Chapter 5

Public Health Analysis

This chapter explores the social determinants of health and the disparities experienced by the region's communities, drawing connections to the economic and environmental factors that influence health outcomes.

Key Takeaways

- The Redwood Coast region experiences higher age-adjusted mortalities than the state as a whole across most causes of death, especially unintentional injuries, all forms of cancer, drug-induced deaths, chronic lower respiratory disease, lung cancer, chronic liver disease and cirrhosis, suicide, motor vehicle traffic crashes, coronary heart disease, prostate cancer, and firearm-related deaths. The proximate risk factors for these are smoking, substance use, and poor mental health. These issues particularly affect specific populations in the region—people of color, people over the age of 50, and lesbian, gay, and bisexual individuals.
- Complex and interrelated social and community factors are observed with respect to disability rates, high reported Adverse Childhood Experiences (ACEs), poverty and attrition from the workforce, lower educational attainment, loneliness and isolation, and other factors that are pervasive and disproportionately impacting priority communities.[57]

Key Metrics

- **Age-adjusted mortality rates:** Compare mortality rates for major causes of death in the region to state averages to identify areas of concern and track progress over time.
- **Prevalence of proximate risk factors:** Monitor rates of smoking, substance use, poor mental health, and other key risk factors that contribute to the region's high mortality rates.
- **Socioeconomic disparities:** Track poverty rates, educational attainment, and other social determinants of health by race, ethnicity, and geography to identify communities facing disproportionate barriers to health and well-being.
- **Healthcare access barriers:** Assess the prevalence of health professional shortages, delays in accessing care, and unmet health needs, particularly among low-income and mentally ill populations.

[57] The outreach and engagement team's Insights Report offers qualitative insights into the relationship between these phenomena. Participants highlighted socioeconomic factors but also a desire for greater community cohesiveness, better relationships, and social belonging.

Conceptual Framework

The conceptual framework discussed in this section was inspired by the Bay Area Regional Health Inequities Initiative (BARHII) framework, which posits a flow from upstream factors such as social, living environment, and institutional inequities to such downstream factors as health behaviors, diseases, and ultimately mortality rates (BARHII).

To maintain focus on the most salient health determinants, this chapter 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 those in lung cancer rates. This analysis yielded a set of health outcomes for which a significant adverse disparity exists between the region and the state. Identifying these enabled a focused approach to identifying immediate or "proximate" downstream factors contribute to these disparities, such as health behaviors like tobacco use.

The analysis then moves further upstream to identify deeper factors (i.e., institutional, economic, and/or social ones) that may contribute to disparities in proximate risk factors, the role of poverty in tobacco use, for instance. It considers the potential for direct relationships between health and these deeper factors, e.g., that between poverty and chronic stress. Because of the complexity of such factors, focus is maintained on those commonly raised in the region's community health assessments. Lastly, the report examines health consequences from environmental factors, such as wildfires.

Wherever possible, data sources that include all four counties were sought and used. The California Health Information Survey (CHIS) data include only Humboldt, Mendocino, and Lake counties (referred to in these visualizations as HML). Del Norte is aggregated with a broader seven-county California region, so inclusion of Del Norte would unfortunately substantially skew the data for the region.

Health Disparities on the Redwood Coast

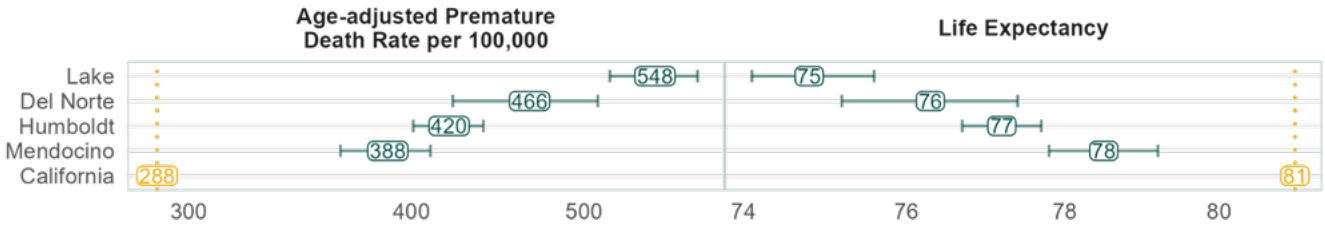
Life expectancy is a fundamental metric that reflects a broad spectrum of health factors, indicating the cumulative influence of wide-ranging health determinants. Disparities in life expectancy, therefore, serve as a good starting point for uncovering signals of disparities in health determinants between geographies and populations. Across the region, life expectancy at birth is significantly lower, and age-adjusted premature deaths per 100,000 significantly higher, than the statewide average. Figure 5.1 provides regional premature death and life expectancy rates by county, and Figure 5.2 displays a breakdown of these rates by race and ethnicity.[58]

Additional data indicate that premature death is elevated among AIAN communities in the Redwood Coast region compared to the overall state total (County Health Rankings and Roadmaps, 2023), signaling significantly higher age-adjusted premature death among white populations, given their size compared to the state average, as well as the overall state total. Additionally, Asian populations experience rates of premature death largely consistent with the overall state average, but significantly higher than the state averages for their respective population sizes. On the other hand, the region's Hispanic population experiences rates of premature death and life expectancy consistent with or

[58] Defined as the number of deaths occurring before age 75 per 100,000 population.

