Appendix B: Community Description

The Path to Clean Air CERP is comprised of the cities of Richmond and San Pablo and the following unincorporated areas in Contra Costa County: Bay View, East Richmond Heights, Rollingwood, Tara Hills, Montalvin Manor, North Richmond, and El Sobrante. These cities and places were founded on land originally inhabited by the Ohlone people. From here on, we will refer to this land and people within the geographic bounds of the CERP as the 'CERP Community' (see Figure 1).

Situated near the East Bay waterfront, our CERP Community — with a current population of 166,415 — was a magnet for World War II-era industries like shipbuilding, chemical production, and oil refining. In the 1940s, the population surged as many workers, including many people of color, flocked here for jobs. This period was part of the Second Great Migration when Black Americans migrated en masse to the West Coast for jobs and to find respite from the Jim Crow policies prevalent in the American South that enforced segregation and marginalized Black communities. Despite their contributions to the region's growth during and after the war, newly arrived Black and Brown people were targets of exclusionary labor and housing policies that continue to negatively affect income, homeownership, mobility, and wealth accumulation to this day.

Today, our community has become a significant corridor for transporting goods via ship, rail, and 18-wheelers, leading to congested freeways and roads running through residential communities. These transportation corridors include I-580 to the south, I-80 to the east, Richmond Parkway to the west, and San Pablo Avenue through the center of our community. In addition to these transportation corridors, the Chevron Refinery, rail yards, and rail lines associated with the Port of Richmond lie west of the CERP Community. The Chevron Refinery is a concerning source of air pollution emissions in the CERP Community. As it emits more fine particulate matter and sulfur dioxide than all other contributing sources in our community combined. Chevron is also the largest source of numerous toxic air contaminants, such as hydrogen cyanide, sulfuric acid, manganese, and hydrogen sulfide.
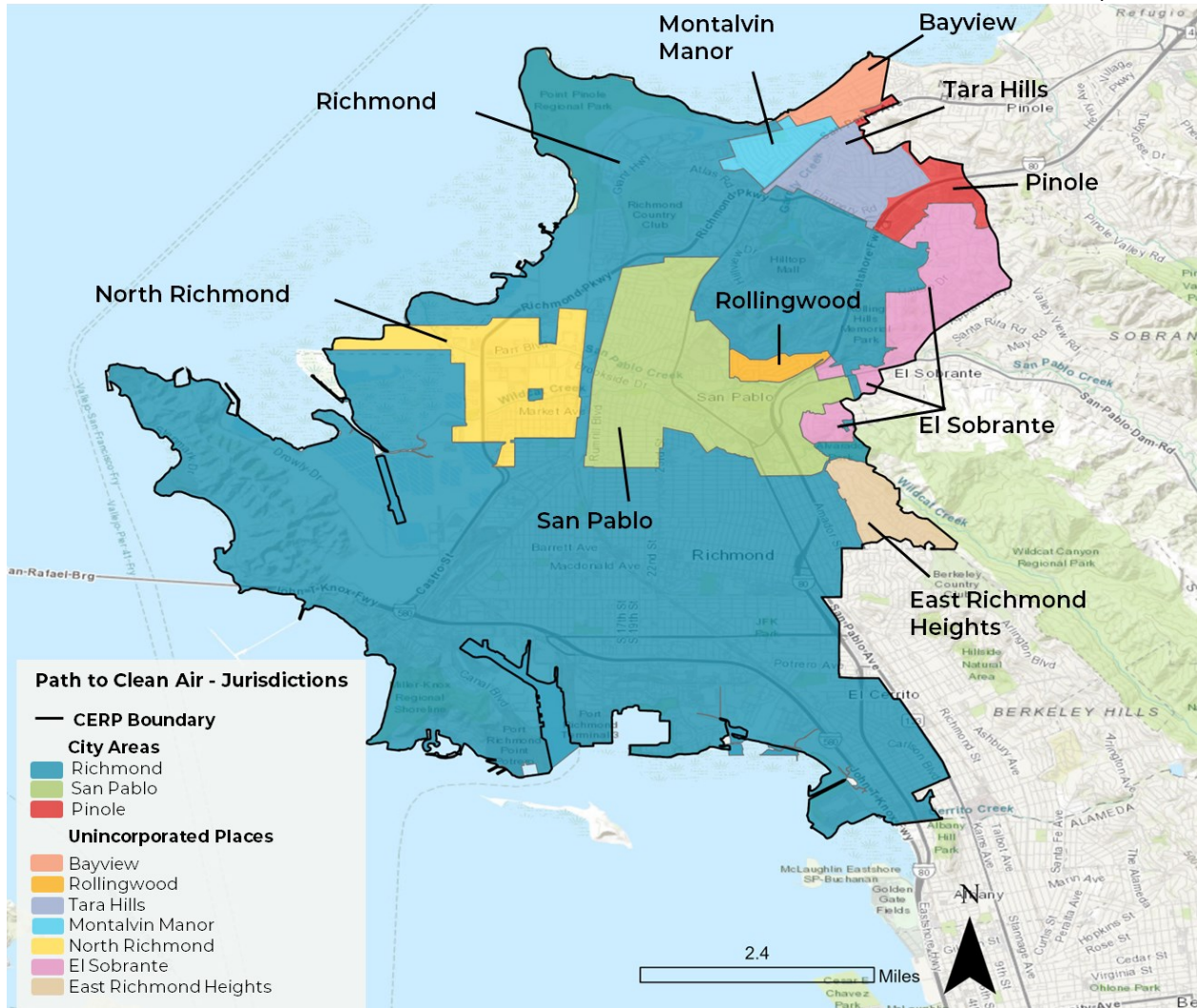
Figure 1. Community Emissions Reduction Plan Boundary and Component Geographies.

I. Land History

The PTCA Community sits on the original territory of Huichin, home to the Chochenyo and Kirkin-speaking Muwekma tribe of the Ohlone nation. The Ohlone stewarded the land that is now Richmond for generations before facing waves of genocide since contact was made with Spanish colonizers. Today, the Ohlone continue to fight for their right to their land, and we acknowledge the impact of colonialism, genocide, exploitation, and displacement on the Muwekma Ohlone Tribe.

Figure 2. Ohlone People Crossing the Waters. Source: Painting of three Ohlone people crossing the waters in San Francisco Bay by Louis Choris, 1816 or 1822.

Ohlone is an umbrella term for approximately 50 distinct tribes with related languages. The Ohlone are Native American people located on the Northern California Coast, inhabiting areas from the San Francisco Bay Area to the Monterey Bay and lower Salinas Valley. The Ohlone family of tribes has inhabited the Bay Area for at least 10,000 years. The Ohlone language groups present in the PTCA Community are the Chochenyo and the Karkin (also spelled "Carquin") -- see Figure 3. The Huichin tribe inhabited most of what today is Richmond.[1] Traditionally, the Ohlone people who resided in the region that includes the current PTCA Community subsisted by hunting, gathering, and harvesting the rich wildlife and diverse plants of the East Bay.
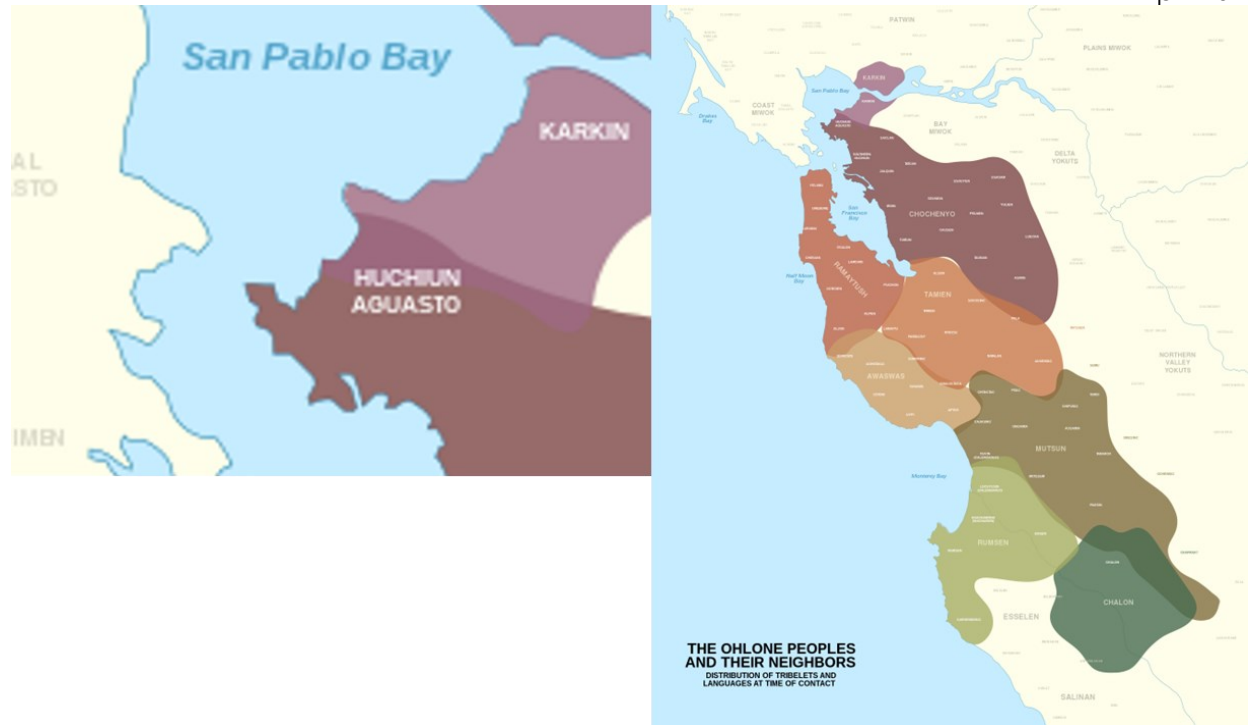
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[1] "Chochenyo." California Language Archive, https://cla.berkeley.edu//languages/chochenyo.html. Accessed 18 May 2022.

Figure 3. Map of Ohlone Traditional Territories. Source: Randall Milliken (1995): https://museumsrv.org/the-bay-miwok-language-and-land/ California Indians and Their Environment: An Introduction (pg 34) Randall Milliken (2007). https://cejce.berkeley.edu/ohloneland.

A current initiative by Ohlone people is the women-run Sogorea Te Land Trust. This is an urban land trust founded in 2012 with the goal of returning indigenous land to indigenous people.[2] Sogorea Te encourages all people living on Ohlone land to pay Shu'mi, or a land tax, to support the work of the land trust and indigenous sovereignty efforts, including the practices of rematriation, cultural revitalization, and land restoration.

II. Land Use and Activism

Industry, Segregation, and Pollution Exposure

Richmond is the largest geography within the PTCA boundary. Richmond is a relatively large city of fifty-six square miles that developed around the needs of two large industrial operations at the turn of the 20th century: The Santa Fe Railroad and the Standard Oil of California refinery (now Chevron). When incorporated in 1905, Richmond had a population of 2,150 and was an industrial town. In 1909 the city charter was adopted, and by 1910 the city had a population of 7,500. Within a few years, the following industries were located in Richmond: Winehaven, Pullman Palace Car Shops, American Radiator, Standard Sanitary Company, and Stauffer Chemical Company, among others. With the arrival of new industrial uses, land previously used for agricultural purposes began subdividing into uniform city lots for development.

As the City grew during the 1920s and 1930s, Richmond's Downtown emerged as the City's business and retail center. Construction of shipping port terminals began in this period. By 1907 harbor construction was being promoted, and bonds issued in 1912 and 1920 funded dredging

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[2] "Sogorea Te." The Sogorea Te Land Trust, https://sogoreate-landtrust.org/. Accessed 18 May 2022.

and terminal construction. In the 1920s, tideland filling made the opening of the Ford Motor Assembly Plant and the Felice and Perelli Cannery in 1931 possible. The City's population grew from 2,150 in 1905 to 23,600 in 1940.

In 1941, to meet WWII industrial demands, the Kaiser Richmond Shipyards opened Richmond's South Shoreline. Between 1940 and 1945, Richmond's population soared in response to wartime manufacturing needs, rising from 23,000 in 1940 to over 100,000 in 1945. Richmond's Black population increased from 270 to 14,000, many of whom migrated from the economically depressed South and Southwest to work in the shipyards.[3]

To accommodate this influx of workers, the federal government funded the development of 24,000 public housing units for 60,000 wartime workers under the condition that units be racially segregated. Units built for Black workers were intended to be temporary, built with low-quality materials, and sandwiched between factories, refineries, and rail lines. These units were the least desirable housing locations with high air pollution exposure yet conveniently close to job sites. Many of these "temporary" housing units are still in use today. If housing could not be found, workers often built temporary shelters such as cardboard shacks, barns, and tents or even used open fields in what is now North Richmond, an unincorporated area without city services.[4]

On the other hand, housing for white workers was of a higher quality and intended to be permanent.[5] During this time, the unincorporated area of Rollingwood was created as a new suburb to help meet wartime housing demands; Federal officials approved bank loans to finance construction that required that none of its 700 houses be sold to a Black person - an example of prevalent racial covenants of the time.

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[3] *An Avalanche Hits Richmond: A Study of the Impact of War Production upon the City of Richmond, California, and an Outline of Measures Necessary to Provide the Facilities for Normal Postwar Community Service, a Report*. The City Manager, 1944. https://alexismadrigal.files.wordpress.com/2019/01/an-avalanche-hits-richmond.pdf
[4] Ibid
[5] Ibid

Figure 4. Kaiser Shipyards, Richmond, CA. Source: Shift Change 3:30 PM – Coming on of Yard 3 – Kaiser Shipyards, Richmond, CA, Circa 1942, Dorothea Lange, Film negative, Gift of Paul S. Taylor, 5 in x 7 in, A67.137.42097.2

The Kaiser shipyards (see Figure 4), a significant wartime employer, initially attempted to use only white employees in its skilled shipyard trades but relented due to Black worker advocacy and eventually employed more Black workers than any other industry in Richmond.[6] However, the unions involved in wartime industries took exclusionary actions against Black workers, and the Kaiser shipyards and other employers refused to interfere.[7] Thus, Black workers were either excluded from unions altogether or given limited rights and positions - suffering denials of promotion or being paid as trainees instead of full-fledged employees.[8] This job exclusion meant lower incomes for highly skilled laborers and limited housing options for Black workers.

Figure 5. Kaiser Shipyard Workers Circa 1942. Source: Shipyards and industrial history, Women line up for paychecks-Richmond Shipyards, Richmond, CA, Circa 1942, Dorothea Lange, Film negative, Gift of Paul S. Taylor, 5 in x 4 in, A67.137.42080.4

[6] Moore, Shirley Ann Wilson. *To Place Our Deeds: The African American Community in Richmond, California, 1910-1963.* Univ of California Press, 2000.
[7] Johnson, Marilynn S. The Second Gold Rush: Oakland and the East Bay in World War II. Univ of California Press, 1994.
[8] Richard Rothstein. The Color of Law: A Forgotten History of How Our Government….Liveright Publishing Corporation, 2018.

At the end of WWII in 1945, the shipyards closed, and a far-reaching readjustment began. Industrial production rapidly declined, and the population decreased steadily from 101,500 persons in 1947 (a special census count) to 71,900 in 1960. Post-war development included strong growth in warehousing, distribution, chemical, and research facilities.

