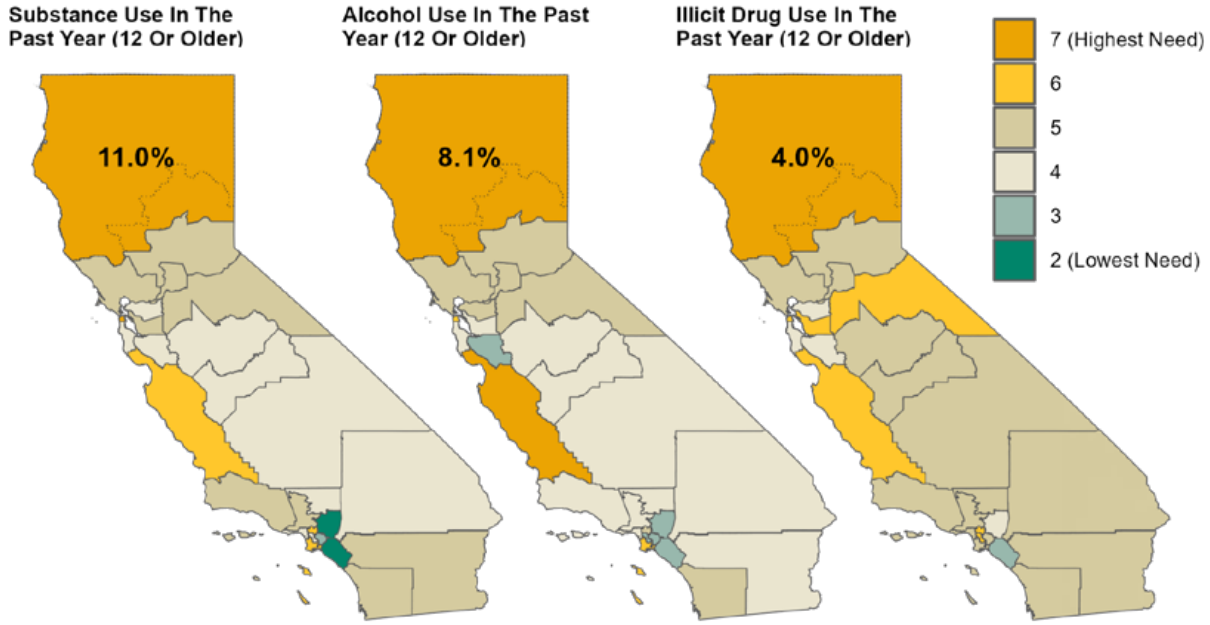
Figure D.5 Substance Use Prevalence Rates and Rankings (2016 - 2018)



Note. Data sourced from the NSDUH. RANCHO region indicated by dotted border. Regions ranked from lowest to highest highest prevalence on a scale of 1 to 7. Rankings are relative to the United States. More recent data are unavailable.

Need for SUD Treatment Facilities (NSDUH)

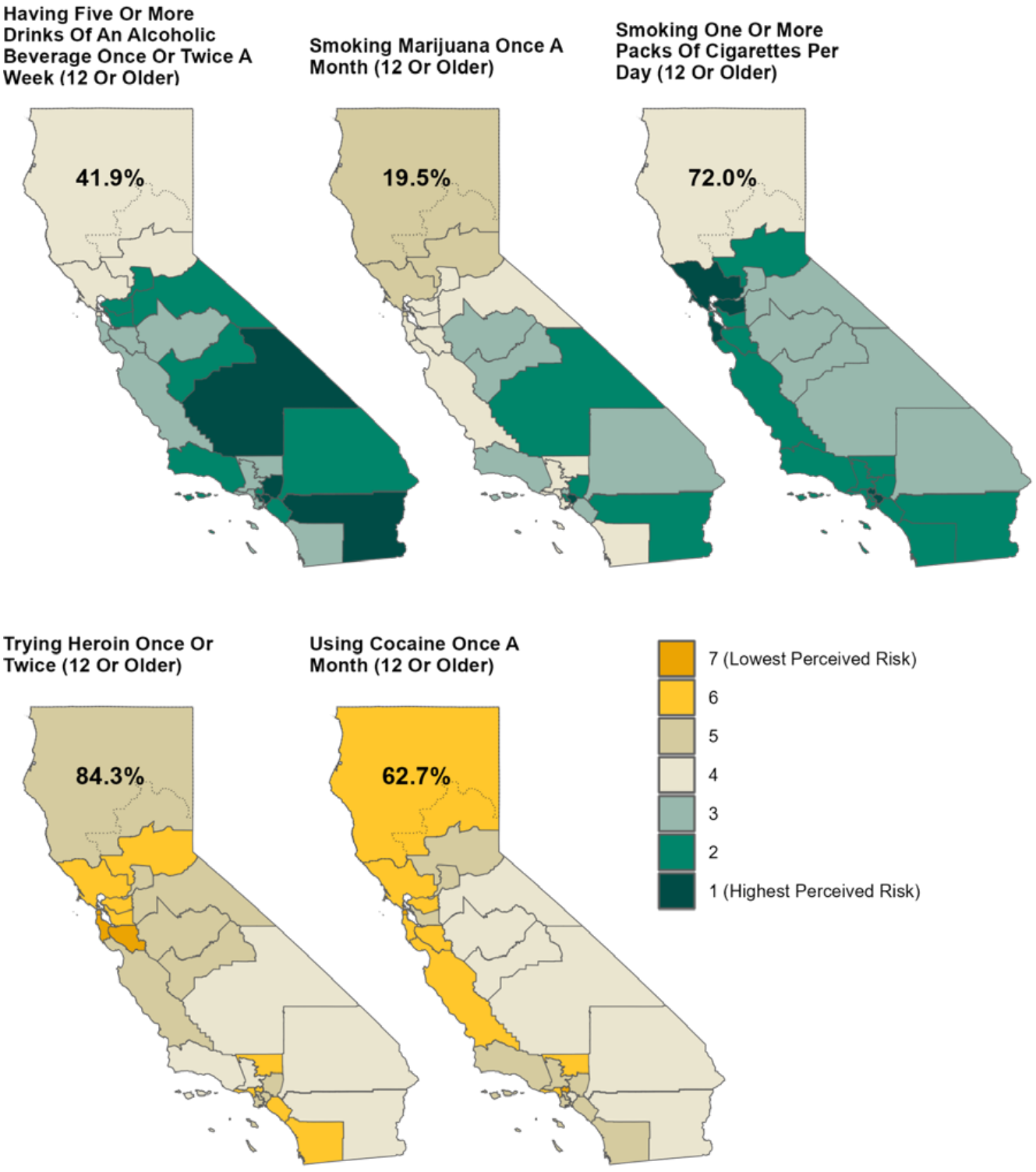
Figure D.6 Unmet Need for Treatment At A Specialty Facility (2016 - 2018)