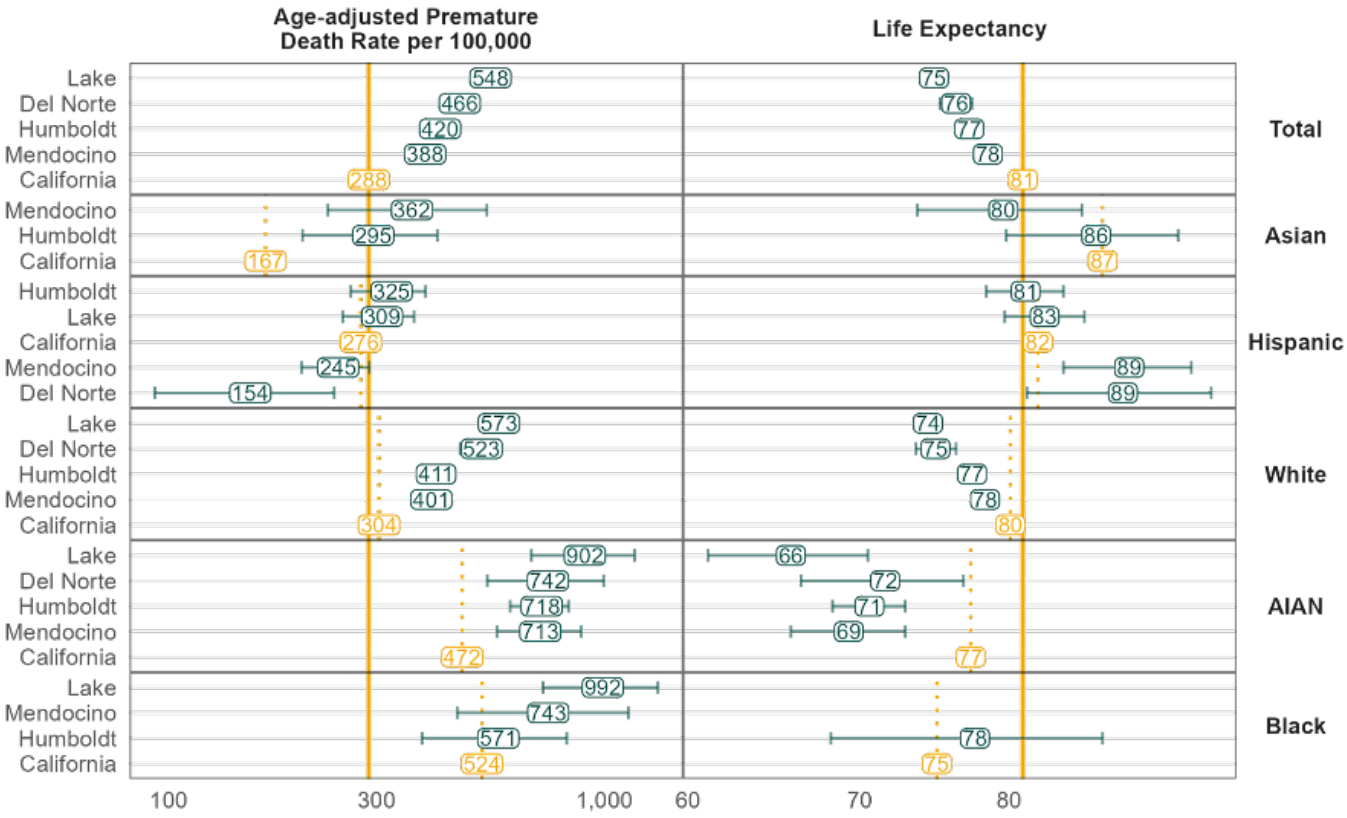
superior to both the state average for this population and the overall state population. Disaggregating mortality rates by cause of death allows for a targeted examination of the determinants of health that specifically contribute to the elevated rates of premature death and lower life expectancy within the region.

Figure 5.1 Premature Death and Life Expectancy (2018-2020)



Note. Data sourced from CHRR.

Figure 5.2 Premature Death and Life Expectancy by Race and Ethnicity (2018-2020)



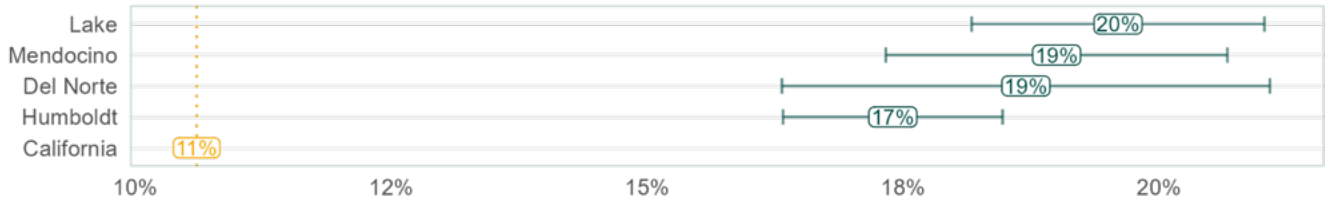
Note. Data sourced from the County Health Rankings & Roadmaps.

The data show a clear regional pattern of substantially higher death rates than those for the state as whole in several categories, including unintentional injuries, all cancer types, drug-induced deaths, chronic lower respiratory disease, lung cancer, chronic liver disease and cirrhosis, suicide, motor vehicle traffic crashes, coronary heart disease, prostate cancer,[59] and firearm-related deaths (California Department of Public Health (CDPH), 2022).

[59] Per 100,000 males.

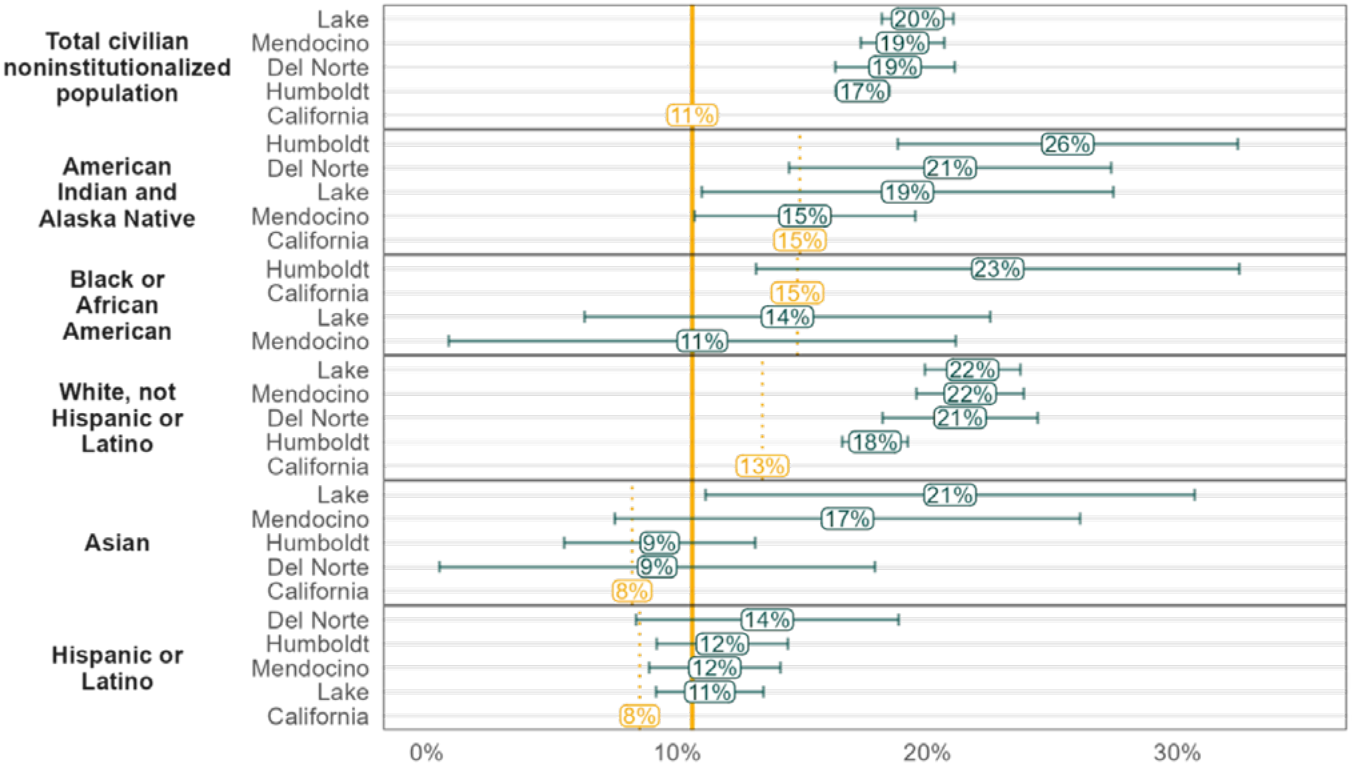
Disability and chronic illness: The data[60] reveal moderately elevated rates of asthma, heart disease, and obesity in the region, although these data do not include Del Norte (CHIS).[61] Conversely, rates of diabetes and high blood pressure are similar to or lower than the state averages. As shown in Figure 5.3, disability[62] rates for the region are higher than those for the state. While the aging population is a contributing factor, even individuals aged 18 to 34 are experiencing disability rates significantly higher than the state average, suggesting that factors beyond the aging population play a role in the region's elevated disability rates. The next section further explores potential factors contributing to this phenomenon.[63]