With the population decreasing, Richmond removed the federal housing originally constructed for wartime workers. The 1950 City of Richmond Master Plan details decisions to bulldoze these majority Black-populated "blighted areas" of wartime housing and build fewer public housing units for Black refinery and shipyard workers to replace these units.[9] Workers were then funneled into sub-standard public housing in Richmond and San Pablo in the mid-1960s. The 1950 Master Plan wanted to maintain "[...] the neighborhoods that contained "small, pleasant, single-family homes" to "[...] control home occupations and [...] to maintain the harmonious residential character of neighborhoods[...]."[10] "Harmonious" is a codeword for using racial homogeneity to maintain all-white occupancy. Additionally, white wartime workers could get cheap loans, aiding their ability to move to single-family suburbs, while the federal government refused to insure bank loans made to Black Americans seeking to buy or build homes.[11]

In sum, when WWII was over, Black workers in the PTCA Community saw stunted income gains compared with white workers and were not permitted to live in the newly built single-family suburbs. Instead, Black workers lived near industrial areas and sources of air pollution in cheaper multi-family dwelling units. In the PTCA Community and across the U.S., Black people and other people of color were excluded from buying or building homes, limiting wealth accumulation, and stunting the transfer of intergenerational wealth.[12] A 2020 Brookings Institute study found that the average white family in the US has a net worth of $171,000, while the average Black family has a net worth of $17,000.[13]

By the 1960s, exclusionary labor and housing practices in the U.S. (e.g., redlining) had firmly established racial income inequality and suburban segregation.[14] The below "Negro Concentration" maps developed by the Commission on Civil Rights show the PTCA Community's racial segregation in 1967 – the darker areas show greater concentrations of Black residents (see Figure 6). This map serves as a proxy for the "redlining" maps developed by the federal government in the 1930s to guide mortgage investment away from communities of color, which were considered "too risky" for investment. When placed alongside a current map of household mean income for 2020 to 2016 (Figure 7), we see that the high segregation rates are closely aligned with the lowest-income census tracts of today. Exclusionary housing policies and practices of the past shape neighborhood conditions in the present in the entire PTCA Community. Places that once hosted Black wartime housing, and later public housing, saw less financial investment and development over time and to date; these places remain neighborhoods with less desirable housing stock. Today, these are areas where lower-income residents of color live, mainly Hispanic and Latino residents.

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[9] Housing and Redevelopment, a Master Plan of Richmond California. Master Plan, 1950. https://alexismadrigal.files.wordpress.com/2019/01/1950-richmond-housing-and-redevelopment_complete.pdf
[10] Ibid
[11] Richard Rothstein. The Color of Law: A Forgotten History of How Our Government....Liveright Publishing Corporation, 2018.
[12] Ibid
[13] Shambaugh, Kriston McIntosh, Emily Moss, Ryan Nunn, and Jay. "Examining the Black-White Wealth Gap." Brookings, 27 Feb. 2020, https://www.brookings.edu/blog/up-front/2020/02/27/examining-the-black-white-wealth-gap/.
[14] Richard Rothstein. The Color of Law: A Forgotten History of How Our Government....Liveright Publishing Corporation, 2018.
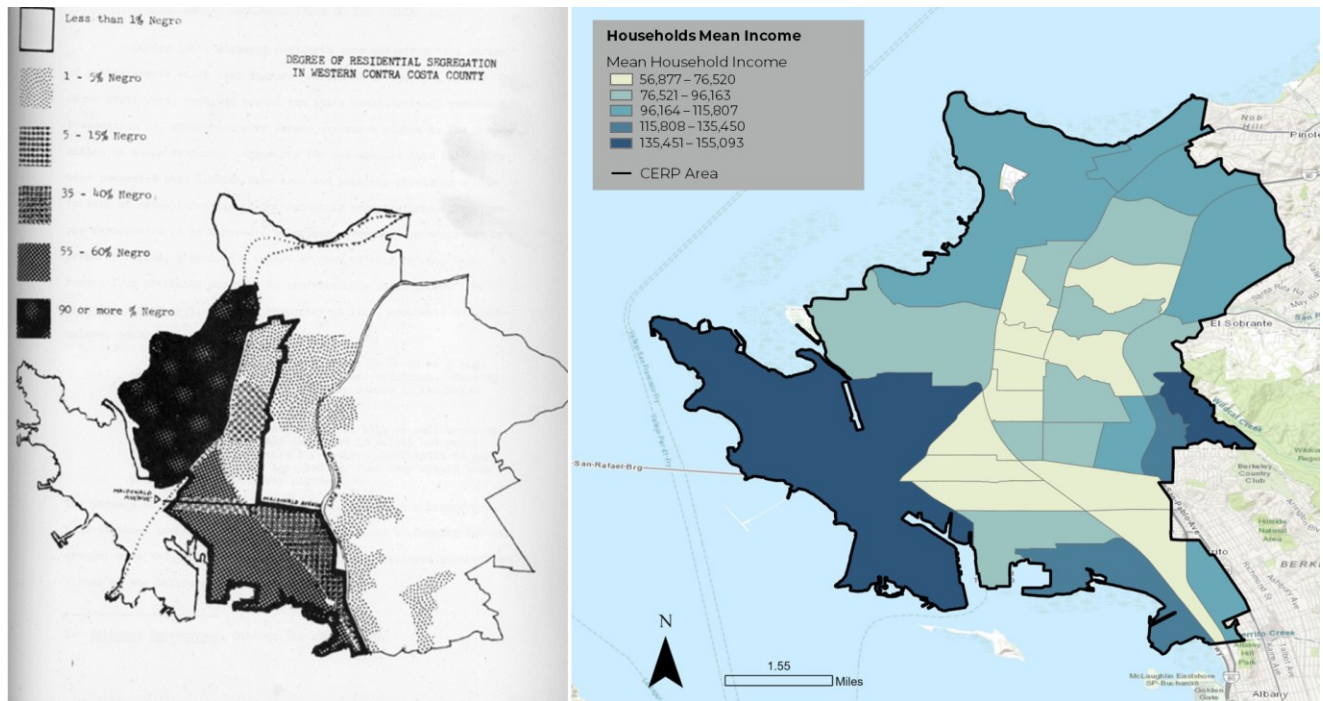
Figure 6. Map of residential segregation in Richmond, CA, 1967 (Left). Source: U.S. Commission on Civil Rights. *Figure 7.* Map of Household Mean Income, 2020-2016 (Right). Source: Census Table S1902, MEAN INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS), 2020-2016: ACS 5-Year Estimates Subject Tables.

The combination of single-family homes – more expensive, per-unit, than multi-family dwellings – and exclusionary housing and labor practices have concentrated low-income communities of color near the many air pollution sources in the PTCA Community. With limited economic mobility, people could not and still cannot afford housing further from pollution hot spots such as industrial businesses, freeways, railways, and refinery operations. As shown below in the map showing $PM_{2.5}$ exposures (Figure 8), the more densely populated areas near the northwest of the PTCA Community have a higher portion of the exposure from local sources of emissions. These areas are also lower-income areas. For more information on air pollution assessments, see Chapter 5.
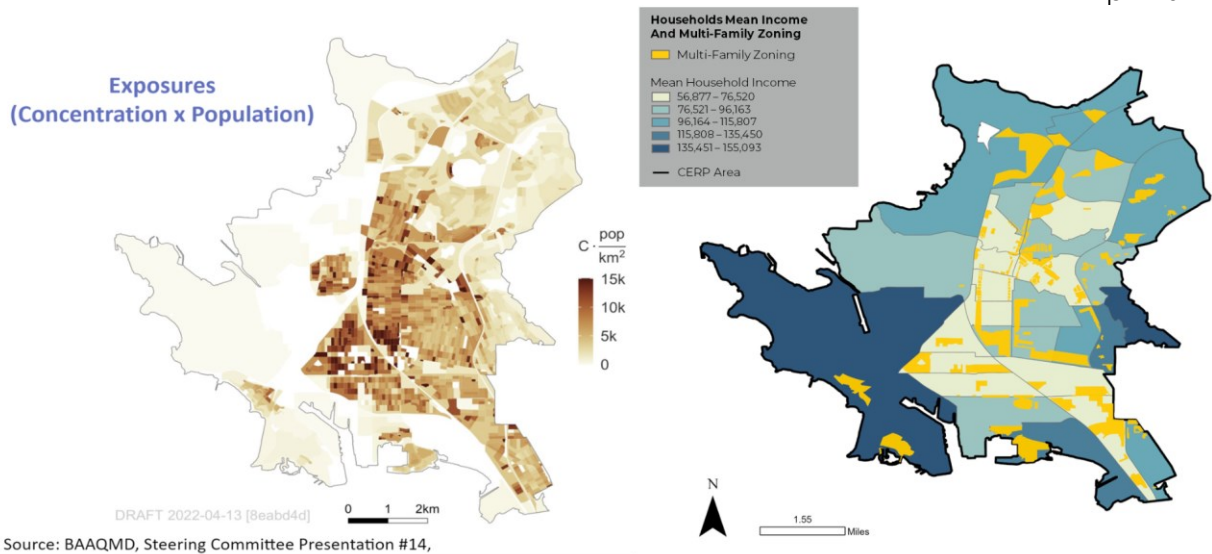
Figure 8. Modeled PM$_{2.5}$ Exposure from Local Sources (Left). Figure 9. Mean Household Income and Multi-Family Zoning (Right). Source: Modeled PM$_{2.5}$ Impacts from Local Sources, Air District, Steering Committee Presentation #14, results from modeling and monitoring.

Beyond the inequity of air pollution exposure in the PTCA Community, from 1960 to 1995, significant changes happened in Richmond's geography and its economy. Starting in the mid-1970s, the Harbor Redevelopment Project on the city's South Shoreline led to the transformation of the old Inner Harbor Basin (the site of the wartime Kaiser shipyards) into the Marina Bay development, a 350-acre master-planned waterfront community with over 2,000 residential units and 650,000 square feet of commercial space. In addition, Hilltop Mall Regional Shopping Center opened in 1976. Hilltop is a 1.3 million square foot enclosed shopping center located in the northern corner of the City along Interstate 80. Richmond's downtown business district began to decline in the early 1970s as its large retailers (Macy's, J.C. Penney's, Thrifty, and Woolworth's) all either moved to Hilltop or closed their Richmond operations entirely.

Transportation infrastructure changed in 1978 when the proposed Hoffman Freeway (now the Knox Freeway, Interstate 580) was designated a part of the Interstate freeway system, thereby ensuring its construction. Construction was mostly completed by the end of 1991. This freeway crosses Richmond's South Shoreline and connects Interstate 80 with the Richmond-San Rafael Bridge. The freeway provided seven new interchanges along the South Shoreline and has made it an attractive corridor for high-tech industries, business parks, and commercial developments. The construction of another freeway, the Richmond Parkway, began in 1990. The Parkway is a 7 1/2-mile expressway linking the northern edge of Richmond (Interstate 80 at Hilltop) and the City's southwest corner (the new I-580 freeway and the Richmond-San Rafael Bridge). The Parkway has fostered the development of a large industrially zoned area that is becoming a major logistics and distribution hub.

Throughout this history, Chevron has occupied 13% of the land area of the City of Richmond (see Figure 10) and has been its biggest taxpayer. It has grown steadily and remains one of the City's biggest employers, along with Kaiser Permanente, the Social Security Administration, and the City government. Chevron's refinery is the largest on the West Coast of North America and sells $15-30 billion in finished goods every year (mainly depending on prices), making, on average, well over $1 billion per year.

The result of the PTCA Community's industrial heritage is a crescent of industrial zoning (shown in purple below) from the southern-most shoreline along the I-580 corridor up to the Chevron

refinery in Point Richmond and bending northeast up to Hilltop and Interstate 80 along the Richmond Parkway and Castro Street. Rail lines exist both within the industrial crescent and through residential neighborhoods.
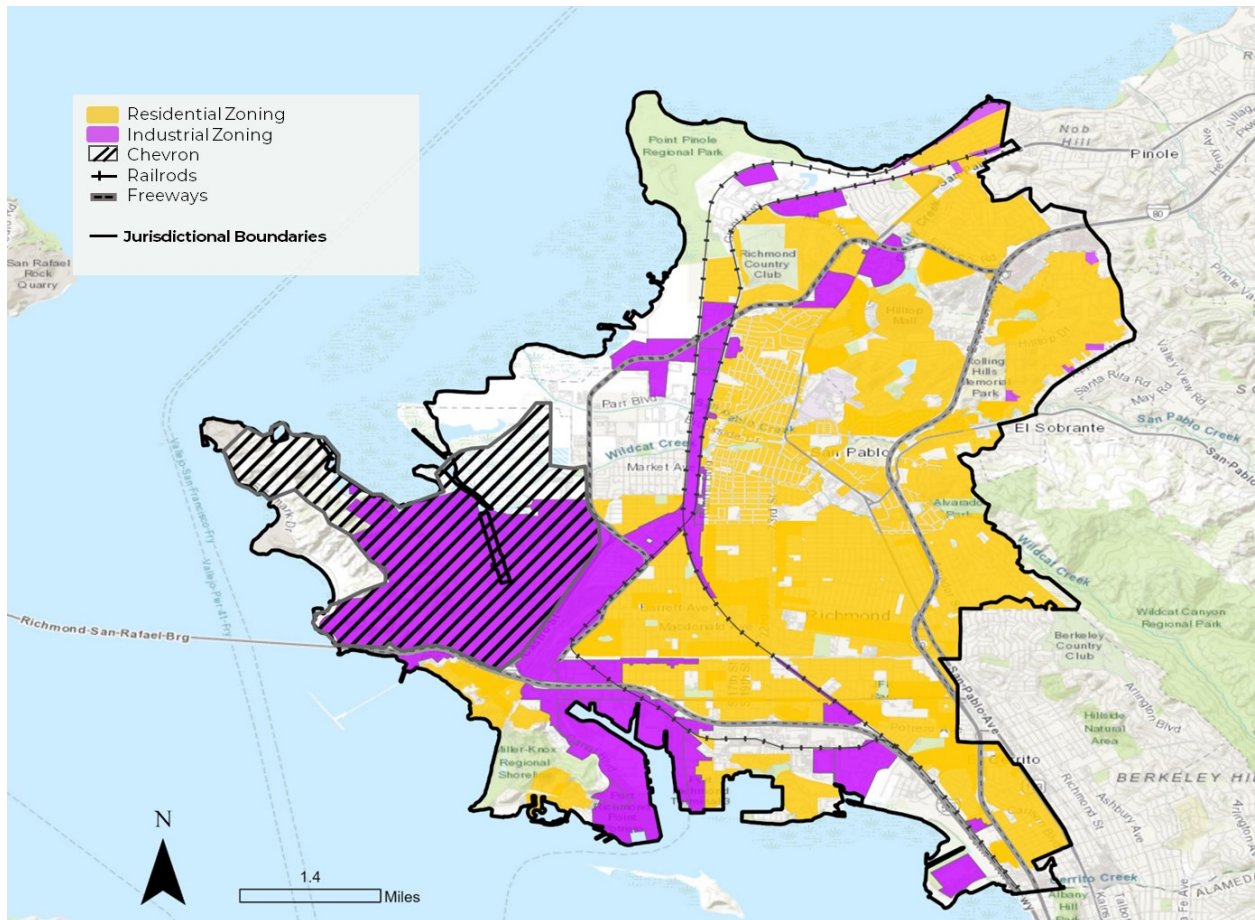

Figure 10. Land Use in the PTCA Community. Source: City of Richmond, City of San Pablo, County of Contra Costa. Note: Many of the "holes" or "breaks" in the "industrial crescent" are due to either no zoning classification for county land in North Richmond or the rezoning of some previously industrial areas to mixed-use – most of the uncolored areas are mixed-use commercial or planned areas. Many of the areas on the shoreline have legacy issues from industrial pollution in the past.

Environmental Justice and Activism in the PTCA Community

The PTCA Community has a long and deep history of environmental and social justice activism in the region. Community members and activists have formed coalitions to unite against fossil fuel operations in our cities and have primarily been led by Black and Brown activists. This section highlights the efforts of several historic and current local organizations that have worked with community members to advocate for more just, equitable, and safe community environments.

Black Panther Party

The Black Panther Party was founded in October 1966 in Oakland and had a significant presence in communities such as North Richmond, where they worked to meet the needs of Black and Brown communities ignored by decision-makers.