Note. Data sourced from the NSDUH. RANCHO region indicated by dotted border. Regions ranked from highest to lowest perceived risk on a scale of 1 to 7. Rankings are relative to the United States. No observations in California have a rank of 1.

Perceived Risk by Risk Activity (NSDUH)

Figure D.7 Perception of 'Great Risk' by Risk Activity (2016 - 2018)



Note. Data sourced from the NSDUH. Regions ranked from highest to lowest perceived risk on a scale of 1 to 7. Rankings are relative to the United States. RANCHO region indicated by dotted border.

Appendix E DISAGGREGATED POVERTY RATES

Figure E.1 Disaggregated Poverty Rates

	CA	Modoc	Humboldt	Trinity	Siskiyou	Tehama	Lake	Glenn	Del Norte	Mendocino	Shasta	Lassen	
5 to 17 years	16%	31%	22%	28%	21%	26%	23%	18%	28%	19%	16%	17%	Age Range
Under 18 years	16%	32%	22%	28%	20%	26%	22%	19%	25%	19%	17%	16%	
Under 5 years	16%	34%	20%	28%	20%	28%	18%	23%	16%	20%	20%	13%	
18 to 34 years	13%	21%	31%	36%	21%	17%	18%	20%	18%	21%	17%	21%	
35 to 64 years	10%	17%	17%	26%	18%	16%	17%	10%	17%	13%	14%	13%	
65 years and over	10%	14%	11%	7%	10%	12%	10%	13%	9%	13%	9%	8%	
Less than high school	20%	37%	32%	33%	31%	26%	26%	19%	21%	25%	27%	18%	Educational Attainment (25+)
High school or equivalent	13%	14%	20%	28%	15%	17%	20%	13%	15%	17%	15%	15%	
Some college	9%	16%	17%	18%	15%	13%	14%	10%	12%	13%	11%	11%	
BA or higher	5%	~4%	10%	4%	7%	7%	5%	4%	8%	7%	7%	7%	
Black	19%	53%	43%	~4%	36%	~16%	35%	~57%	39%	36%	27%	~28%	Race/Ethnicity
Asian	10%	~46%	32%	~54%	27%	14%	18%	48%	47%	~12%	24%	~17%	
AIAN	17%	22%	37%	~4%	22%	48%	38%	24%	26%	22%	12%	32%	
Two or more races	12%	32%	24%	~13%	19%	16%	21%	26%	22%	20%	15%	17%	
Hispanic or Latino	16%	21%	24%	20%	22%	25%	16%	16%	21%	22%	16%	10%	
White, not Hispanic or Latino	9%	18%	17%	24%	15%	15%	15%	11%	13%	12%	13%	12%	
Female	13%	22%	21%	28%	17%	18%	18%	18%	19%	17%	16%	13%	Sex
Male	11%	17%	19%	17%	16%	18%	15%	12%	16%	15%	13%	15%	
Unemployed	24%	30%	32%	60%	41%	30%	33%	34%	14%	34%	26%	36%	Work (16+)
Did not work	21%	23%	30%	33%	22%	24%	23%	25%	26%	25%	22%	20%	
Worked part-time	13%	13%	25%	17%	19%	18%	17%	13%	14%	14%	14%	15%	
Worked full-time	2%	8%	4%	1%	4%	5%	2%	4%	2%	4%	2%	2%	

> 3X CA Avg. > 2X CA Avg. > CA Avg. ≤ CA Avg.

Note. Data sourced from the ACS. (~) denotes statistically unstable estimate.[43]

[43] For these data, an estimate is determined to be statistically unstable if it is not significantly higher than 0 or significantly lower than 100%.

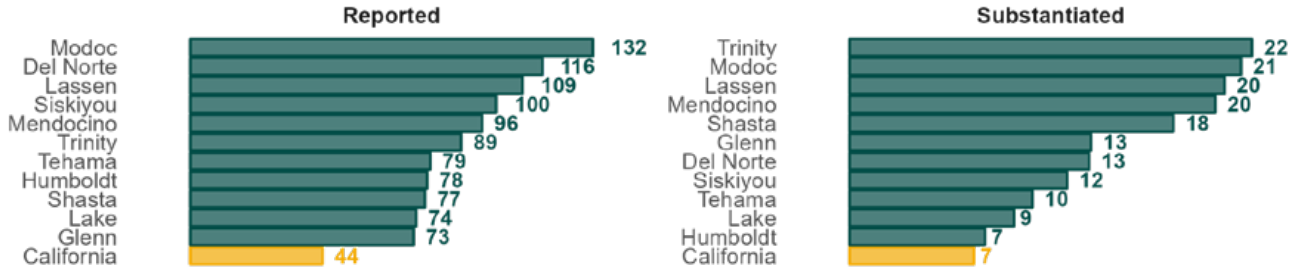
Appendix F

ACES, CHILD ABUSE, AND DOMESTIC VIOLENCE

Figure F.1 Odds Ratios, Adjusted for Age, Gender, Race, and Educational Attainment (Anda et al., 1998)