Figure 5.3 Disability Rates (2017-2021)



Note. Data sourced from the U.S. Census Bureau (2022).

Figure 5.4 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.

[60] County-level morbidity data are relatively 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.

[61] All CHIS data include only Humboldt, Mendocino, and Lake counties.

[62] Including both physical and mental health disabilities.

[63] Appendix C presents disability rates by race and ethnicity.

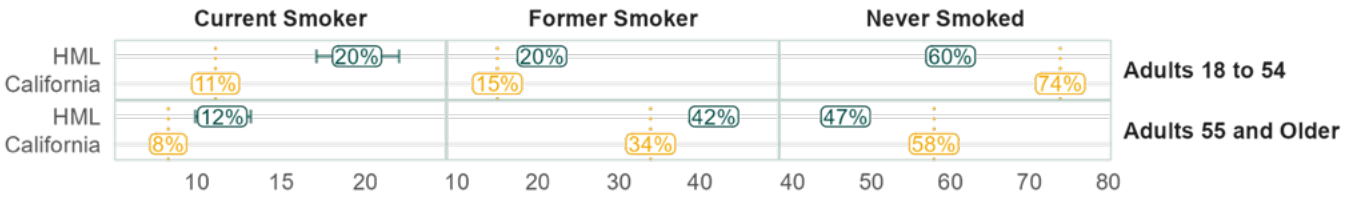
It is important to consider differences in disability rates and other health factors by race or ethnicity in the context of age, as differences in a population's age structure can strongly influence differences between the disability rates of populations. Consistent with national and state trends, Latino 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, a greater level of age-related disparities in health outcomes would be expected for the non-Hispanic white population whereas a lower level of such disparities would be expected for the Hispanic population.

Proximate Risk Factors

This section explores the potential factors contributing to the health disparities between the region's Redwood Coast region and the state, as identified in the previous sections. A more comprehensive analysis of the underlying factors (e.g., poverty) potentially related to these proximate risk factors are explored in the following section.

Smoking: As shown in the previous section, evidence demonstrates higher mortality rates among the region's residents from cancer, lung cancer, chronic lower respiratory disease, and heart disease than the state averages. One explanation could be the significantly and substantially higher smoking rates across the region shown in Figure 5.5. Notably, the proportion of current smokers among adults aged 18 to 54 in the Redwood Coast region (labeled as HML in the figure) is nearly double the state average (CHIS). 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 5.5 Smoking Rates (2011-2022)



Note. Data sourced from the CHIS.

Heart Disease: The primary risk factors for heart disease include high blood pressure, high low-density lipoprotein (LDL) cholesterol, diabetes, unhealthy diet, physical inactivity, obesity, smoking, and exposure to secondhand smoke (CDC, 2022). The available evidence indicates that rates of high blood pressure, high cholesterol, and diabetes in the region are comparable or superior to state averages. Additionally, although limited in scope, that data suggest that diets in Humboldt, Mendocino, and Lake (HML) counties are on par with or, in some cases, healthier than the statewide average, and indicators of physical activity in these counties are similar or superior to statewide averages (CHIS).[64] While the data for Del Norte are more limited, they suggest that food access in Del Norte is more limited and rates of physical inactivity are somewhat higher there than in the rest of the region. However, while diet and exercise may be contributing factors for Del Norte County, the data suggest that obesity and smoking play a key role in the prevalence of heart disease regionwide.

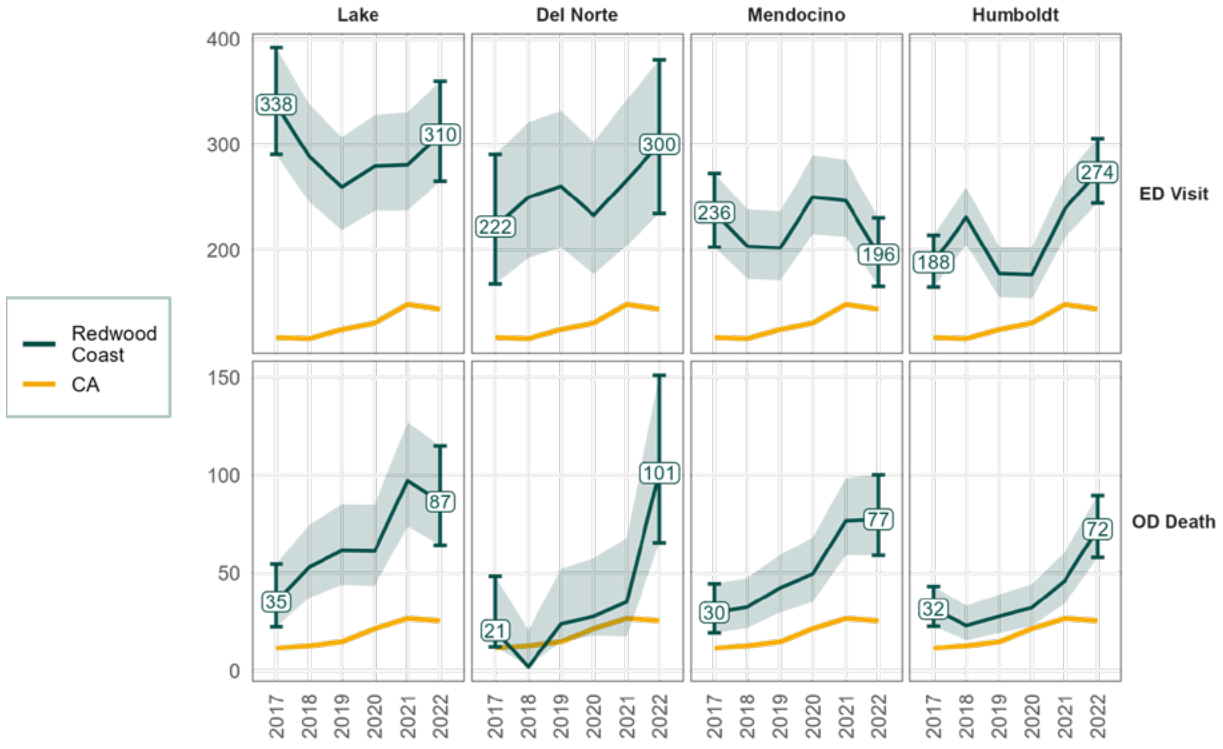
[64] Data for Del Norte are more limited, but the available data do not rule out diet and physical inactivity as contributing factors to the disparity in heart disease between Del Norte and the state.