West County Toxics Coalition (WCTC)

The West County Toxics Coalition (WCTC) was formed in 1986 and aimed to empower low-income residents in communities of color to exercise greater control over environmental problems generated by the Chevron Refinery and other sources of pollution in Contra Costa County.[15] Residents in this area still face prevalent environmental hazards due to various industries in the area, so WCTC works to empower residents to be actively involved in developing and implementing environmental justice policies and assessing environmental conditions in collaboration with other community residents, activists, and organizations.[16] Efforts include incorporating environmental justice into ordinances in Richmond, Contra Costa County, and the State of California as well as holding regulatory agencies accountable for equitably enforcing environmental laws.[17] WCTC was instrumental in mobilizing thousands of residents between 1989 to 1994 in response to major chemical incidents by the Chevron Oil refinery and General Chemical plant to demand compensation, prevent future incidents, and remediate existing systems.[18]

Communities for a Better Environment (CBE)

Communities for a Better Environment (CBE), an environmental justice organization that launched in California in 1978, similarly advocated strongly for greater emissions restrictions and improved safety for the Chevron refinery and decreasing greenhouse gas emissions from Richmond facilities.[19] Along with other community organizations, CBE contributed to organizing efforts, including increased community participation at hearings regarding Chevron, legal organizing, media and outreach efforts, and political advocacy.[20] In general, CBE provides low-income residents and communities of color in heavily polluted areas in California with "organizing skills, leadership training, and legal, scientific and technical assistance" to address threats to environmental health.[21] In addition, CBE is working to "build a just transition from fossil fuels and advocating for clean energy and community-based solutions to fight climate change and build a new economy." [22]

Asian-Pacific Environmental Network (APEN)

Asian-Pacific Environmental Network (APEN) is an environmental justice organization founded in the early 1990s with strong ties to California's Asian immigrant and refugee communities in the Bay Area.[23] In particular, APEN engaged with the Laotian refugee community in Richmond. These efforts included developing a multi-language seafood consumption guide and community garden projects to engage with the community about toxic substances and their impacts.[24] APEN also advocated for the first country-wide Multilingual Warning System following a fire at the Chevron refinery, organized with other community organizations to stop the Chevron refinery from expanding and processing dirtier crude oil, and stopped large developers from transporting dirty coal through the Bay.[25] APEN plays a critical role in bringing together

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[15] "Welcome." West County Toxics Coalition, https://dhventures.com/West_home.htm. Accessed 26 June 2023.
[16] Ibid.
[17] Ibid.
[18] Ibid.
[19] "Northern California." Communities for a Better Environment, https://www.cbecal.org/. Accessed 26 June 2023.
[20] Ibid.
[21] Ibid.
[22] Ibid.
[23] "Home." Asian Pacific Environmental Network, https://apen4ej.org/. Accessed 26 June 2023.
[24] Ibid.
[25] Ibid.

Asian immigrants in the Oakland and Richmond area to fight for solutions and put power back in the hands of these communities.

Groundwork Richmond

Groundwork Richmond was founded in 2010 and is one of 20 local affiliates of the larger Groundwork USA organization.[26] Groundwork Richmond's mission is to regenerate, improve, and manage the physical environment through developing community-based partnerships, empowering community members and organizations, and promoting environmental, economic, and social well-being.[27] Groundwork Richmond's efforts center on increasing green spaces and the tree canopy in Richmond, monitoring air quality and educating the community on air quality findings, reclaiming vacant lands for conservation and recreation purposes, and providing youth opportunities to engage in science, technology, engineering, art, and math projects.[28]

Urban Tilth

Urban Tilth was founded in 2005 and focuses on community justice and health by building more sustainable food systems.[29] Urban Tilth utilizes school and community gardens and small urban farms to teach community members about growing and cultivating food, feeding the community, restoring relationships with the land, and the relationships between food, health, poverty, and justice.[30]

Safe Organized Spaces Richmond (SOS Richmond)

Safe Organized Spaces Richmond (SOS Richmond) is a community organization that coordinates with both housed and unhoused residents to advocate for jobs, encampment services, outreach, and safe living spaces as solutions to homelessness.[31] These efforts include developing safe, sanitary interim housing options with pathways to permanent housing, creating job opportunities for unhoused community members that encourage long-term career development and security, delivering water, sanitation, and hygiene responses and providing amenities to improve unsafe encampment conditions, and building relationships with community members and public agencies.[32]

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[26] "The Groundwork Mission." Groundwork Richmond, http://www.groundworkrichmond.org/about.html. Accessed 26 June 2023.
[27] Ibid.
[28] Ibid.
[29] "About Us." Urban Tilth, https://urbantilth.org/about-us/. Accessed 26 June 2023.
[30] Ibid.
[31] "SOS Mission." Safe Organized Spaces Richmond, https://www.sos-richmond.org/what-we-do1.html. Accessed 26 June 2023.
[32] Ibid.

III. Racial Composition

The total population in the PTCA Community is 166,415.[33] Proportionally, there are more people of color in the PTCA Community (82%) than in Contra Costa County as a whole (57%) -- see Figures 11 and 12. Most PTCA geographies - cities and unincorporated areas - within the PTCA boundary are 50% or more Hispanic/Latino, Asian, and Black/African American residents. East Richmond Heights is the only geography within the PTCA Community with a white resident majority.
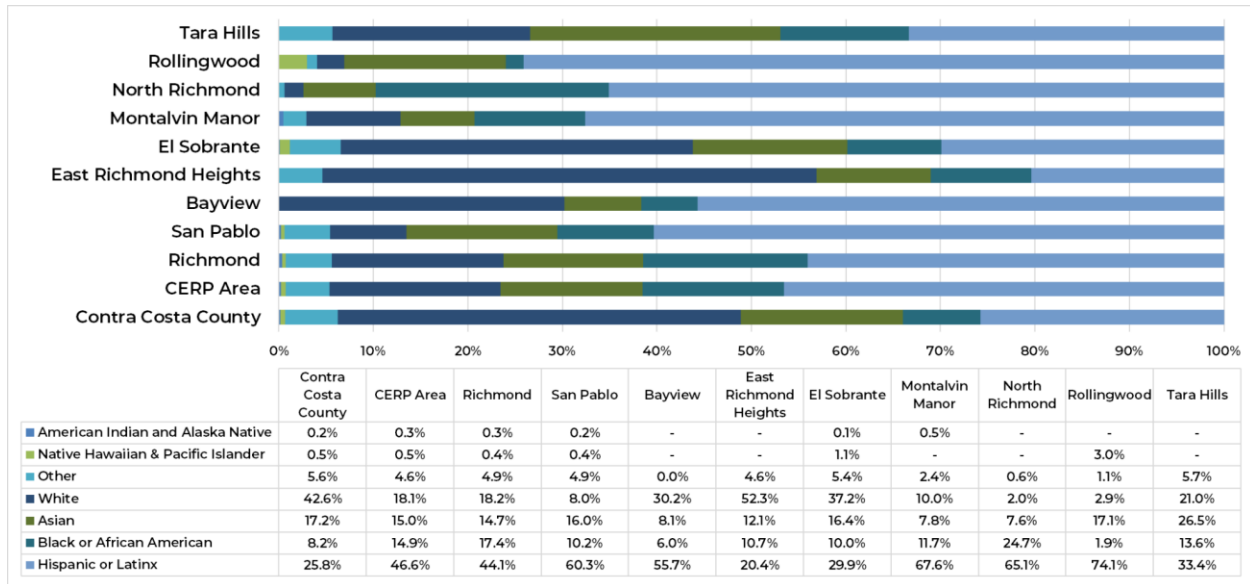

	Contra Costa County	CERP Area	Richmond	San Pablo	Bayview	East Richmond Heights	El Sobrante	Montalvin Manor	North Richmond	Rollingwood	Tara Hills
American Indian and Alaska Native	0.2%	0.3%	0.3%	0.2%	-	-	0.1%	0.5%	-	-	-
Native Hawaiian & Pacific Islander	0.5%	0.5%	0.4%	0.4%	-	-	1.1%	-	-	3.0%	-
Other	5.6%	4.6%	4.9%	4.9%	0.0%	4.6%	5.4%	2.4%	0.6%	1.1%	5.7%
White	42.6%	18.1%	18.2%	8.0%	30.2%	52.3%	37.2%	10.0%	2.0%	2.9%	21.0%
Asian	17.2%	15.0%	14.7%	16.0%	8.1%	12.1%	16.4%	7.8%	7.6%	17.1%	26.5%
Black or African American	8.2%	14.9%	17.4%	10.2%	6.0%	10.7%	10.0%	11.7%	24.7%	1.9%	13.6%
Hispanic or Latinx	25.8%	46.6%	44.1%	60.3%	55.7%	20.4%	29.9%	67.6%	65.1%	74.1%	33.4%

Figure 11. Race Within the PTCA Community. Source: Census Table B03002, HISPANIC OR LATINO ORIGIN BY RACE, Universe: Total population,2020-2016: ACS 5-Year Estimates Subject Tables. https://api.census.gov/data/2020/acs/acs5.
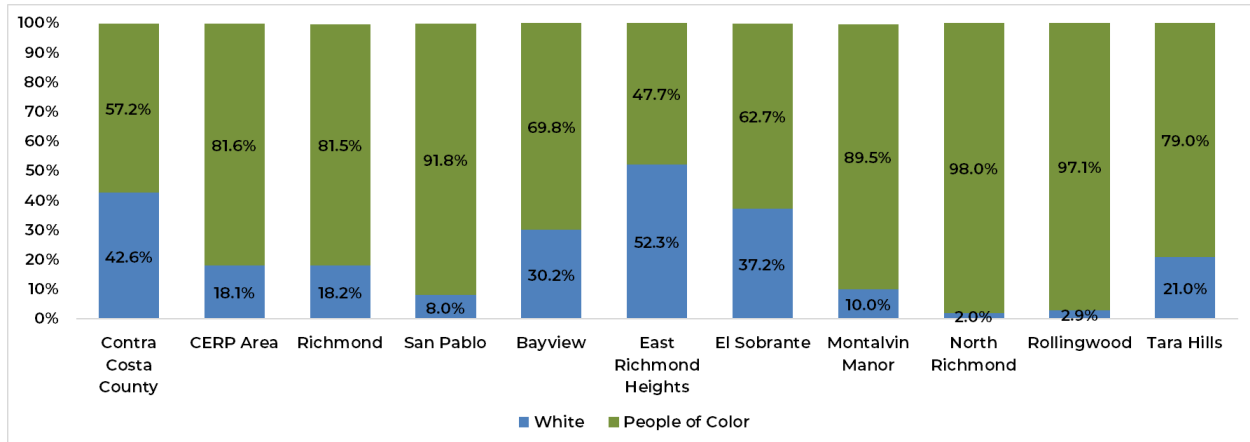

Figure 12. Race by Percent People of Color and Percent White Within the PTCA Community. Source: Census Table B03002, HISPANIC OR LATINO ORIGIN BY RACE, Universe: Total population, 2020-2016: ACS 5-Year Estimates Subject Tables. https://api.census.gov/data/2020/acs/acs5.

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[33] Source: Census Table P2, HISPANIC OR LATINO, AND NOT HISPANIC OR LATINO BY RACE, 2020, Decennial Census Redistricting Data, Census Blocks, https://www2.census.gov/programs-surveys/decennial/2020/data/

IV. Pollution Burden

Exposure

Communities of color and low-income communities across the United States experience higher exposure to air pollution than other communities, making air pollution exposure a national environmental justice issue.[34] [35] [36] This pattern holds true for the PTCA Community, where most census blocks within 1,000 feet of a freeway or railway have a population of 50% or more people of color (this excludes blocks with a population of zero) -- see Figure 13 below. Living or working near highly trafficked freeways, industries with emitted pollutants, railway and rail yards, and marine ports often lead to greater exposure to air pollutants, particularly to fine particulate matter of diameters smaller than 2.5 micrometers ($PM_{2.5}$), increasing the risk of adverse health effects.[37] The pollution burden is addressed in greater detail in the Technical Assessment section in Chapter 5.
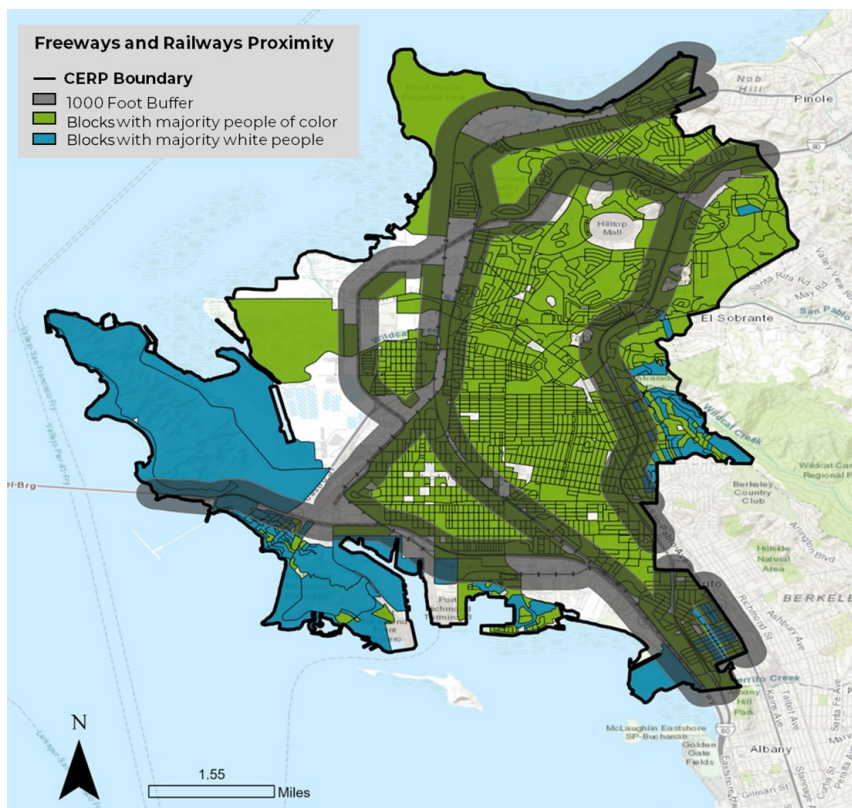
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[34] Environmental Defense Fund. *Analysis of PM2.5-Related Health Burdens Under Current and Alternative NAAQS*. 15 Apr. 2022, https://globalcleanair.org/files/2022/05/Analysis-of-PM2.5-Related-Health-Burdens-Under-Current-and-Alternative-NAAQS.pdf.

[35] Tessum, Christopher W., et al. "PM2. 5 Polluters Disproportionately and Systemically Affect People of Color in the United States." *Science Advances*, vol. 7, no. 18, 2021, p. eabf4491.

[36] Jbaily, Abdulrahman, et al. "Air Pollution Exposure Disparities across U.S. Population and Income Groups." *Nature*, vol. 601, no. 7892, 2022, pp. 228–33.

[37] U.S. EPA, ORD. *Research on Near Roadway and Other Near Source Air Pollution*. 16 July 2014, https://www.epa.gov/air-research/resarch-near-roadway-and-other-near-source-air-pollution.

Figure 13. Freeways and Railways Proximity to Census Block by Race. Source: Census Table P2, HISPANIC OR LATINO, AND NOT HISPANIC OR LATINO BY RACE, 2020, Decennial Census Redistricting Data, https://www2.census.gov/programs-surveys/decennial/2020/data/.

For many air pollutants, the Chevron Refinery is by far the largest single generator of emissions in the area. For example, Chevron emits more of the criteria air pollutants, such as fine particulate matter ($PM_{2.5}$) and sulfur dioxide, than all other sources in the community-scale emissions inventory combined, and the refinery is also the largest source of numerous toxic air contaminants, such as hydrogen cyanide, sulfuric acid, manganese, and hydrogen sulfide. Criteria air pollutants are six common air pollutants that the U.S. EPA has determined ambient air quality standards for ground-level ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead.[38] Toxic air contaminants are air pollutants that are known to increase the risk of cancer and/or other health effects.[39]

Of the neighborhoods close to the Chevron Refinery, only one has a majority white population - Point Richmond. The other Richmond neighborhoods near Chevron (North Richmond, the Iron Triangle, Atchison Village, Santa Fe, and Shields-Reid) have populations of at least 50% of people of color (excluding blocks with zero population) -- see Figure 14.