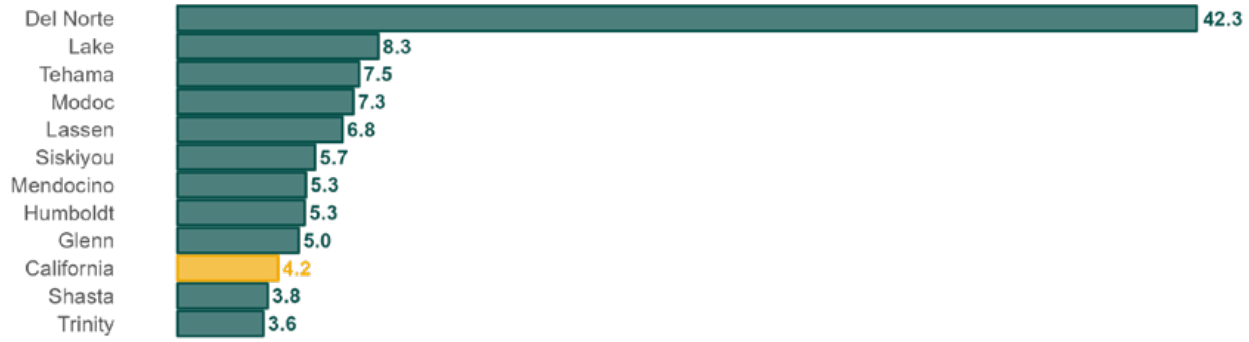
Number of ACEs	0	1	2	3	4 or More
Current smoker	1	1.1	1.5	2	2.2
Considers self an alcoholic	1	2	4	4.9	7.4
Ever used illicit drugs	1	1.7	2.9	3.6	4.7
Ever injected drugs	1	1.3	3.8	7.1	10.3
Two or more weeks of depressed mood in the past year	1	1.5	2.4	2.6	4.6
Ever attempted suicide	1	1.8	3	6.6	12.2

Figure F.2 Reported or Substantiated Abuse or Neglect per 1,000 Children Aged 0 to 17 (2020)



Note. For reported abuse, data is sourced from KidsData's 2020 data set titled "Reports of Child Abuse and Neglect;" for substantiated abuse, data is sourced from KidsData's 2020 data set titled "Substantiated Cases of Child Abuse and Neglect."

Figure F.3 Domestic Violence Calls per 1,000 Population (2016-2020)



Note. Domestic violence call totals sourced from Kidsdata.org. Population data sourced from American Community Survey five year estimates. Data were aggregated over a five year period and rates were calculated by the author.

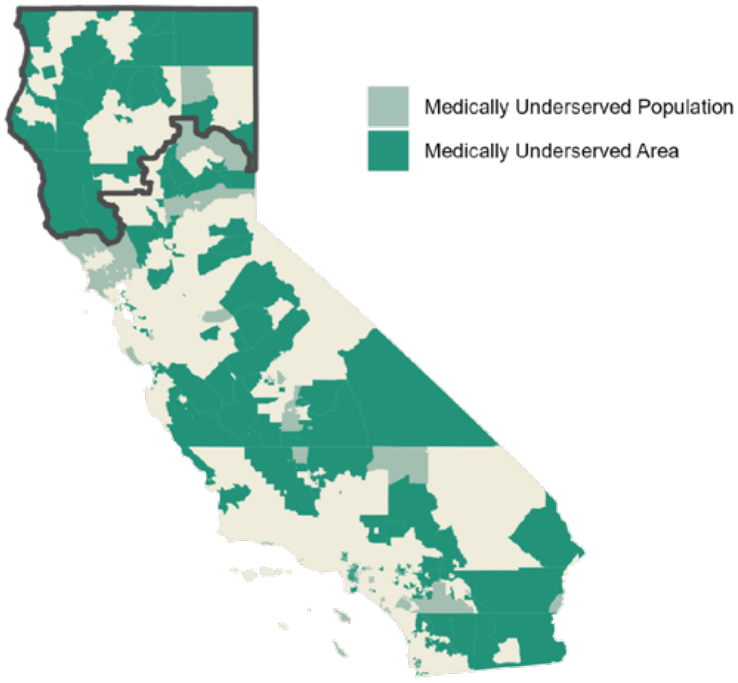
Appendix G

FURTHER EVIDENCE FOR HEALTHCARE BARRIERS

Medically Underserved Areas or Populations

Medically Underserved Areas or Populations (MUA/P) are areas or populations within an area that have been designated by the U.S. Department of Health and Human Services (HHS) as having a shortage of primary care providers. While 57.1% of California's geographic area is within an MUA/P, 66.8% of RANCHO's geographic area is within an MUA/P.

Figure G.1 Medically Underserved Area or Population (2023)



Note. Data sourced from the Health Resources and Service Administration's data on shortage areas, measuring HPSA areas in primary care, dental health, and mental health.

Among survey respondents who delayed or forwent healthcare, only 18% of RANCHO+ respondents indicate arising specifically from the regional healthcare system as the main reason for delayed care, a similar figure compared to the state average. There do not appear to be substantial correlation with income strata for citing this reason for delayed care. This suggests that factors in addition to the general limitations of the healthcare resources in the region may be critical to delayed care.