Mental Health and Substance Use: As previously identified, the region exhibits elevated rates of accidental (i.e., unintentional) injuries, drug-induced deaths, motor vehicle accidents, liver disease, suicides, and firearm-related deaths. The analysis presented below suggests 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 also observed there.

The category of unintentional injuries includes unintentional poisoning and drug overdose, alcohol poisoning, motor vehicle accidents, and other unintentional injuries. Nationally, unintentional poisoning, including drug overdoses, 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 accounted for more than half of all unintentional injury deaths, followed by motor vehicle accidents (CDC).[65] 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 Figure 5.6 below, drug-induced deaths began rising sharply in the Redwood Coast region starting around 2018, which the fentanyl epidemic has exacerbated in recent years. Statewide, fentanyl deaths began rising exponentially starting around 2017 and now account for over half of statewide overdose deaths. Similarly, fentanyl deaths have also increased exponentially in the Redwood Coast region and now account for roughly half of all drug overdose deaths.

Figure 5.6 Age-Adjusted Drug Overdose Rate per 100,000 (2017-2022)



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. ED=Emergency Department. OD=Overdose

[65] A 2019 report for Humboldt County reported findings that indicate a similar trend, with the largest component being overdose, followed by motor vehicle crash injury deaths (County of Humboldt, Department of Health and Human Services, 2019). Also, according to this report, most of the disparity between the region's unintentional injury mortality rate and that of the state is attributable to these two causes of death.

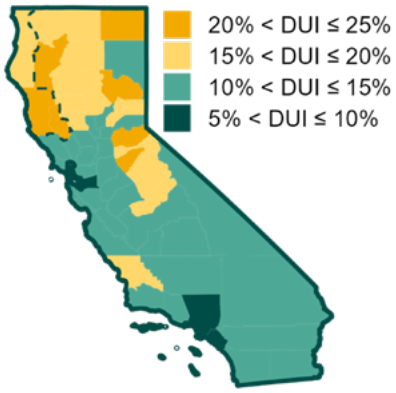
Rates of liver disease mortality have increased in recent years statewide; in the Redwood Coast region, this increase is occurring faster than in the state as a whole in all but Humboldt County, highlighting the urgency of addressing this worsening trend.[66] Multiple data sources collectively point to higher rates of excessive drinking in the region compared to the state (CHIS; CHRR). Although CHIS data related to binge drinking are somewhat limited, at least one heavy drinking variable in the CHIS data indicates high rates of binge drinking.[67]

Motor vehicle mortality rates are sharply elevated across the region. Traffic safety ranking data from the California Office of Traffic Safety point to several factors possibly contributing to the region's elevated rates of motor vehicle traffic fatalities. According to these data, Redwood Coast individuals have a higher risk of being involved in pedestrian, hit-and-run, nighttime, and alcohol-involved fatal and injury-causing traffic accidents than do those elsewhere in the region.

Two additional data sources highlight the role of substance use in traffic safety in the region (TIMS; CHRR). As shown in Figure 5.7, crashes within the region in which the driver was driving under the influence (DUI) account for a greater proportion of all vehicle crashes (including those without injury) compared to those in the majority of the state.

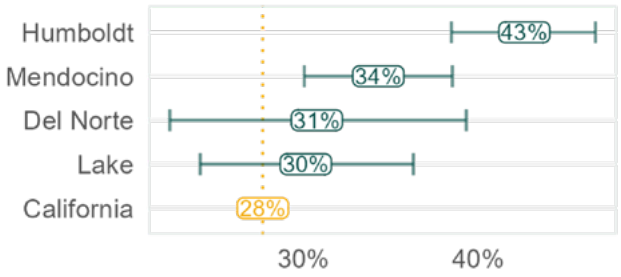
Figure 5.7 Car Crashes or Deaths Involving Alcohol Use

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.

While other factors such as infrastructure and climate contribute to the region's elevated motor vehicle crash fatalities, substance use appears to play a critical role in the region's elevated motor vehicle deaths and—along with drug-induced deaths—and in its unintentional injury deaths.[68,69]

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

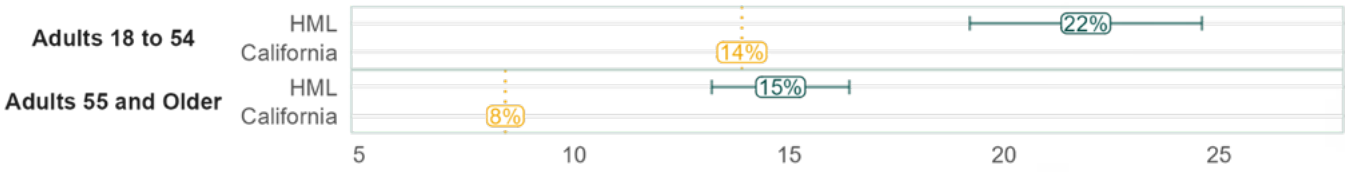
[67] Adult binge drinking data from CHIS is limited to only a few years. Data collected between 2021 and 2022 on recent binge drinking show rates consistent with state averages but with wide confidence intervals reflecting the limited duration of data collection. CHIS data collected between 2011 and 2015 show higher rates of binge drinking in the past year.

[68] Another factor not captured in the data reported above but particularly salient in the rural Redwood Coast context, is emergency medical service (EMS) response time which 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 and 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).

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

Suicidal Ideation: Data from multiple sources strongly signal higher risk factors for suicide in the Redwood Coast (Figure 5.8). Both youth and adults located there are more likely to report having considered suicide than in the state as a whole, and youth in the region are more likely to have reported feelings of sadness.