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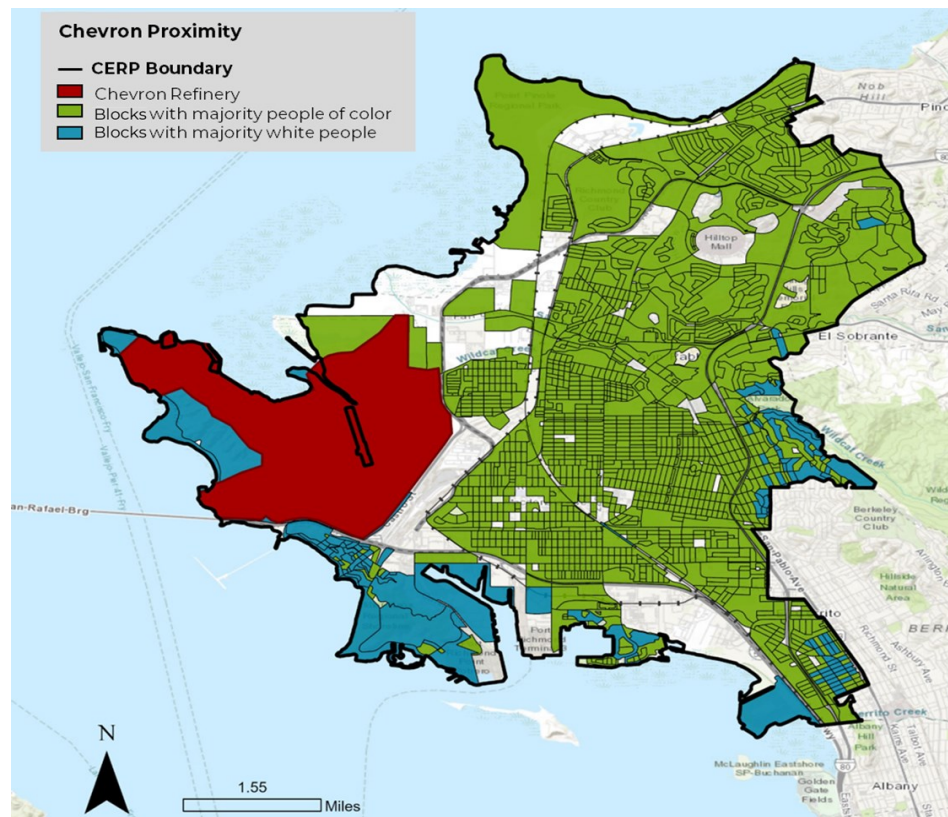
[38] *Criteria Air Pollutants*. CARB. (n.d.). https://ww2.arb.ca.gov/our-work/programs/criteria-air-pollutants/about
[39] *Toxic Air Contaminants*. Bay Area Air Quality Management District. (n.d.). https://www.Air District.gov/about-air-quality/research-and-data/emission-inventory/toxic-air-contaminants

Figure 14. Chevron Proximity to Census Block by Race. Source: Census Table P2, HISPANIC OR LATINO, AND NOT HISPANIC OR LATINO BY RACE, 2020, Decennial Census Redistricting Data, https://www2.census.gov/programs-surveys/decennial/2020/data/.

We can examine the Air District's Rule 6-5 analysis to investigate PM$_{2.5}$ exposure to Chevron emissions by race. Please note that while these results include the PTCA Community, they also include areas beyond the PTCA Community that are also exposed to Chevron emissions, as a larger modeling domain was used for Rule 6-5.

The analysis shows that, on average, African American/Black residents are the most exposed to PM$_{2.5}$ from Chevron in all modeled results, and white residents are the least exposed (see Figure 15 below). Sources other than the refinery Fluidized Catalytic Cracking Unit (FCCU), which is used in the refining process and results in air pollution emissions, drive these disparities.
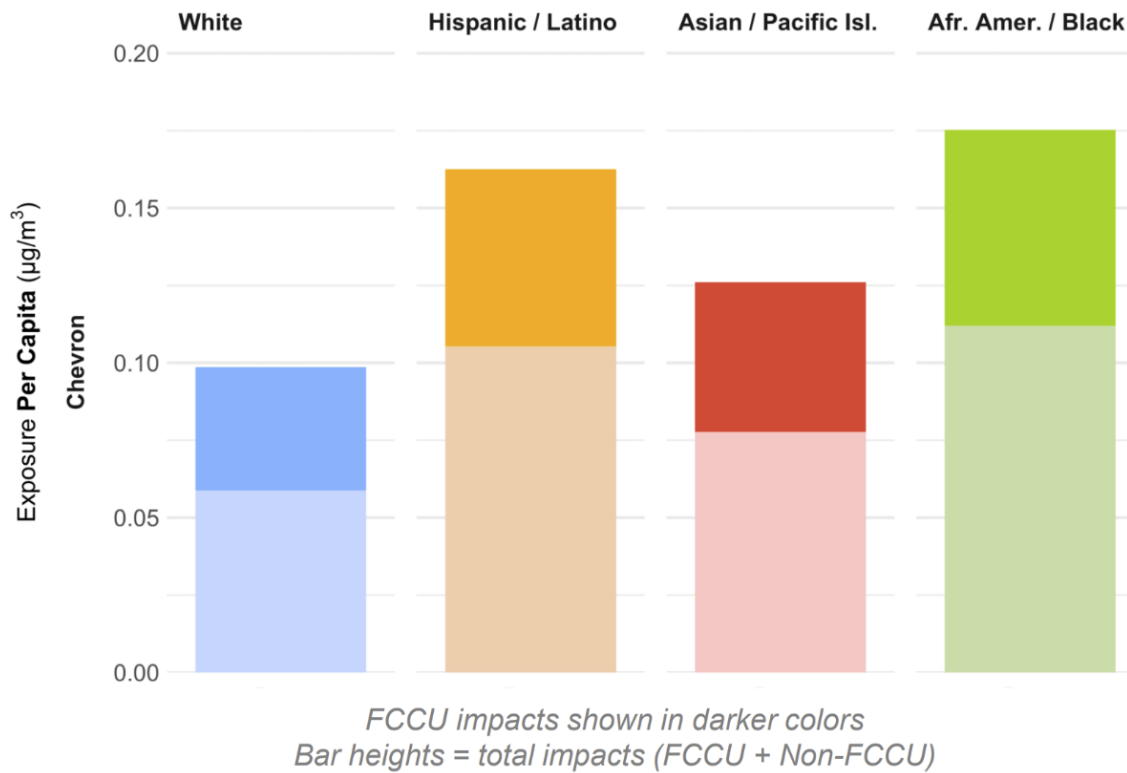

Figure 15. Disparities in PM$_{2.5}$ Exposure from Chevron. Source: Bay Area Air Quality Air District. See Figure 5-22 in Chapter 5. Disparities in PM$_{2.5}$ exposure resulting from emissions from the Chevron Refinery.

Pollution Comparisons

It is helpful to profile the differences between relatively non-industrial cities such as Concord and San Rafael and communities with industrial areas such as the PTCA Community and West Oakland. To make comparisons, we use CalEnviroScreen 4.0, a tool from OEHHA, which compares pollution burdens across census tracts throughout California.

CalEnviroScreen 4.0 shows us that over 32% of our PTCA Community census tracts are in the top quartile of California census tracts for pollution burden – a composite indicator – while Concord and San Rafael are less impacted by the pollution burden (see Figure 16 below).

Pollution Burden Percentile
Percentile of combined *Exposures* and *Environmental Effects* Indicators
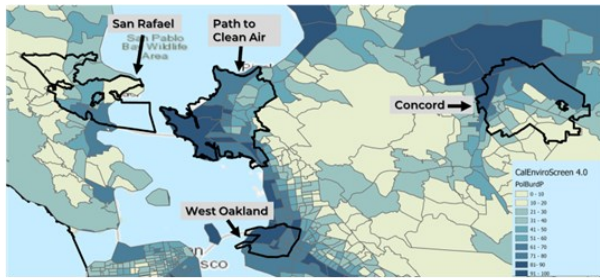
Pollution Burden Percentile

Most West Oakland's tracts rank as highly impacted percentiles (76th +) for *Pollution Burden* impact. Path to Clean Air tracts are distributed more equally across the 26% to 100% percentile range. Populations in these tracts have high cumulative exposures and hazards (see right).

Percentile	Path to Clean Air	West Oakland	Concord	San Rafael	Total Tracts
Low (0-25)	1	0	11	4	16
Medium (26-50)	8	0	8	4	20
Medium-High (51-75)	10	5	5	1	21
High (76-100)	9	8	1	2	20
Total Tracts	28	13	25	11	

Figure 16. Pollution Burden Percentiles.

CalEnviroScreen shows that over half of our PTCA Community census tracts are in the top quartile of California census tracts for toxic release emissions, as are other census tracts close to refineries such as Rodeo and parts of Martinez, while toxic emissions impact Concord and San Rafael less (see Figure 17 below).[40] It should be noted that other communities with refineries in Contra Costa County, such as Martinez and Rodeo, also have pollution burdens and health profiles almost identical to the half of our PTCA Community closest to the Chevron refinery. The strategies we recommend for our PTCA Community will be relevant to other refinery towns in California.

Toxic Releases from Facilities
Toxicity-weighted concentrations of modeled chemical releases to air from facility emissions and off-site incineration (averaged over 2017 to 2019)
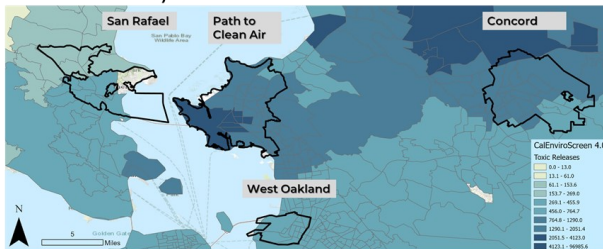
Toxic Releases Percentile

More than half of Path to Clean Air tracts rank as highly impacted percentiles (76th +). for the *Toxic Releases* Indicator. West Oakland tracts are largely in the 51-75th percentile range.
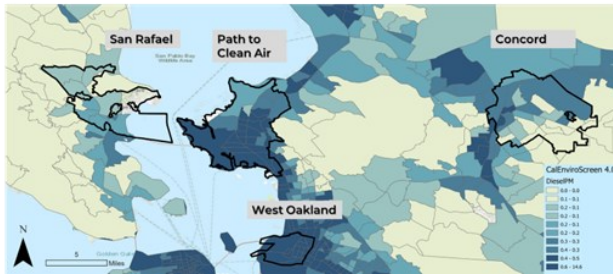
Percentile	Path to Clean Air	West Oakland	Concord	San Rafael	Total Tracts
Low (0-25)	0	0	0	0	0
Medium (26-50)	0	1	0	10	11
Medium-High (51-75)	13	12	25	1	51
High (76-100)	15	0	0	0	15
Total Tracts	28	13	25	11	

Figure 17. Toxic Releases from Facilities and Toxic Releases Percentile.

16% of census tracts in Concord are in the top quartile for DPM emissions, and San Rafael does not have any census tracts in the top quartile (see Figure 18 below). Our PTCA Community and West Oakland are far more impacted.

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[40] August, Laura. "CalEnviroScreen 4.0." OEHHA, 20 Sept. 2021, https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.

Diesel Particulate Matter
Spatial distribution of gridded diesel PM emissions from on-road and non-road sources 2016 (tons/year).

Diesel Particulate Matter Percentile

All West Oakland tracts rank as highly impacted percentiles (76th +) for the *Diesel Particulate Matter* Indicator. More than half of Path to Clean Air tracts also rank as highly impacted percentiles.

Percentile	Path to Clean Air	West Oakland	Concord	San Rafael	TOTAL
Low (0-25)	0	0	8	2	10
Medium (26-50)	1	0	7	4	12
Medium-High (51-75)	6	0	6	5	17
High (76-100)	21	13	4	0	38
	28	13	25	11	

NOTE: Diesel PM emissions in CalEnviroScreen are from 2016 and won't necessarily match up with the BAAQMD 2019 inventory developed for the PTCA study area. However, the percentiles discussed here won't likely change much whether 2016 or 2019 DPM emissions were used.

Figure 18. DPM and DPM Percentile.

The CalEnviroScreen 4.0 database shows all comparison geography census tracts as mostly average or below average in terms of PM$_{2.5}$ measurements (see Figure 19 below). However, the CalEnviroScreen 4.0 PM index is an estimate of the total annual average concentration, so local emissions contributions, concentrations, and exposures will look different (see Chapter 5 for more information).

PM 2.5
Annual mean concentration of PM2.5 (weighted average of measured monitor concentrations and satellite observations, µg/m3), over three years (2015 to 2017).

PM2.5 Percentile

None of Path to Clean Air tracts rank in the top 50 percentiles for the *PM2.5* Indicator.

Percentile	Path to Clean Air	West Oakland	Concord	San Rafael	Total Tracts
Low (0-25)	0	0	0	11	11
Medium (26-50)	28	9	25	0	62
Medium-High (51-75)	0	4	0	0	4
High (76-100)	0	0	0	0	0
Total Tracts	28	13	25	11	

NOTE: CARB, local air pollution control districts, tribes and federal land managers all maintain a wide network of air monitoring stations in California. However, in the Bay Area, the Bay Area Air Quality Management District maintains the network of air monitoring stations throughout.

Figure 19. PM$_{2.5}$ and PM$_{2.5}$ Percentile.

When looking at our local Emissions Inventory, Concord is similar to San Rafael, and both are very different from the PTCA Community and West Oakland regarding toxic air contaminants. We would like more data on which toxic air contaminants (TACs) are present and at what levels. TACs include DPM, ammonia, arsenic, nickel, formaldehyde, hydrogen cyanide, hydrogen sulfide, sulfuric acid, manganese, arsenic, and diethanolamine.

Table 1. Pollution Comparisons - Permitted Sources from Air District Emissions Inventories.

Metric	PTCA Community	San Rafael	Concord	West Oakland
Population	159,000	61,000	125,000	26,000
Permitted Sources	303	146	153	205
TACs in Inventory	79	33	23	50

Metric	PTCA Community	San Rafael	Concord	West Oakland
TAC Emissions (tons per year)	284.1	7.1	7.3	31.7
PM$_{2.5}$ Emissions (tons per year)	502.8	7.6	0.7	17.8

Note: The number of permitted sources includes large and small businesses.

The PTCA Community is exposed to more chemical emissions that are absent or are only present in very small amounts in San Rafael and Concord, cities that have less industrial land use and fewer industrial activities. The comparisons might look different for largely suburban cities like Walnut Creek or San Ramon without industrial sources of air pollution.

Table 2. TAC Emissions Comparisons - Permitted Sources from Air District Emission Inventories.

	Emissions (lbs./year)			
Pollutant	PTCA Community	San Rafael	Concord	West Oakland
Manganese	2,282.87	0.07	0.04	N/A
Nickel Compounds	300.44	0.80	0.51	0.07
Sulfuric Acid	18,134.12	N/A	7.03	N/A
Hydrogen Cyanide	91,667.17	N/A	N/A	N/A
Hydrochloric Acid	33,846.32	7.06	N/A	124.70
Formaldehyde	21,920.19	145.15	158.34	3,073.31
Benzene	7,001.52	138.57	241.35	1,467.77
Arsenic	32.25	0.02	0.01	0.05
Diethanolamine	2,994.27	N/A	N/A	N/A
Hydrogen Sulfide	8,716.54	N/A	N/A	4,923.07

The attributable number of deaths, premature deaths, and cases of disease related to air pollution can be found in academic literature.[41] [42] [43] While it is not a part of Air District's methodologies for CERPs currently, estimates of attributable numbers of premature death and new cases of disease from air pollution would be valuable information for the PTCA Community and would help measure the health impacts of air pollutants for community members.