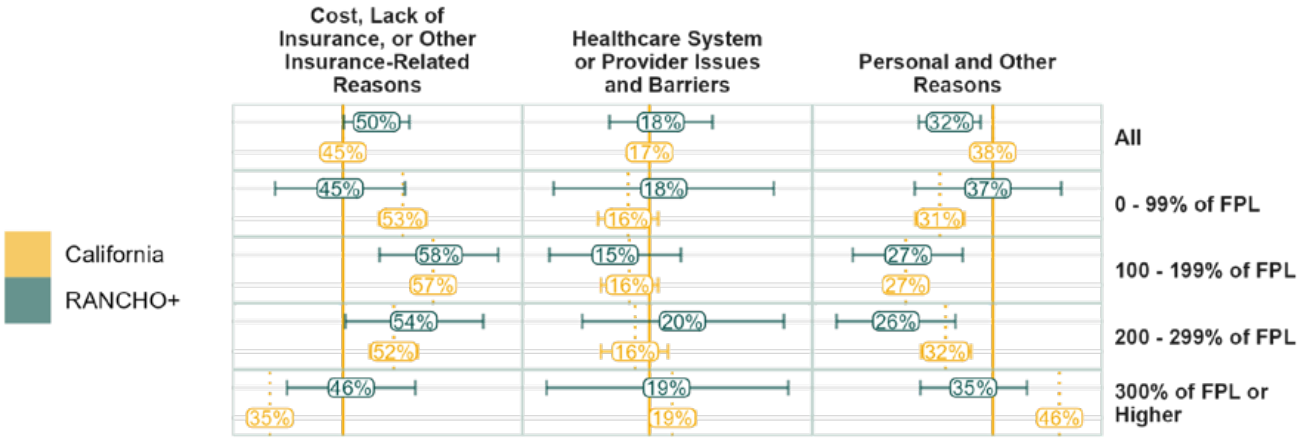
Among low income individuals, cost and insurance issues are relatively less important compared to those with moderate incomes, whereas 'personal and other reasons' appear to be of greater significance.

Further Analysis of Barriers to Healthcare

Rural areas are uniquely impacted by barriers to healthcare. Cultural, transportation, financial, and technology barriers as well as a simple lack of available healthcare resources all contribute to reduced healthcare access and utilization in rural areas (Biswas et al., 2015).

Regionally, issues arising specifically from the limitations of the region's healthcare system may only be one factor in producing delayed care among low income individuals, suggesting that factors not specifically tied to the shortage of healthcare providers and facilities in the region may be salient. As shown below, among low income households that delayed care, only about one-fifth cite the healthcare system as the reason. Roughly half cite cost of insurance issues, but a remaining one-third cite personal or other reasons for their healthcare delays.

Figure G.2 Main Reason for Delayed or Forgone Care, Population Who Delayed Care (2013 - 2021)

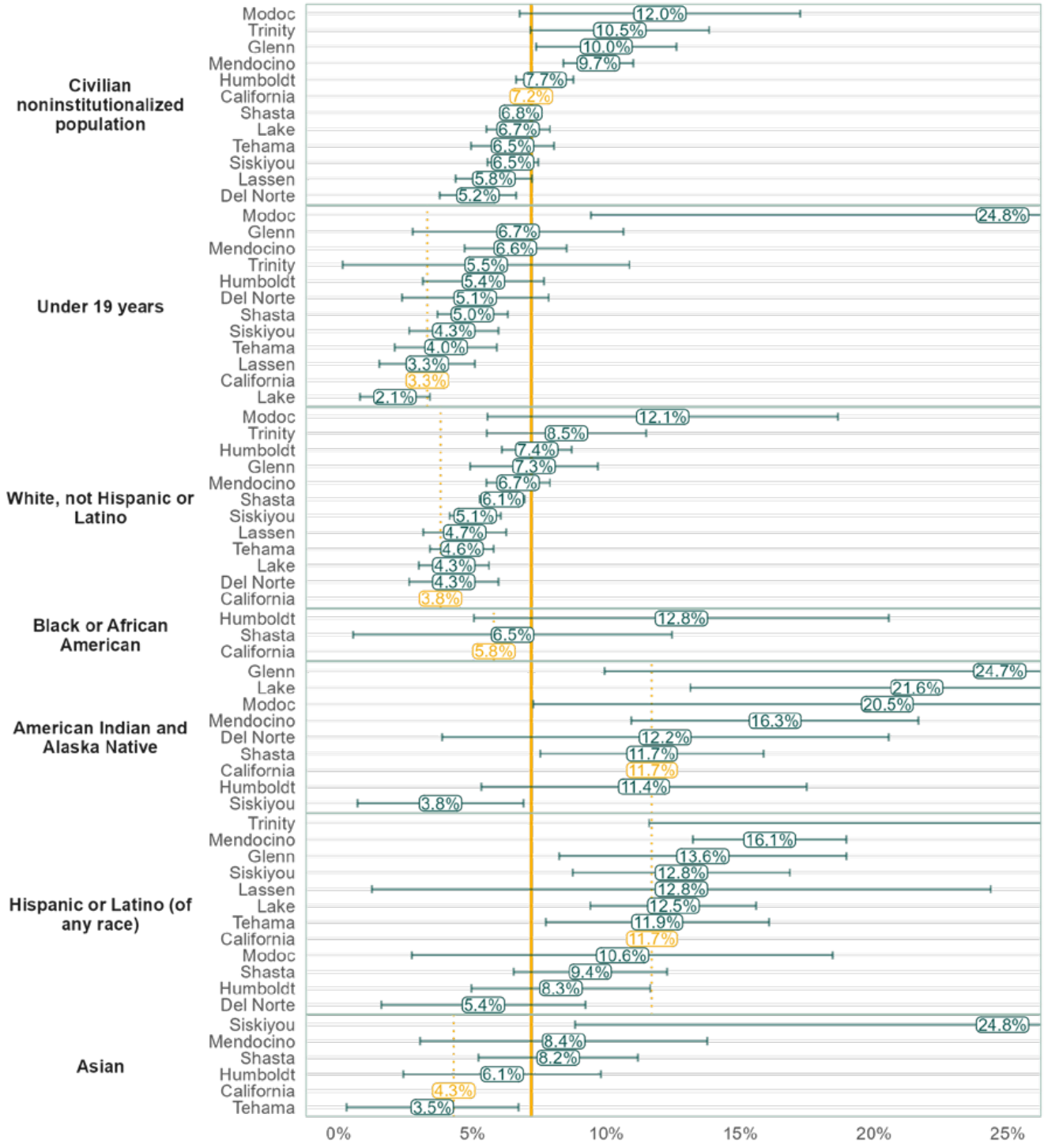


Note. Data sourced from California Health Information Survey, via AskCHIS.