Figure 5.8 Answers to the Question *"Have you ever seriously thought about committing suicide?"* (2011-2022)



Note. Data sourced from CHIS.

Amongst the leading causes of illness and death, poor mental health and substance use appear to play either a direct or an indirect role in contributing to many of the disparities in health outcomes observed in the region. Along with tobacco use as discussed previously, substance use and mental health factors appear to strongly influence those health outcomes displaying the greatest disparities between the Redwood Coast and the state.

Impacts of Disinvestment on Community Health

Homelessness: While the data presented below indicate an elevated level of homelessness in the Redwood Coast, important to acknowledge is that following and measuring homelessness is a complex task, leading to limitations and uncertainties in these figures. Nevertheless, these indicators suggest an elevated homelessness rate across the region compared to the rest of California (*HUD.gov / U.S. Department of Housing And Urban Development (HUD)*, n.d.); KidsData, 2023).

As shown in Figures 5.9 and 5.10 below, homeless point-in-time (PIT) data[70] from the Department of Housing and Urban Development (HUD) reveal that homelessness on a per capita basis in the region exceeds the state average.[71] These data do not include Del Norte; however, a 2023 report from the NorCal Continuum of Care (CoC) region found 694 homeless people in Del Norte, producing a rate of 2,525 per 100,000 population. Similarly, an alternative data source indicates a greater proportion of youth homelessness among public school students across the region (KidsData, 2023).

[70] PIT data is gathered by counting how many people are experiencing homelessness on a given day.

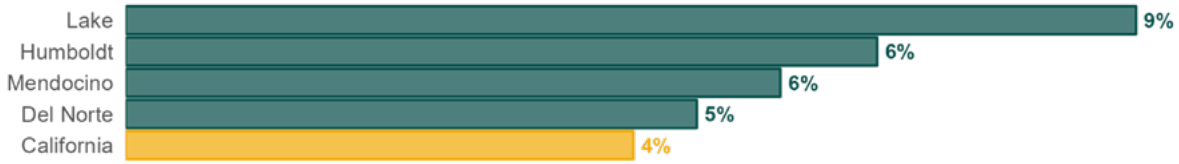
[71] HUD compiles reported homeless counts gathered by regional participants of the Continuum of Care (CoC) program throughout the U.S. During a 24-hour period in the first ten days of January each year, CoC participants conduct a Point-in-Time (PIT) count of homeless people in their respective regions.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

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

Figure 5.9 Total Counted Homeless per 100,000 Population by Continuum of Care (2016-2020)[72]

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 five-year averages from 2016 to 2020. Rates calculated by the author are five-year estimates using population data from the U.S. Census Bureau (2022) for 2016-2020. Population estimates are summed for each CoC service area by county.

Figure 5.10 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.

Poverty: Economic conditions strongly influence health disparities. Poverty is linked to lower life expectancy and increases in health risks related to obesity, smoking, substance use, and chronic stress (Healthy People, 2030). People living in poverty are also more likely to burn wood for residential heating and live on or near unpaved roads, exposing them to dust from these sources, which are leading causes of air pollution (see Chapter 4) and can exacerbate health conditions.

Poverty rates for all ages are sharply higher in the Redwood Coast region compared to those for the state as a whole. People in the Black, Hispanic or Latino, and AIAN communities specifically are more likely to live in poverty than state averages (U.S. Census Bureau, 2022). Figure 5.11 below shows detailed, disaggregated data on poverty.

[72] The 2021 data, which show 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, thereby also reducing the headcount of sheltered homeless (U.S. Department of Housing and Urban Development).

Figure 5.11 Disaggregated Poverty Rates (2017-2021)

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

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

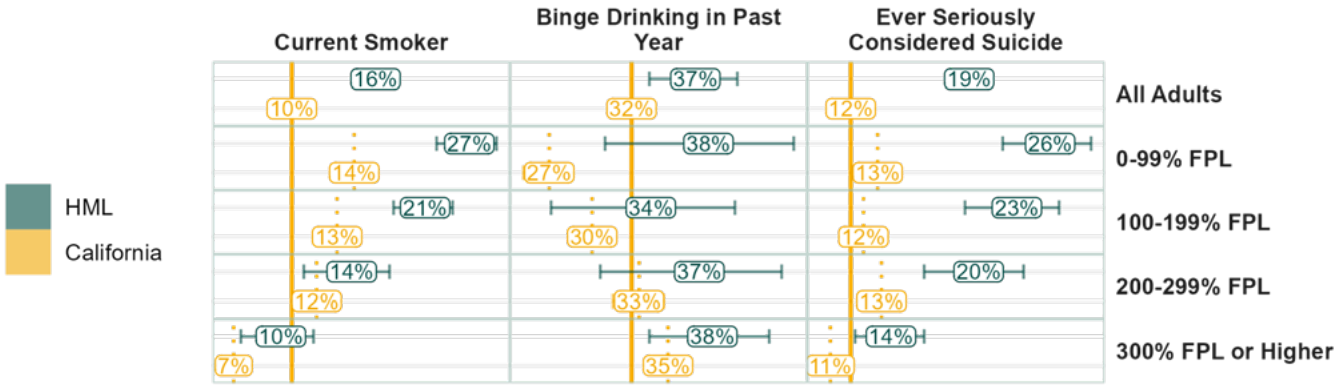
Note. Data sourced from the U.S. Census Bureau (2022). (~) denotes a statistically unstable estimate.[73]

Poverty in the Redwood Coast appears to be strongly connected with two proximate risk factors, smoking and suicide ideation (CHIS). Nearly 27% people living below the poverty line in the region are current smokers compared to just 15% statewide. Similarly, 26% of people living below the federal poverty level (FPL) have seriously considered suicide.

Statewide, recent binge drinking is *positively* associated with income (see Figure 5.12), 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, those below the poverty line have rates of binge drinking that are significantly higher compared to those in the same income bracket statewide. For smoking and suicidal ideation, those with low or moderate incomes are at much greater risk in the region.

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

Figure 5.12 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.

Educational Access and Outcomes: 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"). In the Redwood Coast, gaps in educational attainment begin early, with K-12 students lagging behind their statewide peers on reading and math proficiency. Regional 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. Across the Redwood Coast region, high school graduates complete the course requirements for admission to the University of California (UC) or California State University (CSU) systems (i.e., "A–G courses") at roughly half the rate of their statewide counterparts (Kidsdata. 2023). Correspondingly, all Redwood Coast counties lag behind in four-year degree attainment. Therefore, while the region fares relatively well in terms of high school graduation rates, it appears that the educational system faces challenges in preparing high school graduates for college.[74]

With respect to the region's health challenges, educational attainment appears to be strongly associated with tobacco use.[75] Both in the region and across the state, smoking rates decrease significantly as educational attainment increases; however, this relationship is particularly strong in the Redwood Coast, where one in four individuals with less than a four-year college degree is a current smoker, compared to just 14% statewide (CHIS).