Air pollution exposure from sources like freeways, railways, and Chevron, along with other factors such as noise pollution, can potentially repress housing prices as buyers reject 'unhealthy' neighborhood environments. As air pollution affects property values, it can also lower property tax revenues received by cities and counties, making them less able to provide services and programs that mitigate or reduce air pollution.

V. Health Impacts

Exposure to air pollution increases the risk of numerous diseases and health issues. Reducing air pollution exposure to protect our community members' health is a primary purpose of our PTCA Plan.

Health outcomes in the U.S. also are closely linked with economic, social, and environmental advantages or disadvantages, which can result in disparities or inequities between groups of people and their health outcomes - such as higher mortality rates. Health disparities adversely affect people who have experienced systematic social or economic obstacles to health care and healthy environments based on their racial or ethnic group, socioeconomic status, gender, age, mental health or ability, and other characteristics linked to discrimination or exclusion. In the United States, research on air pollution disparities shows that census tracts with a majority of people of color or low-income populations are correlated with increased exposure to fine particulate matter ($PM_{2.5}$).[44] Academic literature also documents that in the U.S., people of color and low-income people have a higher risk of death from being exposed to $PM_{2.5}$.[45] [46] [47] [48] The burden of death attributed to $PM_{2.5}$ is especially high for Black and Hispanic populations.[49] Racist and exclusionary practices, such as redlining and racial covenants, have systematically

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[41] Southerland, Veronica A., et al. "Assessing the Distribution of Air Pollution Health Risks within Cities: A Neighborhood-Scale Analysis Leveraging High-Resolution Data Sets in the Bay Area, California." *Environmental Health Perspectives*, vol. 129, no. 3, p. 037006. *ehp.niehs.nih.gov (Atypon)*, https://doi.org/10.1289/EHP7679.

[42] Environmental Defense Fund. *Analysis of PM2.5-Related Health Burdens Under Current and Alternative NAAQS*. 15 Apr. 2022, https://globalcleanair.org/files/2022/05/Analysis-of-PM2.5-Related-Health-Burdens-Under-Current-and-Alternative-NAAQS.pdf.

[43] Anenberg, Susan C., et al. "Particulate Matter-Attributable Mortality and Relationships with Carbon Dioxide in 250 Urban Areas Worldwide." *Scientific Reports*, vol. 9, no. 1, 1, Aug. 2019, p. 11552. *www.nature.com*, https://doi.org/10.1038/s41598-019-48057-9.

[44] Colmer, Jonathan, et al. "Disparities in *PM2.5* air pollution in the United States." *Science* 369.6503 (2020): 575-578.

[45] Di, Qian, et al. "Air Pollution and Mortality in the Medicare Population." *New England Journal of Medicine*, vol. 376, no. 26, 2017, pp. 2513–22.

[46] Bell, Michelle L., et al. "Evidence on Vulnerability and Susceptibility to Health Risks Associated with Short-Term Exposure to Particulate Matter: A Systematic Review and Meta-Analysis." American Journal of Epidemiology, vol. 178, no. 6, 2013, pp. 865–76.

[47] Wang, Yan, et al. "Long-Term Exposure to PM2. 5 and Mortality among Older Adults in the Southeastern U.S." *Epidemiology (Cambridge, Mass.)*, vol. 28, no. 2, 2017, p. 207.

[48] Kioumourtzoglou, Marianthi-Anna, et al. "PM2. 5 and Mortality in 207 U.S. Cities: Modification by Temperature and City Characteristics." *Epidemiology (Cambridge, Mass.)*, vol. 27, no. 2, 2016, p. 221.

[49] Environmental Defense Fund. *Analysis of PM2.5-Related Health Burdens Under Current and Alternative NAAQS*. 15 Apr. 2022, https://globalcleanair.org/files/2022/05/Analysis-of-PM2.5-Related-Health-Burdens-Under-Current-and-Alternative-NAAQS.pdf.

located people of color and low-income people near sources of air pollution, leading to high levels of exposure and health disparities.[50] [51]

Social determinants of health (SDH) are social conditions that influence health outcomes. The World Health Organization states SDHs are a "[...] set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies, and political systems. [...] Research shows that the social determinants can be more important than health care or lifestyle choices in influencing health."[52]

As an example, note that health insurance coverage is a social determinant of health (SDH), as possessing health insurance increases access to health care and improves health outcomes.

In the PTCA Community, fewer people have health insurance coverage than in Contra Costa County (see Figure 20 below).
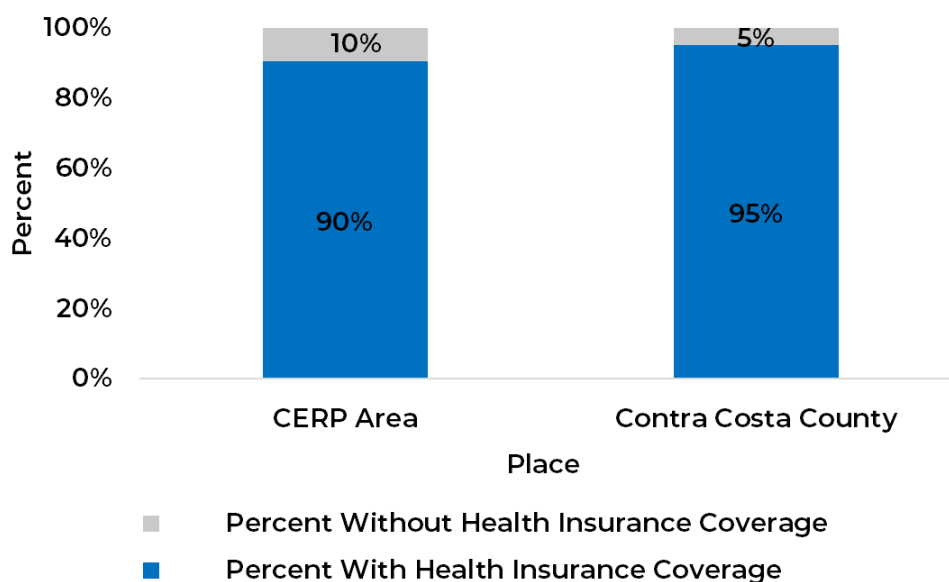
Figure 20. Health Insurance Coverage in the PTCA Community and Contra Costa County. Source: Census Table DP03, SELECTED ECONOMIC CHARACTERISTICS, 2020-2016: ACS 5-Year Estimates Subject Tables. https://api.census.gov/data/2020/acs/acs5/profile.

Air pollution damages not only the lungs and airways but also other organs in the body. A study by the Forum of International Respiratory Societies in 2019 estimated that "[...] about 500,000 lung cancer deaths and 1.6 million COPD [chronic obstructive pulmonary disease] deaths can be attributed to air pollution, but air pollution may also account for 19% of all cardiovascular

[50] Lane, Haley M., et al. "Historical Redlining Is Associated with Present-Day Air Pollution Disparities in U.S. Cities." *Environmental Science & Technology Letters* 9.4 (2022): 345-350.
[51] Hajat, Anjum, Charlene Hsia, and Marie S. O'Neill. "Socioeconomic disparities and air pollution exposure: a global review." *Current environmental health reports* 2.4 (2015): 440-450.
[52] Social Determinants of Health. https://www.who.int/health-topics/social-determinants-of-health. Accessed 18 May 2022.

deaths and 21% of all stroke deaths."[53] Air pollution also has been linked to poor cognitive function, increased risk of dementia, allergic responses, diabetes mellitus prevalence, morbidity, and mortality. Air pollution is primarily a man-made phenomenon, and therefore, it and its health effects are potentially preventable. (ibid) Air pollution is especially harmful to fetuses and children and has been linked to childhood leukemia, delayed psychomotor development, lower child intelligence, and stunted lung development in childhood – a predictor for lung impairment in adults. (ibid) For children, $PM_{2.5}$ has been associated with an increased incidence of ADHD.[54] Ultrafine particulate matter (PM0.1) exposure for pregnant women may increase the risk of low birth weight, especially in those living within 50 meters of heavy traffic.[55]

Life Expectancy

Life expectancy is arguably the most important measure of health, broadly speaking. Epidemiological studies from the 1990s analyzed the correlation between PM exposure and premature mortality, finding that long-term exposure to PM is associated with an increased risk of death by all cardiovascular causes.[56] This conclusion suggests that reducing PM levels would prevent premature deaths and extend average life expectancy. In 2009, Pope et al. examined data on life expectancy and other socioeconomic and demographic characteristics in addition to fine particulate matter air pollution concentrations for 211 counties in 51 metropolitan areas in the United States between the late 1970s and the early 2000s.[57] This study found that a 10 μg per cubic meter decrease in fine particulate matter concentration was associated with an increase in average life expectancy of 0.61±0.20 years, or approximately 7.3 (±2.4) months. Further, this study concluded that reductions in air pollution contributed to significant and measurable improvements in United States life expectancy, accounting for up to 15% of the overall increase in life expectancy in the study areas.[58] In a separate data analysis from 1990 to 2008, Bay Area Air Quality Management District staff similarly estimated that air quality improvements increased the average life expectancy per person in the Bay Area by approximately six months.[59]

More recently, a 2019 study by the Public Library of Science estimated the health and longevity impacts of current $PM_{2.5}$ concentrations in the U.S., looking at life expectancy, among other impacts. It found that the estimated deaths from $PM_{2.5}$ "[...] would lower national life expectancy by an estimated 0.15 years (0.13–0.17) for women and 0.13 years (0.11–0.15) for men." A 2020 study published in *Cardiovascular Research* found that exposure to ambient air pollution is a leading cause of excess mortality and can cause a significant loss of life expectancy, mainly through cardiovascular and respiratory diseases.[60] This study utilized a data-informed atmospheric model and global exposure mortality model to analyze exposure to $PM_{2.5}$

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[53] Schraufnagel, Dean E., et al. "Air Pollution and Noncommunicable Diseases: A Review by the Forum of International Respiratory Societies' Environmental Committee, Part 2: Air Pollution and Organ Systems." Chest, vol. 155, no. 2, 2019, pp. 417–26.

[54] Yuchi, Weiran, et al. "Neighborhood Environmental Exposures and Incidence of Attention Deficit/Hyperactivity Disorder: A Population-Based Cohort Study." Environment International, vol. 161, Mar. 2022, p. 107120. ScienceDirect, https://doi.org/10.1016/j.envint.2022.107120.

[55] Laurent, Olivier, et al. "Sources and contents of air pollution affecting term low birth weight in Los Angeles County, California, 2001–2008." *Environmental research* 134 (2014): 488-495.

[56] Bay Area Air Quality Management District. (2012). *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area*.

[57] Pope, C. A., Ezzati, M., & Dockery, D. W. (2009). Fine-particulate air pollution and life expectancy in the United States. *New England Journal of Medicine*, 360(4), 376–386. https://doi.org/10.1056/nejmsa0805646

[58] Ibid.

[59] Bay Area Air Quality Management District. (2012). Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area.

[60] Lelieveld, J., Pozzer, A., Pöschl, U., Fnais, M., Haines, A., & Münzel, T. (2020). Loss of life expectancy from air pollution compared to other risk factors: A worldwide perspective. *Cardiovascular Research*, 116(11), 1910–1917. https://doi.org/10.1093/cvr/cvaa025

and loss of life expectancy in comparison to other global risk factors and concluded that the loss of life expectancy due to $PM_{2.5}$ exposure "surpasses that of HIV/AIDS, parasitic, vector-borne, and other infectious diseases by a large margin" and "exceeds the [loss of life expectancy] due to all forms of violence by an order of magnitude and that of smoking by a third."[61]

The 2019 study by the Public Library of Science also found that in the U.S., "[a]t any $PM_{2.5}$ concentration, life expectancy loss was, on average, larger in counties with lower income and higher poverty rate than in wealthier counties."[62] In the U.S., poverty rates in 2020 were highest for Black (19.5%) and Hispanic (17%) people. This is compared to 8.2% of white people in poverty, and 8.1% of Asian people in poverty.[63] In sum, exposure to air pollution is associated with a reduced life expectancy, and low-income people of color can be expected to bear the brunt of this effect.
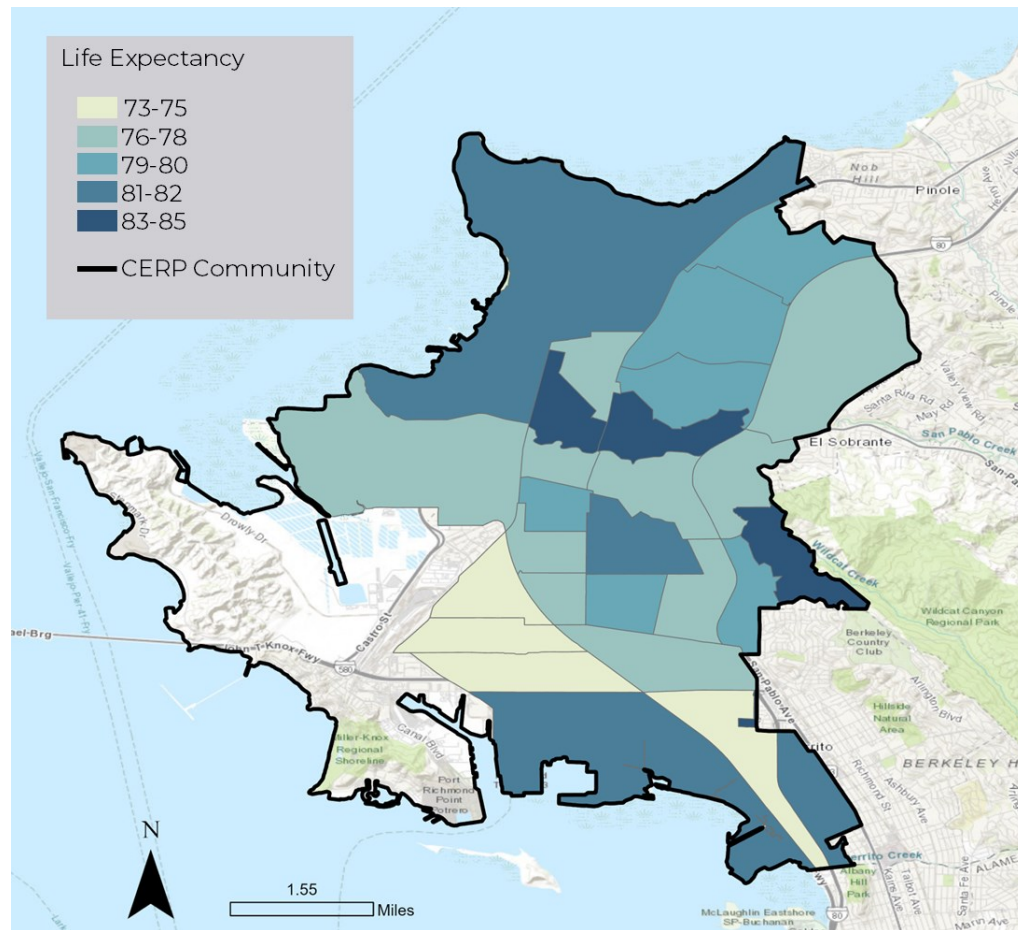
Figure 21. Life Expectancy (2010-2015). National Center for Health Statistics. U.S. Small-Area Life Expectancy Estimates Project (USALEEP): Life Expectancy Estimates File for {Jurisdiction}, 2010-2015]. National Center for Health Statistics. 2018. Available from: https://www.cdc.gov/nchs/nvss/usaleep/usaleep.html.

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[61] Ibid.

[62] Bennett, James E., et al. "Particulate Matter Air Pollution and National and County Life Expectancy Loss in the USA: A Spatiotemporal Analysis." PLOS Medicine, vol. 16, no. 7, July 2019, p. e1002856. PLoS Journals, https://doi.org/10.1371/journal.pmed.1002856.

[63] Bureau, U.S. Census. "Income and Poverty in the United States: 2020." Census.Gov, https://www.census.gov/library/publications/2021/demo/p60-273.html. Accessed 5 July 2022.