Cost and Insurance Barriers: Roughly half of residents cite cost or insurance-related issues as the main reason for delayed or forgone care compared to 45% statewide. Across income strata, these data are largely consistent with state averages with higher income households being less likely to cite cost and insurance issues as the main reason for delayed or forgone care. Interestingly, however, those in the lowest income bracket are less likely to cite cost or insurance as the main reason for delayed or forgone care compared to the next higher bracket. This may be the result of qualification for public health benefits such as Medi-Cal among those in the lowest income bracket. Nevertheless, those in the lowest income bracket are more likely to have delayed care, suggesting that critical factors beyond cost or insurance-related issues create barriers to timely care for low income households.

While there appear to be other critical factors contributing to healthcare delays in the region, as shown below, insurance barriers appear to disproportionately impact households with children, AIAN, and Hispanic communities.

Figure G.3 Uninsured by Age, Race and Ethnicity (2017 - 2021)



Note. Data sourced from the ACS. Only data with confidence intervals not including 0 or 100% are included.

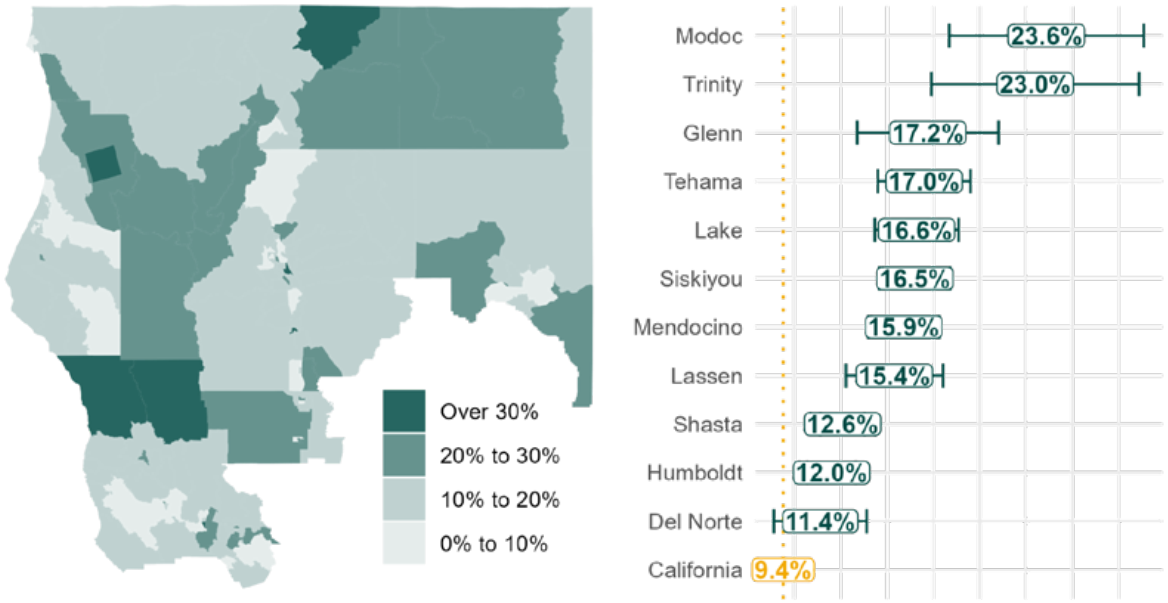
The remaining 32% of respondents (in the figure above) cited personal or other reasons as the main reason for delayed care. Responses for this reason for delayed care appear to mirror those of cost and insurance issues, suggesting that among those with the highest and lowest income brackets personal or other reasons are likely relatively more important issues than cost, insurance, or issues arising specifically from the healthcare system.

Cultural Perceptions: Patients in rural areas may hesitate to seek medical care due to concerns about stigma, discrimination, and confidentiality, especially when their healthcare providers are also part of their close-knit community. Studies have shown that rural residents, including minorities and vulnerable populations, face barriers in accessing healthcare, with factors socio-economic status and stigmas influencing their treatment-seeking behaviors and the quality of care they receive (Biswas et al., 2015). For instance, as shown in "Equity Analysis and At-Risk Populations," lesbian, gay, and bisexual individuals are significantly more likely to have recently delayed care.

Transportation: Travel time has also been shown to be a barrier to healthcare-seeking and transportation barriers are particularly critical among lower income and the under or uninsured (Biswas et al., 2015; Gerber et al., 2013).

Internet Access: With the rise of telehealth services, access to the internet (particularly in a private setting) is increasingly helpful for addressing transportation barriers to healthcare. Unfortunately, significantly more households in RANCHO counties lack internet access compared with the state averages (as shown below). This problem is likely caused by a combination of the region's rural setting, which limits access to affordable broadband, and its high poverty rate, which makes internet access unaffordable for many. The rise of telehealth could be a part of the region's overall strategy to improve healthcare access; however, increasing the availability of broadband will be critical in this effort.