Social Isolation: A recent report by the U.S. Surgeon General brought national attention to the 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 encompassing cardiovascular disease, hypertension, diabetes, infectious disease, cognitive decline, depression, and anxiety (U.S. Surgeon General, 2023).[76, 77]

[74] 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. Only Humboldt County is home to a public four-year university.

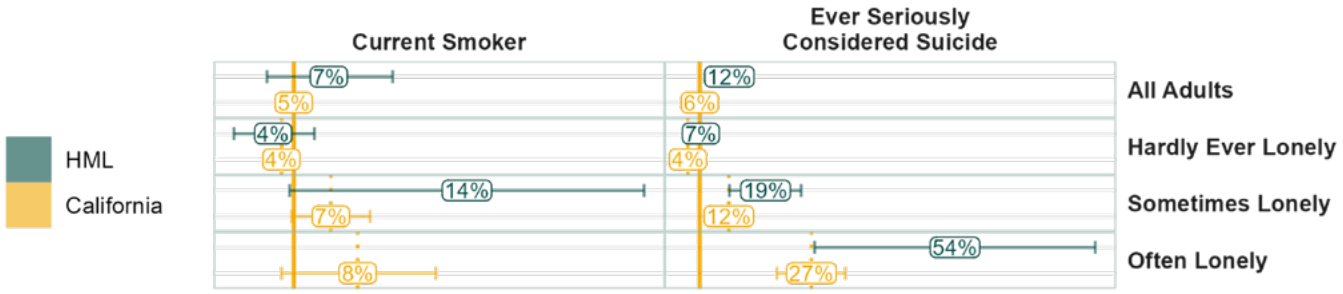
[75] Alcohol use and suicide ideation do not exhibit clear relationships with educational attainment. Rates of both appear to be *lower* among those with less than a high school education.

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

[77] 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)".

Data on loneliness at the local level is scarce. However, statewide data from CHIS indicate that significantly fewer adults over the age of 65 report themselves as hardly ever feeling lonely compared to the state average, suggesting that the experience of loneliness among the elderly population is more prevalent in the HML region. Older adults who experience loneliness are at higher risk of smoking and suicide ideation (CHIS) (see Figure 5.13). Over half of Redwood Coast seniors who report often feeling lonely also report having seriously considered suicide and at a significantly and substantially higher rate than those who report only sometimes or hardly ever feeling lonely. Therefore, older Redwood Coast 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.

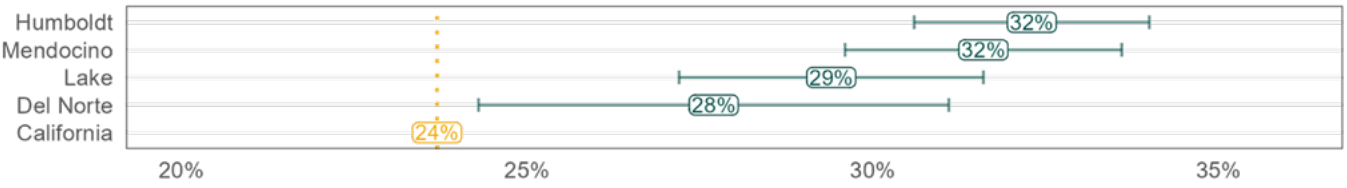
Figure 5.13 Proximate Risk Factors by Loneliness, Age 65+ (2019-2020)



Note. Data sourced from the CHIS. Smoking data not available for the "Often Lonely" category.

Significantly more householders live alone in the Redwood Coast, indicating greater levels of social isolation within the household context (Figure 5.14). Isolation is a critical risk factor for suicide, particularly among men who are almost four times more likely to commit suicide than women (CDC, 2023).

Figure 5.14 Householders Living Alone, Percent of Households (2017-2021)



Note. Data sourced from the U.S. Census Bureau (2022).

Adverse childhood experiences (ACEs) involve 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 (Felitti et al., 1998). People who have multiple ACEs are at far greater risk than people with one or no ACEs for poor health outcomes or behaviors, including all proximate risk factors identified in this report (i.e., tobacco use, substance abuse, and mental health challenges). For example, an individual with one ACE is approximately 1.3 times more likely to have ever injected drugs, whereas, for an individual with four or more ACEs, this likelihood rises to 10.3 times compared to someone with no ACEs (Felitti et al., 1998).

The proportion of adults with four or more ACEs is significantly and substantially higher in the Redwood Coast compared to the state average, while the proportion of adults with zero ACEs is significantly lower (CHIS). Recent data reveal that rates of domestic violence and child abuse are elevated across the region, indicating that the region's youth are at risk for ACEs (Kidsdata, 2020). However, no substantive, large-scale study has been done on the region to confirm these results.

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 (CHIS). In particular, 45% of Redwood Coast adults with four or more ACEs have seriously contemplated suicide during their lives compared to just 11% of Redwood Coast adults with no ACEs and 6% of California adults with no ACEs. Therefore, Redwood Coast residents indicating multiple ACEs are at high risk for one of the region's most elevated causes of death.

Food and Nutrition: A healthy diet composed of limited portions of the necessary food groups is associated with lower all-cause mortality, cardiovascular disease, obesity, diabetes, and breast and colorectal cancer (*Healthy People 2030* initiative). Thus, barriers that prevent access to a healthy diet such as poverty, high prices, or transportation may have an adverse influence on these health outcomes.

> "Lack of fresh food impacts wellness in a place where accessible medical treatment is already a challenge."

Rates of heart disease are elevated across HML counties along with somewhat elevated rates of breast cancer and colorectal cancer[78] (CDPH, 2022). Conversely, however, rates of diabetes are consistent with or lower than state averages across Humboldt, Mendocino, and Lake Counties. Health planning documents for Humboldt, Del Norte, and Lake County report food-related health issues. In particular, a 2019 Del Norte Community Health Assessment found high rates of food insecurity in Del Norte, disproportionately impacting children (Freedman et al., 2019).