In the PTCA Community, the lowest life expectancy is seen in the census tracts around the Iron Triangle neighborhood, an area with low median household income (see Figure 21 above). East Richmond Heights is the wealthiest part of the PTCA Community, and it has the highest life expectancy. The estimates below are older data from 2010-2015.

Mortality

In the PTCA Community, mortality rates *by race* – the number of deaths in a population for a given time period – are only available for the cities of Richmond and San Pablo (combined) and Contra Costa County. Due to census data limitations, we must use crude mortality rates, which are based solely on the populations of Richmond and San Pablo, are not adjusted and, therefore, cannot be compared to other geographies. Looking at crude rates for various mortality indicators related to air pollution, we see that Black residents, followed by white residents, in Richmond and San Pablo have the highest rates (see Figure 22 below). * Black residents in Contra Costa County, which includes the PTCA Community, also have the highest rates of asthma emergency department visits. Note that when the numbers of American Indians or Alaskan Native (AIAN) are significant (over ten) and can be reported, such as for mortality, their rates are very high as well.

Age-adjusted rates are preferable to crude rates. However, age-adjusted rates require decennial census detailed tables that include specific age breakdowns. Age-adjusting rates are a way to make fairer comparisons between groups with different age distributions. For example, Contra Costa County has a higher percentage of elderly people and, therefore, may have a higher rate of death or hospitalization than the PTCA Community with its younger population because the elderly are more likely to die or be hospitalized. Keep this caveat in mind when looking at the crude rates in the following graphs.
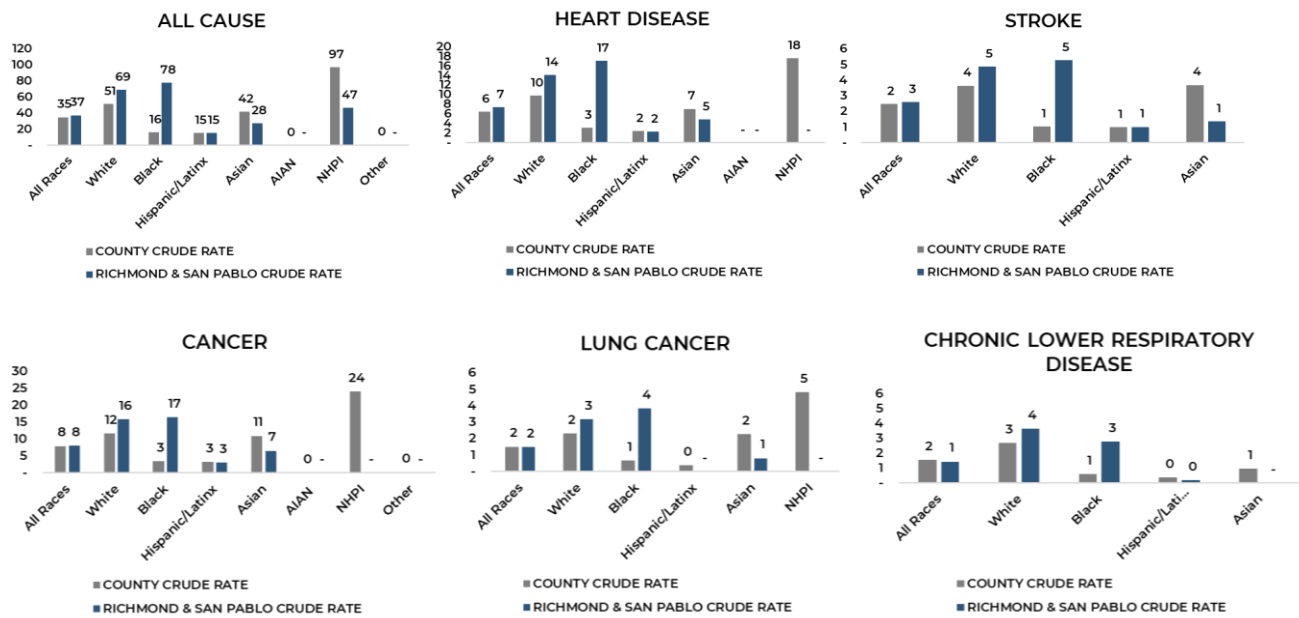

Figure 22. Mortality Rates by Race for Air Pollution-Related Diseases (rates are per 1,000 people) Sources: Mortality numbers are from the California Comprehensive Death Files 2016,2017,2018,2019,2020 Access through Vital Registration Business Information System 8/2021. Population information is from the census: 2Table B03002 HISPANIC OR LATINO ORIGIN BY RACE 2020, 2020-2016 ACS 5-year estimates.

Note: All rates per 1,000 people. All measures associated with counts < 11 are excluded for data de-identification purposes.

Low Birth Weight

An article from 2017 describes low birth weight as "[...] associated with long-term neurologic disability, impaired language development, impaired academic achievement, and increased risk of chronic diseases including cardiovascular disease and diabetes."[64] Prenatal exposure to air pollutants, especially $PM_{2.5}$, is associated with an increased risk of low birth weight.[65]

Within Richmond and San Pablo, Black, and Asian residents have the highest rates of low-birth-weight births (see Figure 23 below). For most races, the rates for Richmond and San Pablo are the same or higher than the county rates.
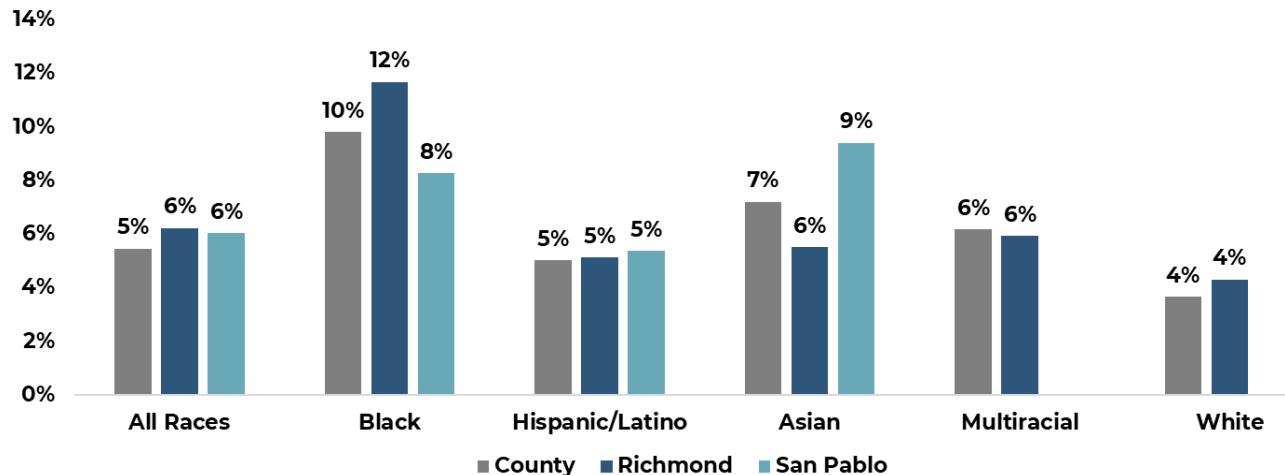
Figure 23. Percent of Low-Weight Births by City, Contra Costa County, and Race. Source: Provided by the Contra Costa County Health Department, California Comprehensive Birth Files 2016, 2017,2018, 2019, 2020, accessed through Vital Registration Business Information System 8/2021

Note: Percent of Singleton Live Births with Birthweight < 2500g.

Asthma

For asthma, emergency department visit rates are the most common indicator of severe asthma events. For ordinary or daily asthma data we have no comprehensive data. For example, there is no automated or centralized tracking of variables like children's daily inhaler use. The rate of asthma emergency department visits by race and age are only available for the PTCA Community by ZIP code. See below for a reference map of the ZIP code areas inside the PTCA boundary.

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[64] Cutland, Clare L., et al. "Low Birth Weight: Case Definition & Guidelines for Data Collection, Analysis, and Presentation of Maternal Immunization Safety Data." Vaccine, vol. 35, no. 48Part A, Dec. 2017, pp. 6492–500. PubMed Central, https://doi.org/10.1016/j.vaccine.2017.01.049.
[65] Li, Changlian, et al. "Maternal Exposure to Air Pollution and the Risk of Low Birth Weight: A Meta-Analysis of Cohort Studies." Environmental Research, vol. 190, Nov. 2020, p. 109970. ScienceDirect, https://doi.org/10.1016/j.envres.2020.109970.
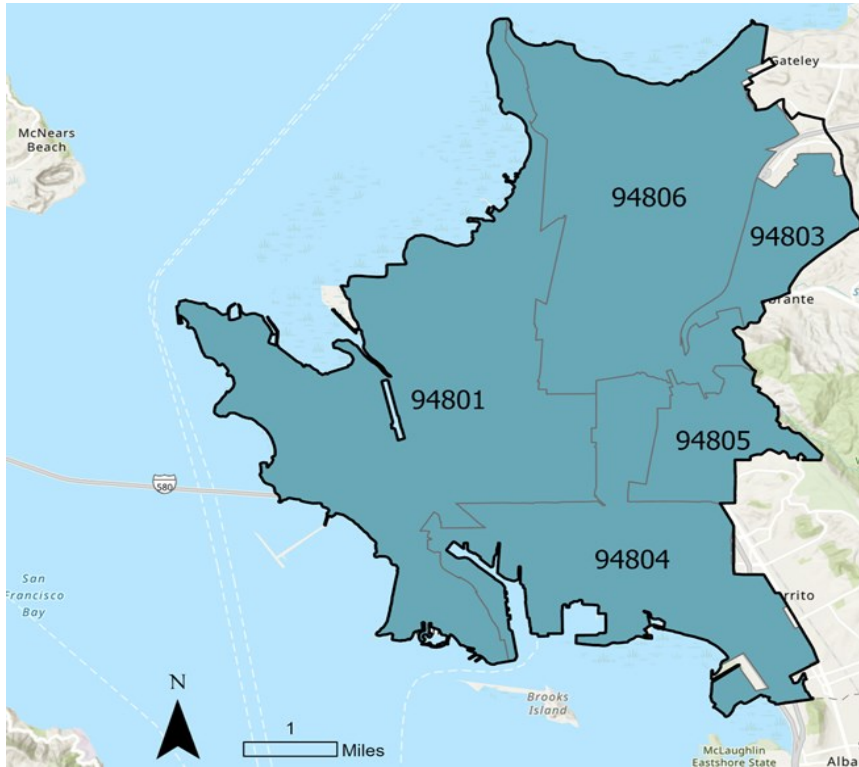
Figure 24. ZIP Code Areas inside the PTCA Boundary.

Black residents experience higher rates of asthma emergency department visits than all other racial groups (see Figure 25 below).
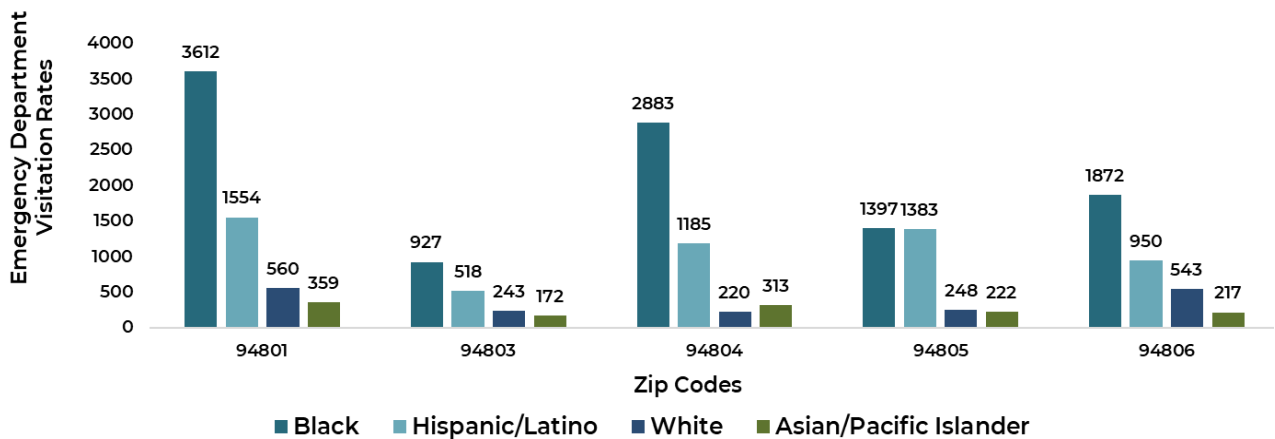

Figure 25. Asthma Emergency Department Visits by Race and Zip Code (Rate per 10,000 people between 2016-2020). Source: 2016-2020. CA Department of Public Health: https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/CPE/Pages/CaliforniaBreathingCountyAsthmaProfiles.aspx.

The rate of asthma emergency department visits by age for Contra Costa County for the years 2016 through 2020, shows that children under age five remain the most impacted group (Figure 26).
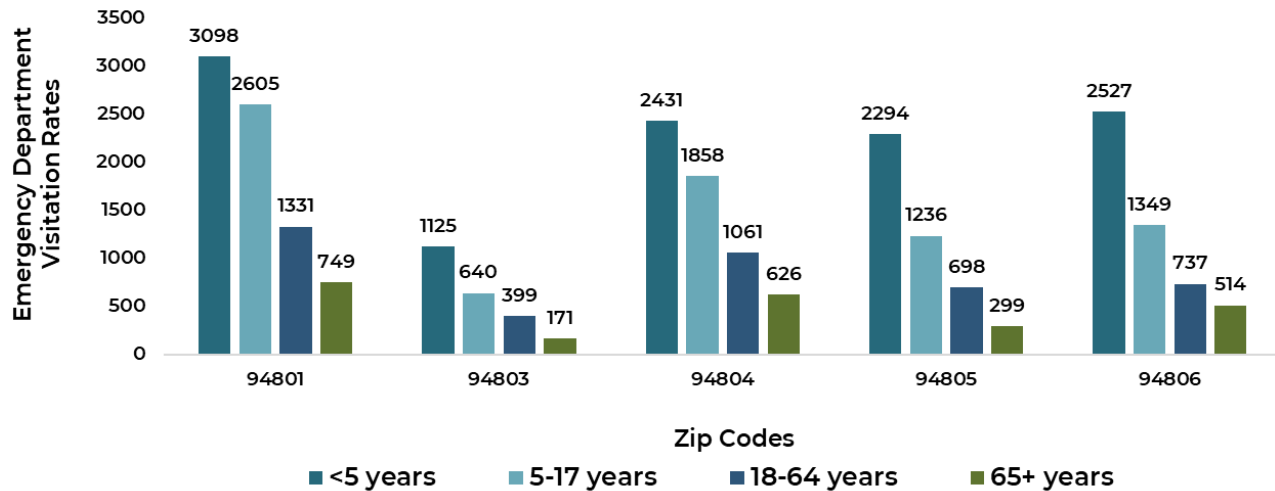
Figure 26. County Asthma Emergency Department Visits by Age (Rate per 10,000 people between 2016-2020). 2016-2020. CA Department of Public Health: https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/CPE/Pages/CaliforniaBreathingCountyAsthmaProfiles.aspx.