Figure G.4 Householders without Internet Access (2017 - 2021)

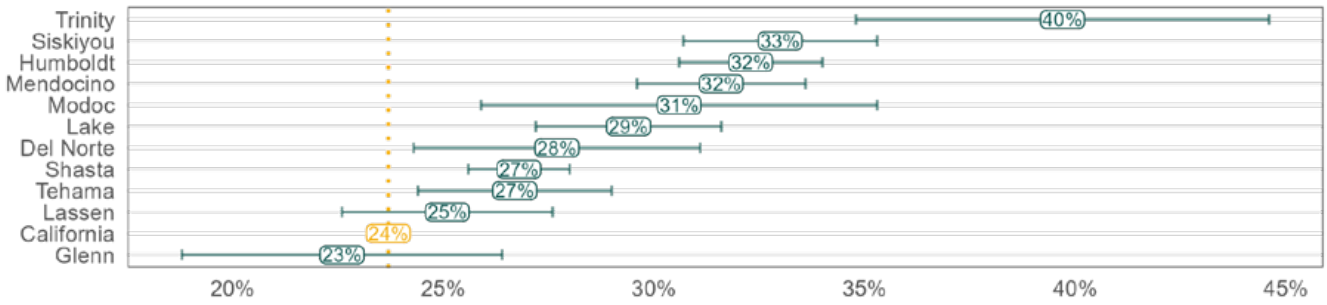


Note. Data sourced from the ACS. Map indicates percentage of households lacking any form of internet subscription.

Appendix H

FURTHER EVIDENCE FOR SOCIAL ISOLATION

Figure H.1 Householders Living Alone, Percent of Households (2017 - 2021)



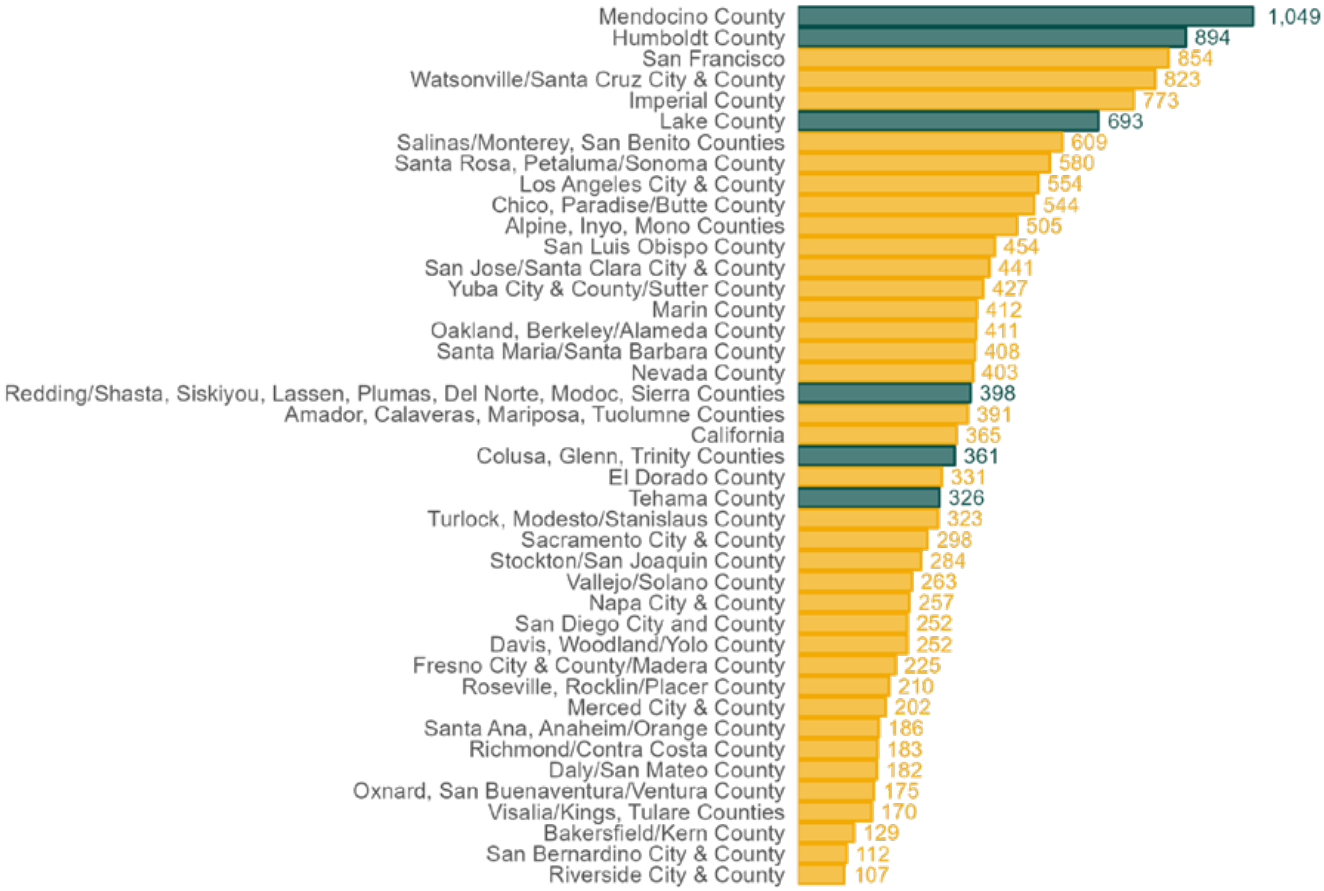
Note. Data sourced from the ACS.

Appendix I

STATEWIDE POINT-IN-TIME HOMELESS COUNTS PER 100,000 POPULATION

Below is the complete version of the point-in-time count for each Continuum of Care reporting to HUD in California.