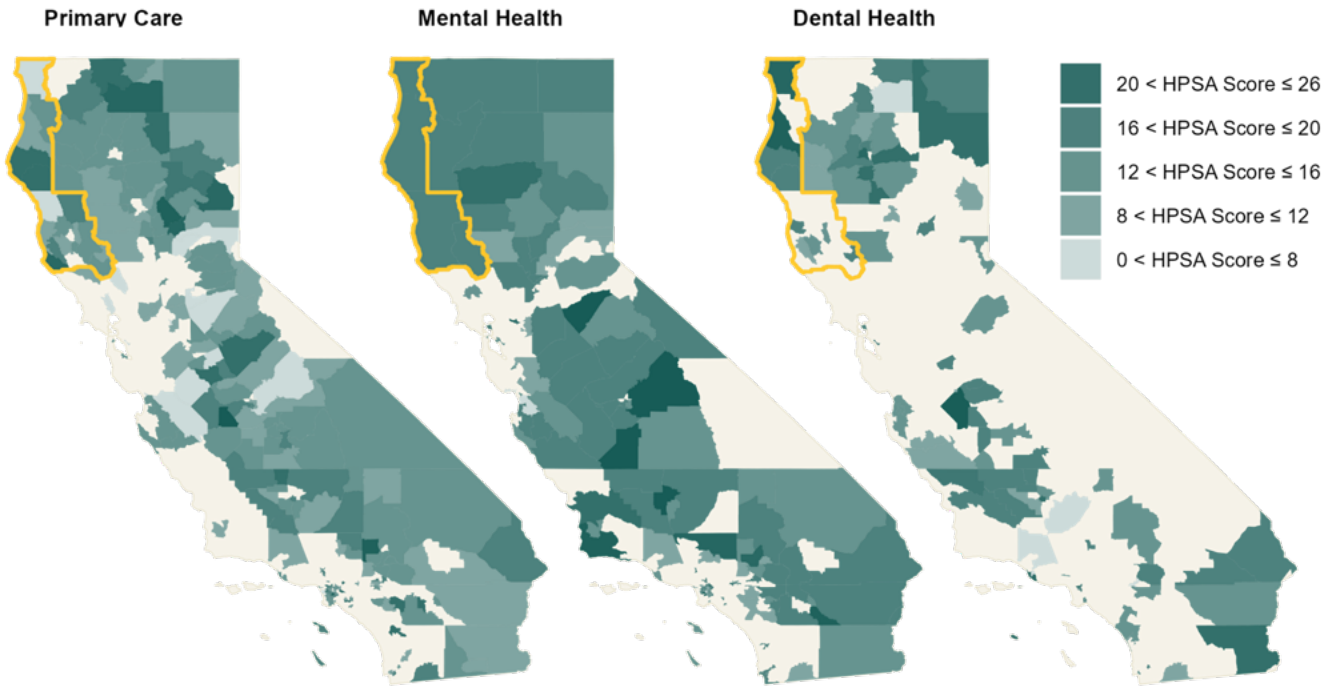
Unfortunately, available data strongly suggest that Del Norte is most impacted by food insecurity in the Redwood Coast, and yet CHIS data is not available for Del Norte County to further assess this county's most vulnerable populations. The data that are available for HML indicate that dietary factors in the region appear to be strongly influenced by household income (CHIS). Consistent with statewide trends, higher income households are more likely to have local access to fresh produce and are therefore less likely to have recently consumed soda and fast food.

For the HML counties, CHIS data suggest dietary outcomes are consistent with or superior to state averages across income strata, at least within the limited contexts of fast food, soda, and fresh produce. Therefore, the available data suggest that food insecurity and dietary risks are greatest in Del Norte County and among low-income households regionwide.

[78] The most recent CDPH data release shows a lower rate of age-adjusted heart disease mortality in Del Norte County, however, the 2017-2019 data release shows higher rates in Del Norte. Moreover, CDC PLACES data suggest higher rates of heart disease in Del Norte County.

Health Access and Barriers: The majority of the Redwood Coast is a designated Health Provider Shortage Area (HPSA), which are 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.[79] 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. See Figure 5.16 below for details.

Figure 5.15 Health Professional Shortage Areas and Scores (2023)[80]



Note. Beige areas are not HPSAs. Blue areas are HPSAs, with darker hues indicating higher HPSA scores (or greater need). The Redwood Coast 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.

In contrast to the state population, a significantly larger proportion of the Redwood Coast population has recently experienced delays in accessing primary healthcare. All income brackets experience higher rates of delayed care compared to corresponding income groups statewide (CHIS). However, those with lower incomes clearly experience increased delays, indicating a disproportionate effect. Moreover, those with incomes below the federal poverty line (FPL) are significantly more likely to have delayed a prescription compared to the same income category statewide, while those with higher income levels do not share this experience. Delayed care may also be a factor in the region's elevated age-adjusted mortalities due to prostate cancer, breast cancer, and colorectal cancers. For all three, delayed care is associated with higher mortality (Hanna et al., 2020; Chan et al., 2021).

[79] These HPSAs are assigned scores, which range 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.

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

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, 42.5% (± 5.0%) have delayed care in the past 12 months compared to just 16.4% (± 2.4%) of HML adults, who have never considered suicide.

Equity Considerations and At-Risk Populations

Redwood Coast communities are vulnerable due to their geographic location and environment, lack of resources and healthcare services, and low representation of at-risk populations (see Chapter 4) both in data and decision-making spaces. At-risk populations, such as people with disabilities and people living in poverty, are often not represented and can exist as hidden populations. A lack of accurate diversity representation can lead to a lack of federal or state funding and increase the disparities seen in planning.

Figure 5.16 below offers a visual comparison of health outcomes and factors across demographics. Each column illustrates the differences between two populations. For example, the first column contrasts the health factors of people of color with those of the white population. Gold shades denote adverse disparities for the primary population relative to the reference group. A specific observation reveals that, in the HML region, 26% of people of color live below the poverty line in contrast to 16% of the white population.[81] These data display several notable trends that further highlight populations at risk in the HML region:

- People of color show higher rates of fair or poor health, higher poverty levels, lower educational attainment, higher ACEs, and more limited access to nutritious foods than their white peers. Based on other data, people of color in Del Norte County experience higher rates of poverty and higher rates of lack of health insurance than whites (U.S. Census Bureau, 2022).

- Lesbian, gay, and bisexual communities within the HML region face numerous disparities: increased smoking and heavy alcohol consumption, suicidal thoughts, higher poverty rates, 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, decreased 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 exhibits fewer risk factors. The health trends of the veteran population resemble these patterns, possibly due to a significant age overlap in the two groups within the region.[82]

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

[82] In the HML region 16.8% of adults 55 and older have served in the military compared to just 4.4% for adults 18 to 54 (2011 - 2022 CHIS data).