To look at asthma by census tract, we can use CalEnviroscreen's 2015-2017 spatially modeled age-adjusted rate of emergency department visits for asthma. Of the census tracts shown below (Figure 27) with the highest rates of emergency department visits for asthma, five and a half are below Area Mean Income (census tracts changed from 2010 to 2020 - some current 2020 census tracts are smaller than the 2010 tracts). In other words, the tracts with high asthma ED visits are also lower-income tracts.
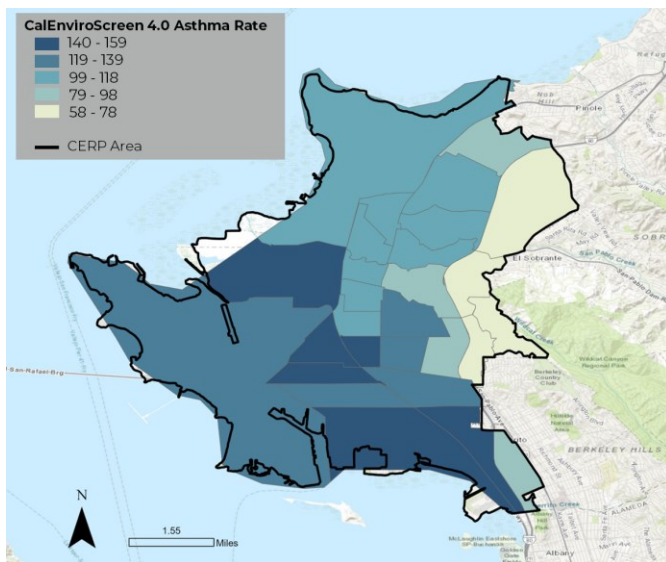
Figure 27. Asthma by Census Tract - CalEnviroScreen 4.0. Source: CalEnviroscreen 4.0. The spatially modeled age-adjusted rate of ED visits for asthma per 10,000 (averaged over 2015-2017). https://oehha.ca.gov/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf.

Note: Rates per 10,000 persons.

Health Comparisons

CalEnviroScreen 4.0, a California-wide index, is used here to compare three indicators of air quality-related health impacts across four geographic areas: the PTCA Community, Concord, San Rafael, and West Oakland.[66] West Oakland also has a PTCA and many air pollution issues. The indicators analyzed are low birth weight, asthma, and cardiovascular disease. The measurements for each are first, percent of low-birth-weight births (2009-2015), second, modeled age-adjusted rate of ED visits for asthma per 10,000 (averaged over 2015-2017), and third, modeled age-adjusted rate of emergency department (ED) visits for heart attacks (averaged over 2015-2017).[67]

When comparing the PTCA Community to the other geographies, we see that Concord and San Rafael fare better across all three indicators. Concord and San Rafael are not as impacted by air pollution. West Oakland is surrounded by freeways, bisected by a railway, and next to a heavily trafficked port. West Oakland has the most census tracts with high rates of low-birth-weight births.

Low Birth Weight Infants
Percent low birth weight (2009-2015)

Low Birth Weight Percentile

Almost all West Oakland's tracts rank as highly impacted percentiles (76th +) for Low Birth Weight outcomes. Half of all Path to Clean Air census tracts are highly impacted.

Percentile	Path to Clean Air	West Oakland	Concord	San Rafael	Total Tracts
Low (0-25)	1	1	9	3	14
Medium (26-50)	6	1	8	6	21
Medium-High (51-75)	6	0	4	1	11
High (76-100)	15	9	4	1	29
Total Tracts	28	11*	25	11	

*Some tracks are not included due to insignificant data

Figure 28. Low Birth Weight Infants and Low Birth Weight Percentile.

The PTCA Community has the most census tracts in the top quartile for cardiovascular disease emergency department visits (see Figure 29 below). Note that cardiovascular disease is measured in the CalEnviroScreen 4.0 as a function of heart attack emergency room visits.

Cardiovascular Disease
Spatially modeled, age-adjusted rate of emergency department (ED) visits for heart attacks (averaged over 2015-2017)

Cardiovascular Disease Percentile

Path to Clean Air has the most tracts rank as highly impacted percentiles (76th +) for heart attacks emergency room department visit rates.

Percentile	Path to Clean Air	West Oakland	Concord	San Rafael	Total Tracts
Low (0-25)	0	2	6	5	13
Medium (26-50)	5	4	12	6	27
Medium-High (51-75)	14	7	2	0	23
High (76-100)	9	0	5	0	14
Total Tracts	28	13	25	11	

Figure 29. Cardiovascular Disease and Cardiovascular Disease Percentile.

[66] August, Laura. "CalEnviroScreen 4.0." *OEHHA*, 20 Sept. 2021, https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.
[67] CalEnviroScreen 4.0, October 2021, https://oehha.ca.gov/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf)

Both West Oakland and the PTCA Community have many tracts with high rates of asthma emergency department visits (Figure 30). Seventy percent of our PTCA Community's census tracts are in the top ten percent for asthma state-wide, and all West Oakland's census tracts are in the top ten percent. However, West Oakland is a smaller geographic area than the PTCA Community. It is worth noting that asthma emergency room visit rates are high in tracts with high percentages of low-birth-weight rates.

Figure 30. Asthma and Asthma Percentile.

Chronic obstructive pulmonary disease (COPD) and other respiratory problems (including low-grade asthma in children) are not addressed in the CalEnviroScreen 4.0 database. Broadly speaking, the data we have documented for health problems in the PTCA Community could be more detailed. For example, it would be beneficial to have data on how many children are using inhalers for asthma by the school or census tract, how many new cases of childhood asthma are diagnosed every year, and how many adults are being treated for chronic obstructive pulmonary disease (COPD). Additionally, organizations tracking all types of pollution may have underestimated the significance of DPM emissions and exposure, as well as the number of abandoned industrial and hazardous waste sites because some of these hazardous waste sites could leak VOCs and other toxins into groundwater, the Bay, and the air.

West Oakland and the PTCA Community also share very high exposures to lead, clean-up sites contaminated with harmful chemicals, and hazardous waste.[68] It is likely that this combination of exposures increases the risk for many health issues. Comparisons like this show that the PTCA Community is not only highly burdened with air pollution-related disease compared to the state but also is highly burdened with air pollution-related disease compared to other geographies in the Bay Area.

Food Access

Limited access to healthy affordable food is often measured by proximity to food stores, income, and the financial ability to buy healthy food, and the ability to travel to a grocery store. Proximity, income, and the ability to travel to grocery stores make it more difficult for people to eat a healthy diet and therefore put people at risk for various health issues.

To demonstrate food access and lack of food access, we will use data from the USDA's Food Access Research Atlas which uses 2019 grocery store data.[69] The following maps (see Figure 31 below) show low-income census tracts in Contra Costa County and the PTCA Community with

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[68] August, Laura. "CalEnviroScreen 4.0." *OEHHA*, 20 Sept. 2021, https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.
[69] USDA ERS - Go to the Atlas. https://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas/. Accessed 26 May 2022.

at least 500 people, *or* 33 percent of the population in the tract, living more than one-half mile from the nearest supermarket, supercenter, or large grocery store.[70] In the map below, the cross-hatching denotes a low-income tract where at least 100 households or more live one-half mile from the nearest supermarket *and* have no access to a vehicle. Low-income tracts are defined by one of the following conditions:

- The tract's poverty rate is 20 percent or greater, or

- The tract's median family income is less than or equal to 80 percent of the State-wide median family income, or

- The tract is in a metropolitan area and has a median family income less than or equal to 80 percent of the metropolitan area's median family income. (Ibid)

In Contra Costa County, the PTCA Community, Martinez, Pittsburgh, Antioch, and Concord all have low-income and low-food access census tracts, with many people residing more than half a mile from a grocery store. However, the PTCA Community has the most census tracts where a significant number of households have low food access *and* no car access – potentially hindering their ability to travel to a grocery store.

PTCA Community   **Contra Costa County**
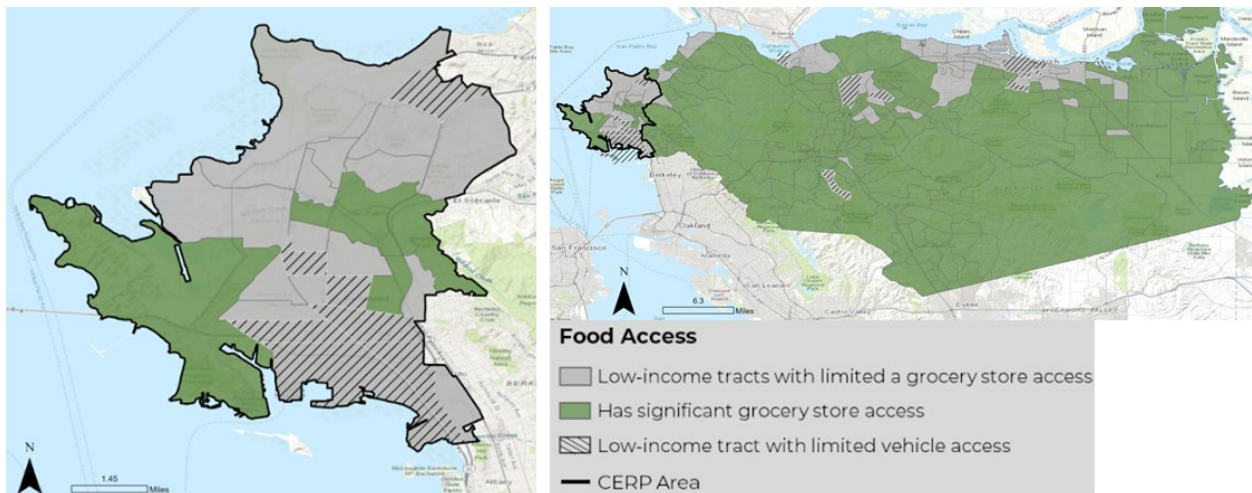

Figure 31. Census Tracts with Limited Food Access, Lower-Incomes, and Limited Car Access. Sources: In the Food Access Research Atlas, a directory of supermarkets, supercenters, and large grocery stores within the United States was derived from merging the 2019 STARS directory of stores authorized to accept SNAP benefits and the 2019 Trade Dimensions TDLinx directory of stores. Population data are from the 2010 Census of Population and Housing. These data were aerially allocated down to ½-kilometer-square grids across the United States. For each ½-kilometer-square grid cell, the distance was calculated from its geographic center to the center of the grid cell with the nearest supermarket. Income data are from the 2014-18 American Community Survey's tract estimates. Rural or urban status is designated by the Bureau of the Census 2019 urban area definition.

VI. Income Distribution

Area Median Income (AMI) is the income of families in the exact middle of the income distribution (half above and half below), with adjustments for family size. For the 2017-2020

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[70] USDA ERS - Documentation. 24 May 2021, https://www.ers.usda.gov/data-products/food-access-research-atlas/documentation/.

period, the AMI for households in Contra Costa County was $103,599.[71] Low-income families are those with incomes that earn less than 50 percent of the area median income, so for a family of four, that is less than $51,780 in Contra Costa County.[72] In the PTCA Community, 66% of households make under the AMI ($103,566), and 34% make at or above the AMI.[73] In the PTCA Community 33% of households are low-income and make less than half of the AMI. In Alameda County, about 25% of households are low-income and make less than half of the AMI.[74]

As mentioned above, the median identifies the income in the middle of the sample for every year, half of the incomes are higher, and half is lower. We can use census median income to compare geographies within the PTCA Community (Figure 32). Doing this, we see that Bay View and El Sobrante are close to the County's median household income, Richmond Heights is above the County's median income, and all others are below. Contra Costa County, Bayview, El Sobrante, and Richmond Heights all have the highest percentage of white residents.
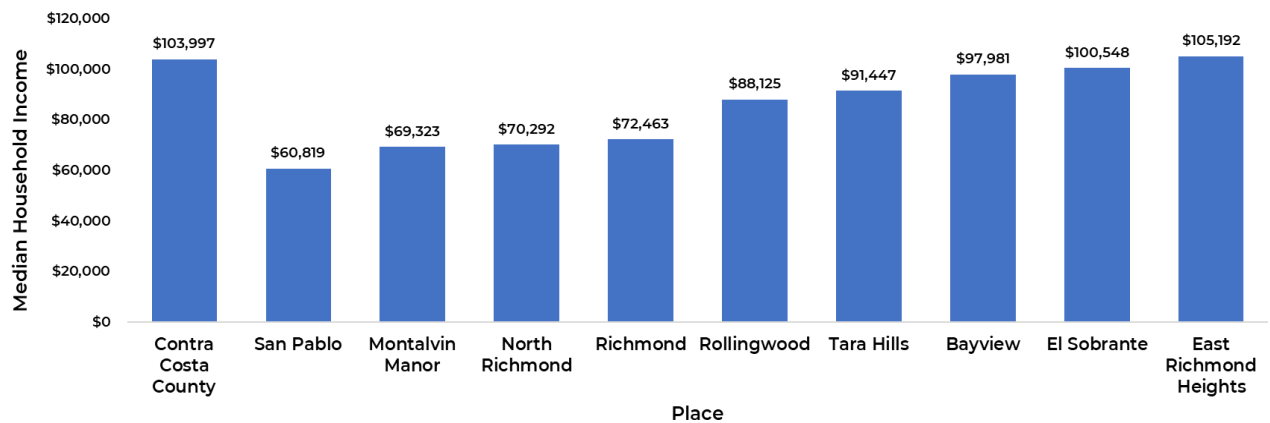

Figure 32. Median Household Income (2020 inflation-adjusted dollars). Source: Census Table S1903, MEDIAN INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS), Universe: Households, 2020-2016: ACS 5-Year Estimates Subject Tables. https://api.census.gov/data/2020/acs/acs5/subject.

The mean is the average across all families or the average income for individuals. The mean income value answers the question: "If income would be equally distributed to everyone or every family, how much would be earned?" For individuals' income, also called per capita income, the mean income within the PTCA Community (Figure 33) was highest for white people. Please note that the 'Hispanic / Latinx' category potentially overlaps with all other racial groups except the white racial group. Some data are unavailable for the following census groups: American Indian, Alaska Native and Native Hawaiian, and Other Pacific Islander groups.

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[71] https://www.huduser.gov/portal/datasets/il.html#2020. Area Median Income is based on a The Department of Housing and Urban Development (HUD) calculation.
[72] "Who Is Low-Income and Very Low Income in the Bay Area?," Ángel Mendiola Ross and Sarah Treuhaft, September 21, 2020, https://bayareaequityatlas.org/node/60841
[73] Census Table B19001, MEDIAN INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS), Universe: Households, 2020-2016: ACS 5-Year Estimates Subject Tables.
[74] Census Table B19001, MEDIAN INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS), Universe: Households, 2020-2016: ACS 5-Year Estimates Subject Tables.
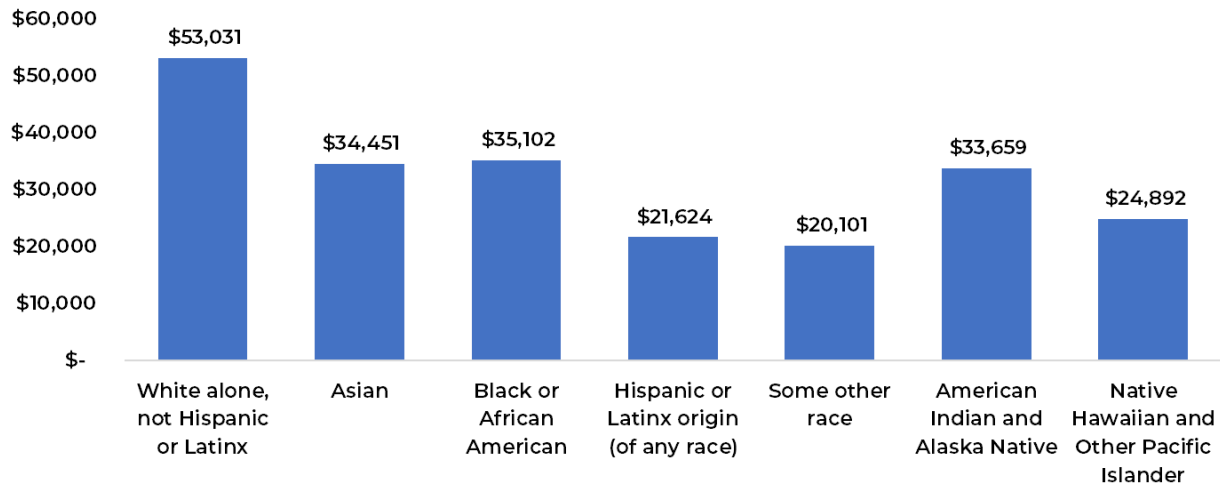
Figure 33. Mean Income Per Capita (2020 inflation-adjusted dollars). Source: Census Table S1902, MEAN INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS), 2020: ACS 5-Year Estimates Subject Tables. https://api.census.gov/data/2020/acs/acs5/subject.