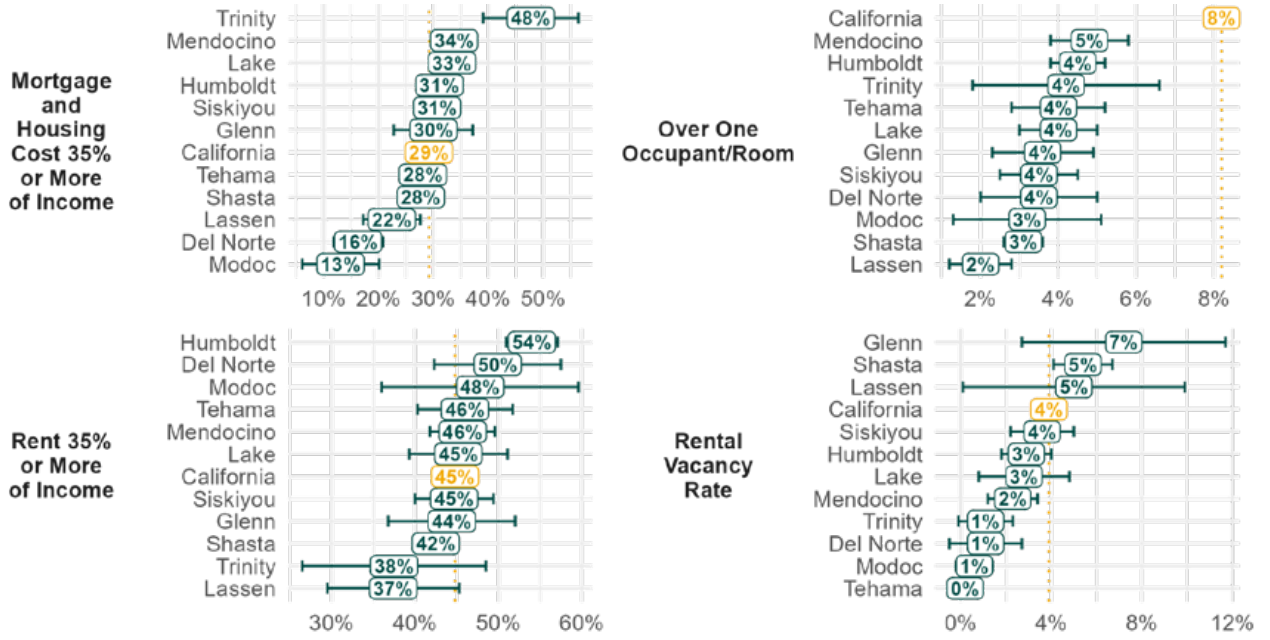
Figure I.1 Total Counted Homeless (Sheltered and Unsheltered) per 100,000 Population (2016 - 2020)



Note. Data sourced from the U.S. Department of Housing and Urban Development's datasets on Point-in-Time (PIT) estimates, a count of sheltered and unsheltered individuals experiencing homelessness. Data are 5-year averages from 2016 to 2020. Rates calculated by the author using population data are 5-year estimates from the American Community Survey from 2016 to 2020. Population estimates are summed for each CoC service area by county.

Appendix J Housing Affordability Indicators

Figure J.1 Housing Affordability, Conditions, and Availability (2017 - 2021)



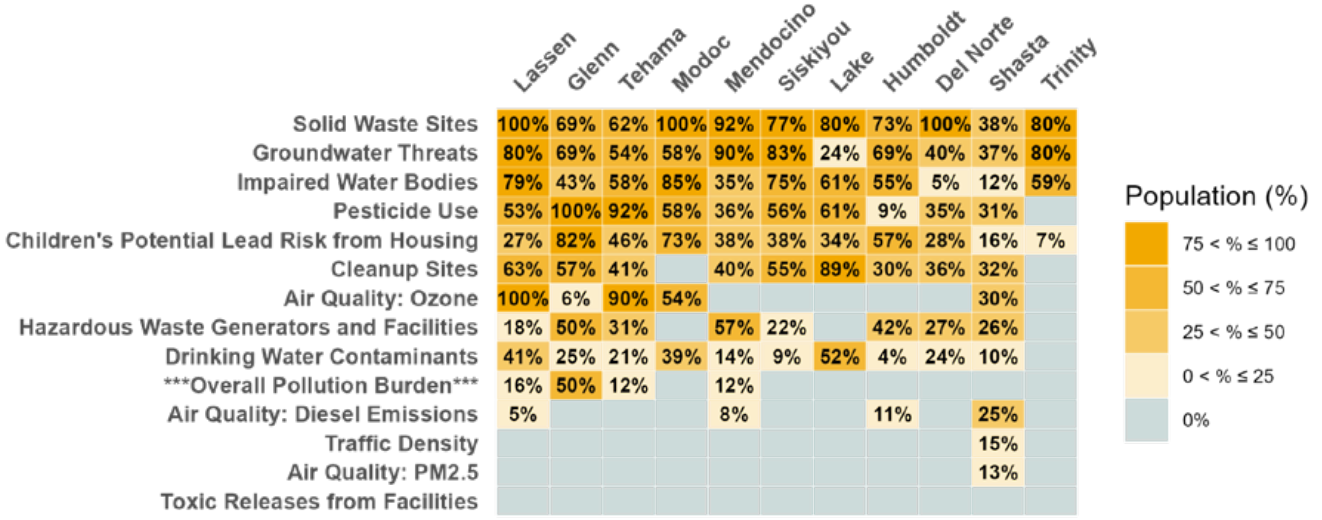
Note. Data sourced from the ACS.

Appendix K

FURTHER ANALYSIS OF ENVIRONMENTAL RISKS

As shown below, while the overall pollution is low, certain environmental risks are elevated in the region.

Figure K.1 CalEnviroScreen 4.0 Risk Factors, Percent of Population at Higher Risk

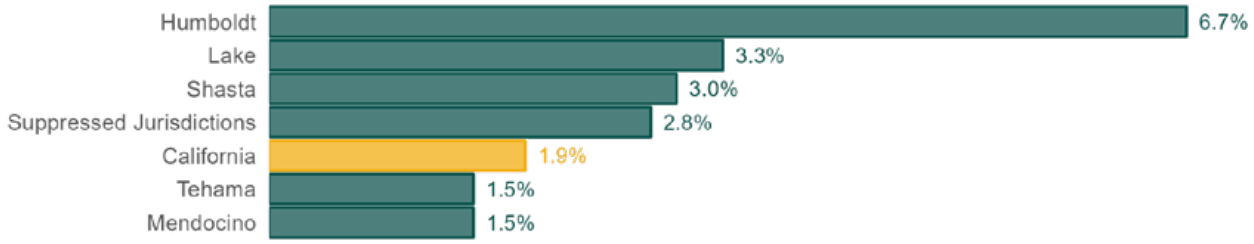


Note. Data sourced from CalEnviroScreen 4.0. Percent of population in each county living in a Census tract ranked in the worst half (ranked at the 50th or higher percentile) of California tracts by risk.