Figure 5.16 Comparative Analysis of Demographic Disparities in Health Factors (2011-2022)

Redwood Coast

	People of Color vs. White	Homosexual or Bisexual vs. Heterosexual	Disabled vs. Non-Disabled	Veteran vs. Non-Veteran	55+ vs. Younger
Fair or Poor Health Status	21/16%	18/19%	41/9%*	27/19%*	22/13%*
Current Smoker	16/16%	19/14%	27/15%*	17/16%	12/20%*
Binge Drinking	17/17%	22/16%	29/42%*	17/17%	10/22%*
Suicide Ideation	17/19%	49/18%*	21/11%*	20/19%	15/22%*
Below FPL	26/16%*	25/16%	24/15%*	11/18%*	12/21%*
Less than BA	79/65%*	57/66%	80/63%*	68/67%	64/69%
3+ ACEs	53/44%	60/43%*		40/46%	36/52%*
Violence by Intimate Partner	~2/2%	~6/1%			~1/2%
Lives Alone	14/19%*	20/18%	29/14%*	28/17%*	27/12%*
Lower Access to Fruits/Veggies	16/12%	~9/13%	17/10%*	11/13%	12/13%
Delayed Care in Past 12 Months	14/19%*	32/20%*	25/15%*	17/22%	16/19%
Health Impacted by Ext. Weather	~7/15%	21/13%		10/14%	12/16%

California

Fair or Poor Health Status	18/14%*	19/18%	41/12%*	18/19%	25/12%*
Current Smoker	10/10%	13/8%*	17/11%*	11/10%	8/11%*
Binge Drinking	16/20%*	28/18%*	25/35%*	16/19%*	10/24%*
Suicide Ideation	11/13%*	35/12%*	15/6%*	12/12%	8/14%*
Below FPL	21/14%*	16/15%	24/14%*	6/16%*	12/18%*
Less than BA	65/59%*	57/60%*	75/60%*	60/62%*	62/61%
3+ ACEs	32/34%*	52/31%*		36/33%	27/37%*
Violence by Intimate Partner	3/2%*	4/2%*		2/3%	1/3%*
Lives Alone	9/13%*	15/11%*	17/10%*	18/11%*	20/7%*
Lower Access to Fruits/Veggies	15/10%*	13/12%	16/10%*	10/12%	10/12%*
Delayed Care in Past 12 Months	11/14%*	25/15%*	21/11%*	11/16%*	12/13%*
Health Impacted by Ext. Weather	5/8%*	14/6%*		6/7%	6/7%*

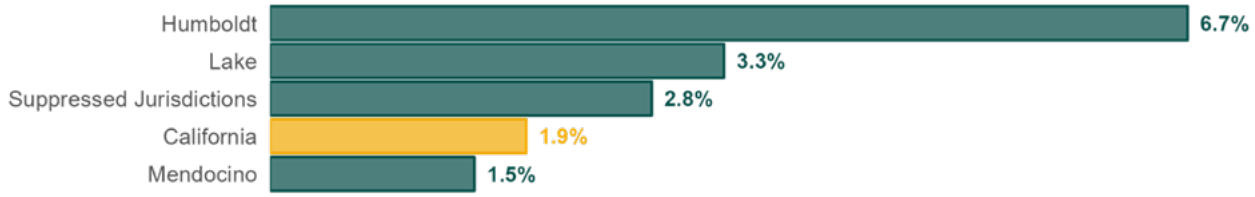
Note. Data sourced from the CHIS. (*) denote statistically significant differences and (~) denote unstable estimates. An estimate may be simultaneously unstable and significantly different. Missing values are not shown. Years are selected based on all available years from 2011 to the present. Binge drinking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

Climate and Environments Impacts on Community Health

Environmental pollutants can contribute to respiratory disease, heart disease, and some cancers (*Healthy People 2030* initiative, "Environmental Health"). CalEnviroScreen 4.0 data (see page 78 in the Climate Analysis) indicate that, overall, the region's pollution burden is lower than statewide estimates. However, certain environmental risks are elevated in some areas of the region, including children's lead risk as well as presence of drinking water contaminants.

Critical to note is that the CalEnviroScreen 4.0 variable "Children's Lead Risk from Housing" does not directly measure lead exposure and instead infers a level of risk based on the incidence of child poverty and age of housing structures.[83] An additional data source shown in Figure 5.17 indicates that blood lead levels (BLL) among children aged five and under are elevated in Humboldt and Lake counties. Moreover, Humboldt's BLL levels are the second highest in the state.[84] The CalEnviroScreen 4.0 data cited above suggest that the epicenter of lead risk in Humboldt County is in the Arcata-Eureka-Fortuna region.

Figure 5.17 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, and Yuba.

Water Quality: Impaired waterways are a major issue in the region (see Chapter 4). Fifty-eight river and stream locations have tested positive for at least one pollutant that is over the relevant safe threshold mandated by the California Water Boards. Each of these locations is polluted by indicator bacteria, surrogates used to measure the potential presence of fecal material and pathogens. Among the many of the region's lakes, reservoirs, harbors, and estuaries, eight bodies of water are listed as polluted, and three-quarters of these are contaminated with mercury, which therefore increases levels of mercury found in fish species in the region. These compromised aquatic species and contaminated groundwaters constitute a public health threat throughout the region.

Wildfires: In contrast to man-made pollutants, wildfires and corresponding health risks have, in recent years, been far more severe in the state's northern region than the rest of the state. Smoke from wildfires can impair lung function, contributing to bronchitis, asthma, and heart failure, and the region's substantial elderly population are particularly vulnerable to these effects (United States Environmental Agency, 2023). Wildfires are the region's largest single natural contributor to air pollution, even surpassing contributions made by cars and farm equipment (see Chapter 4). Consequently, these fires may exacerbate the region's disproportionately high levels of asthma and respiratory illness.

Recent high-impact wildfires and droughts have been linked to extremes in the Evaporation Demand Drought Index (EDDI), which is how much water the atmosphere needs and thus how much moisture evaporates over a period of time. Rising air temperatures are the leading cause of increased evaporative demand for inland regions, whereas humidity is more noticeable in n coastal areas, including the HML region. The EDDI's historical baseline is approximately five days per season with a two-week EDDI above the 95th percentile (see Chapter 4). Based on historical data, current models

[83] Exposure to lead-based paint in older homes is the most significant source of lead poisoning in children (*Experience*, n.d.).

[84] Second to Nevada County.

predict an increase in high fire danger-risk days likely leading to an increased risk of wildfires in the area, which, in turn, could increase rates of asthma and respiratory illness, as well as premature death.

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 as a whole. Between 2019 and 2022, approximately 78% of Redwood Coast residents experienced extreme weather events compared to just 42% of California residents. 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 (CHIS).

RRRISE and Public Health

As evidenced by listening sessions across the region, there is widespread recognition of the relationship between public health and healthcare systems, and the overall wellbeing of Redwood Coast communities in the RRRISE Collaborative. Acknowledging some of these sobering trends on the health of the region's communities, and the role that professional shortages in healthcare fields can play in this (among other factors) contributed to Health and Caregiving being elevated as a priority sector for the initiative. Strategies that seek to address social determinants of health, for example, is detailed in Regional Plan Part 2.