These include factors that put water quality at risk. Risk factors such as solid waste sites (e.g. landfills), groundwater threats (e.g. hazardous waste and underground storage tanks), impaired water bodies (i.e. bodies of water compromised by pollutants) are elevated in the region and indeed some populations in the region are impacted by higher risk of drinking water contamination compared to state averages.

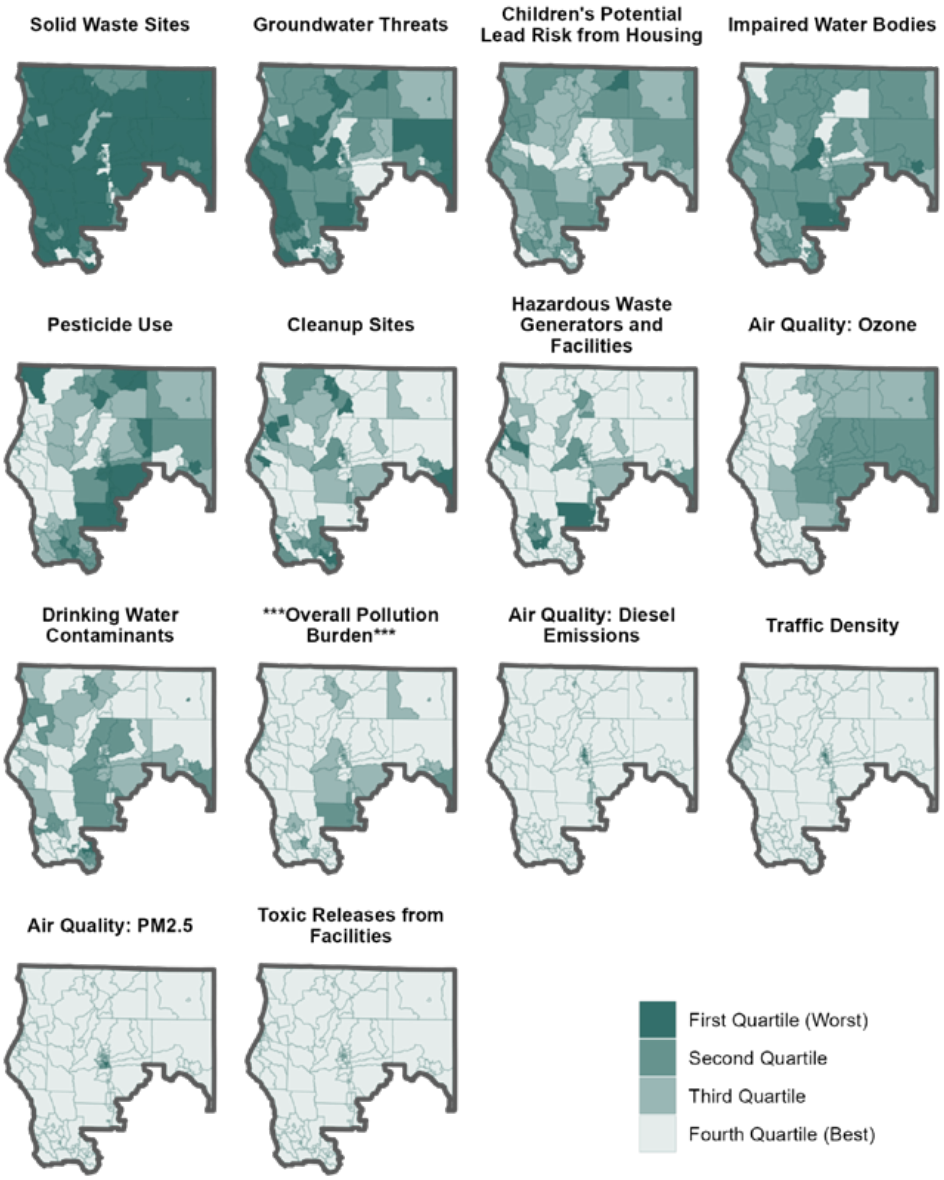
These data also suggest that children in the region may be more likely to be exposed to lead. However, it is critical to note that the CalEnviroScreen 4.0 "Children's Lead Risk from Housing" variable does not directly measure lead exposure, and instead infers a level of risk based on the incidence of child poverty and the age of housing structures. As shown below direct data on children's blood lead levels (BLL) indicate that among children age 5 and under BLLs are elevated in Humboldt, Lake, and Shasta counties, but lower in Mendocino and Tehama counties. The remaining RANCHO counties are suppressed in the dataset due to low sample sizes, however there is also reason to believe that BLL may also be elevated in these counties. California's suppressed jurisdictions include 17 of the state's most sparsely populated counties, six of which are RANCHO counties and these 17 counties as a whole have substantially higher rates of child BLLs compared to the state rate.

Figure K.2 Blood Lead Levels, Children 5 and Under



Note. Data sourced from CDPH. Suppressed jurisdictions include Alpine, Amador, Calaveras, Colusa, Del Norte, Glenn, Inyo, Lassen, Mariposa, Modoc, Mono, Plumas, Sierra, Siskiyou, Trinity, Tuolumne, Yuba.

Figure K.3 CalEnviroScreen 4.0 Risk Factors



Note. Data sourced from CalEnviroScreen 4.0.

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THANK YOU

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