By mapping the mean household income for all of Contra Costa County (Figure 34), we see that many census tracts within the PTCA Community are below the AMI for the County.
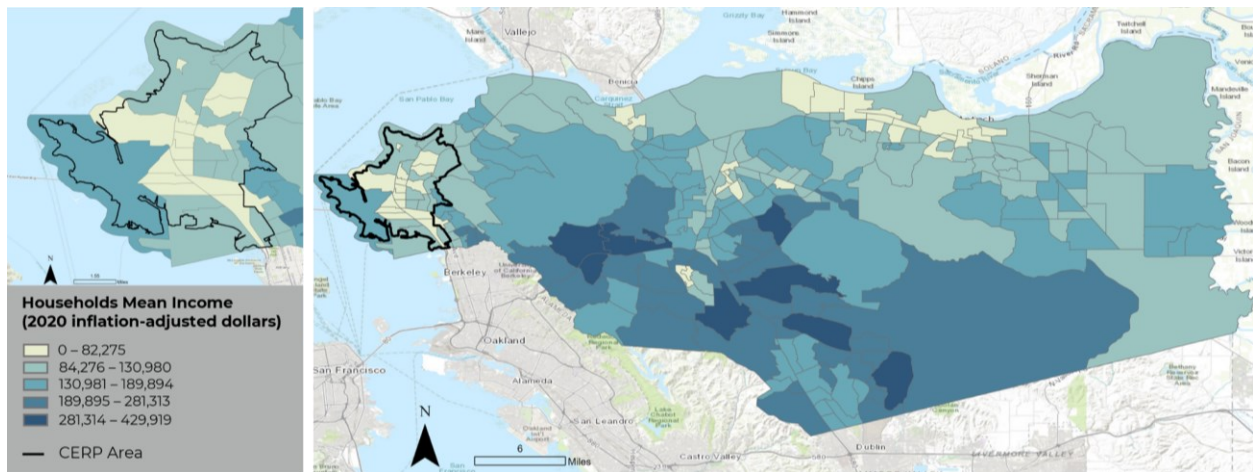

Figure 34. Mean Household Income for all of Contra Costa County. Source: Census Table S1902, MEDIAN INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS), 2020-2016: ACS 5-Year Estimates Subject Tables. https://api.census.gov/data/2020/acs/acs5/subject.

If we graph the percent of white people and mean per capita income for each PTCA geography (Figure 35), we see higher per capita incomes in areas with more white people.
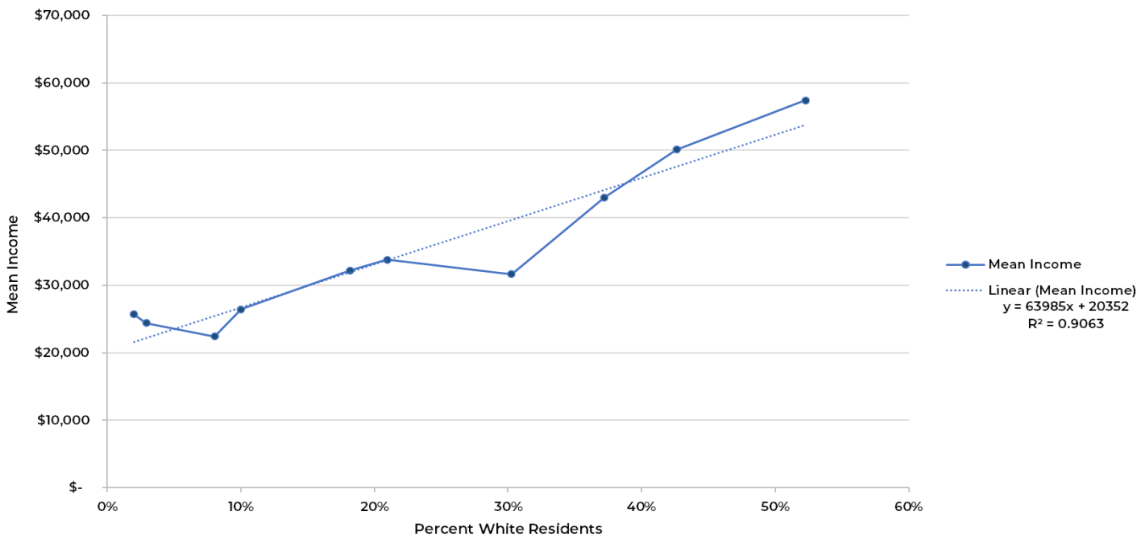
Place	Percent White	Mean Per Capita Income
East Richmond Heights	52%	$ 57,416
Contra Costa County	43%	$ 50,118
El Sobrante	37%	$ 43,017
Bayview	30%	$ 31,653
Tara Hills	21%	$ 33,775
Richmond	18%	$ 32,177
Montalvin Manor	10%	$ 26,420
San Pablo	8%	$ 22,405
Rollingwood	3%	$ 24,412
North Richmond	2%	$ 25,709

Figure 35. Graph of PTCA Geographies and Mean Per Capita Incomes. Source: Census Table B19001, HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS), Universe: Households, 2020: ACS 5-Year Estimates Subject Tables.

VII. Education

Socioeconomic factors, such as education, influence health outcomes.[75] Education can lead to higher-paid work, reduced financial stress, and allow individuals to live in healthier places that are further from environmental hazards like air pollution.

In the PTCA Community, fewer people have a higher education degree than in Contra Costa County. In the PTCA Community, the number of people with less than a high school level of education is twice as high as in Contra Costa County (see Figure 36). Marin County is included here to provide a comparison of the educational attainment of one of the Bay Area's highest-income counties.

[75] Braveman, Paula, and Laura Gottlieb. "The Social Determinants of Health: It's Time to Consider the Causes of the Causes." Public Health Reports, vol. 129, no. 1_suppl2, Jan. 2014, pp. 19–31. SAGE Journals, https://doi.org/10.1177/00333549141291S206.
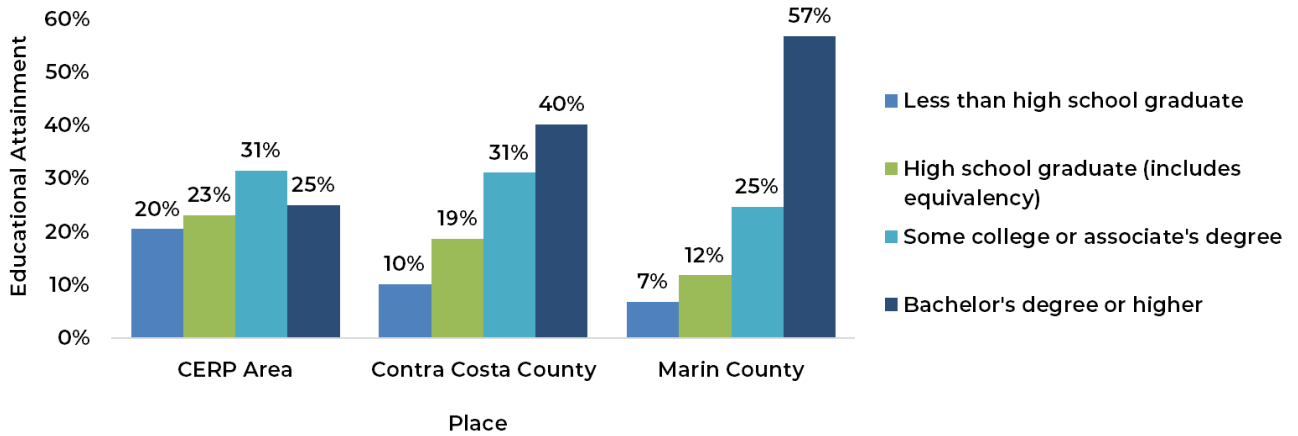
Figure 36. Educational Attainment in the PTCA Community. Source: Census Table S1501, EDUCATIONAL ATTAINMENT, 2020-2016: ACS 5-Year Estimates Subject Tables.

The bar graph below (Figure 37) shows the distribution of race in the PTCA Community and, within each population bracket, the percentage of each racial group with less than a bachelor's degree and a bachelor's degree or higher. In the PTCA area, white people, followed by Asian people, make up the highest proportions of those with a higher education degree.
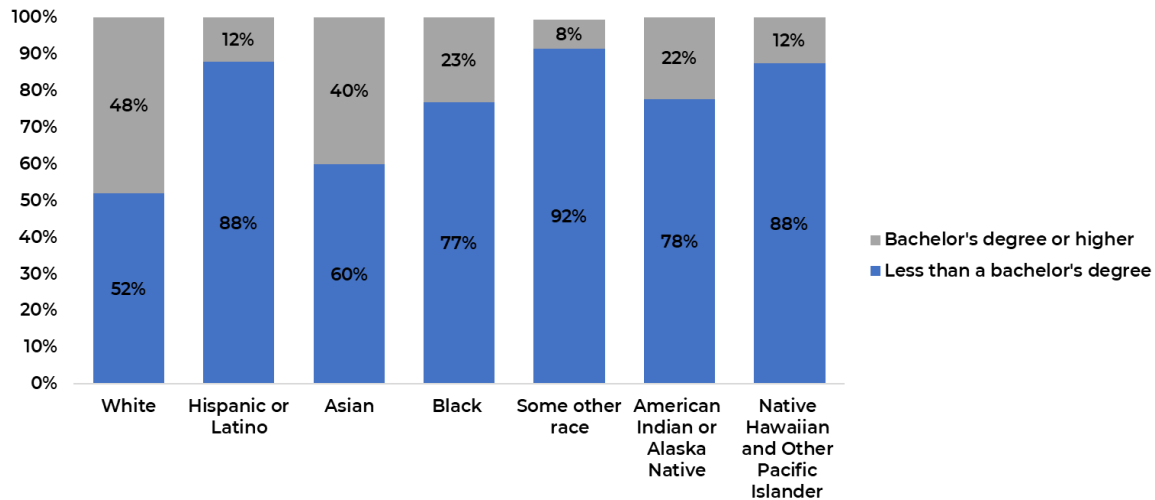

Figure 37. Educational Attainment by Race in the PTCA Community. Source: Census Table S1501, EDUCATIONAL ATTAINMENT, 2020-2016: ACS 5-Year Estimates Subject Tables.

VIII. Employment

Of people living within the PTCA Community and in the County, the largest fields with employment are education, health, and social assistance. Compared with the County, residents in the PTCA Community are more often employed in arts, entertainment, accommodation, food services, construction, transportation and warehousing, and utilities (Figure 38).
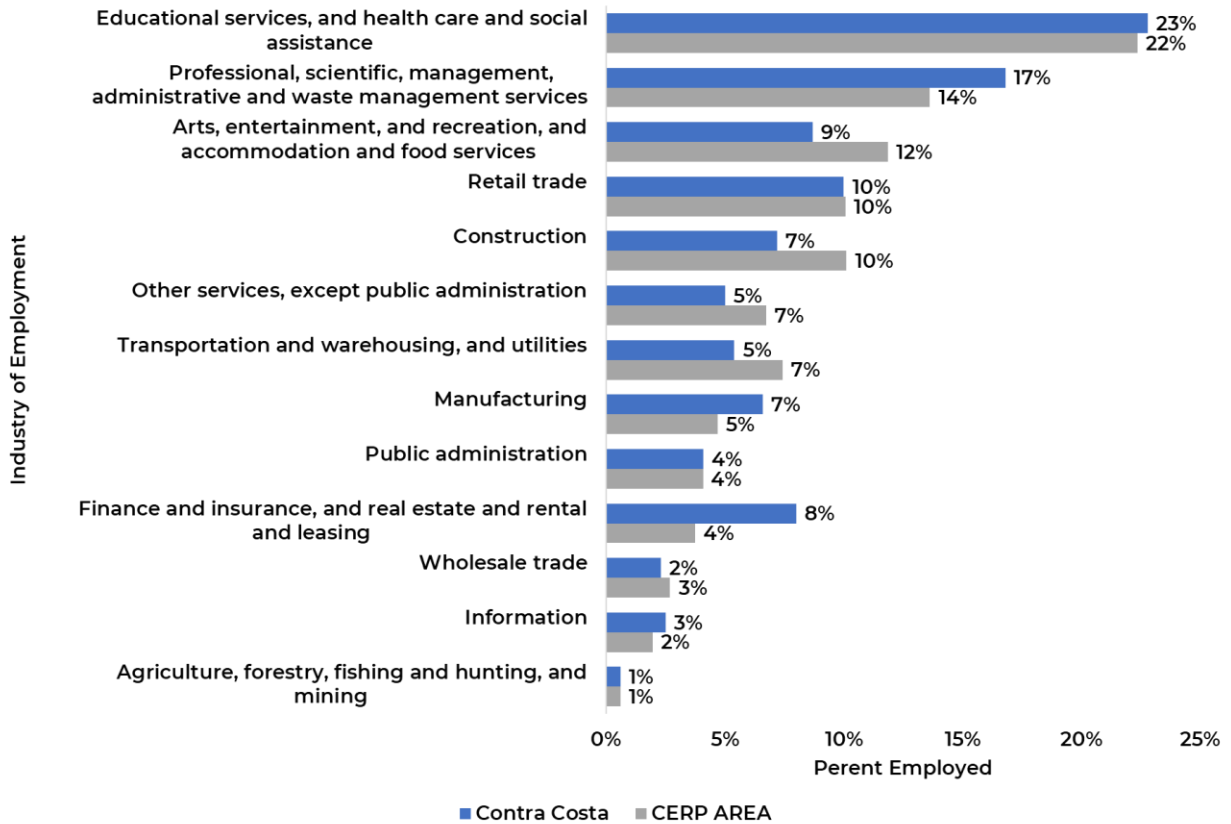
Figure 38. Fields of Employment in Contra Costa County and PTCA Community. Source: Census Table S2405, INDUSTRY BY OCCUPATION FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER, 2020-2016: ACS 5-Year Estimates Subject Tables.

Within the PTCA Community, there are fewer people in the labor force than in Contra Costa County, or even in the United States as a whole (Figure 39). This may be because the population in the PTCA Community is younger than that in the County.
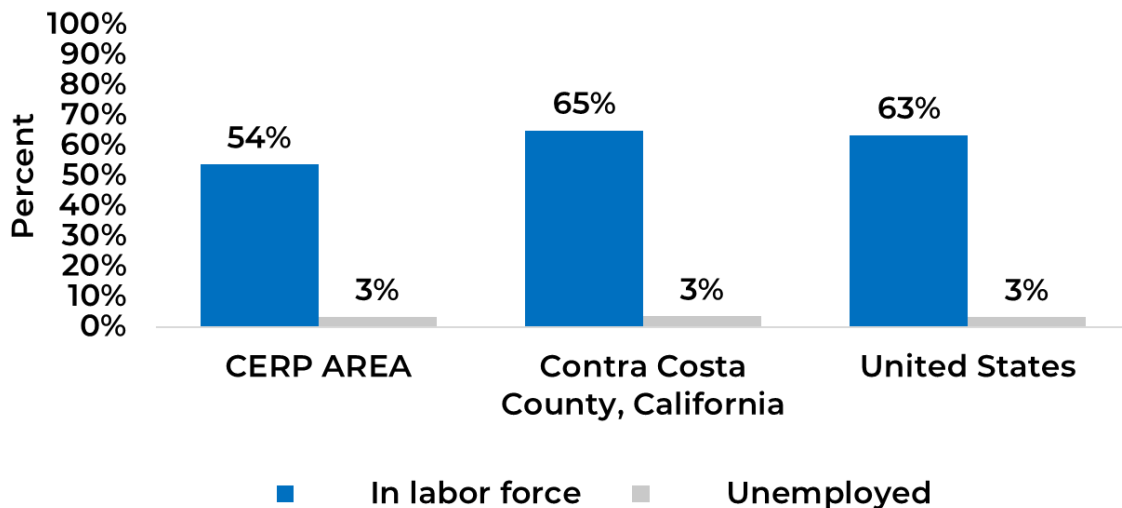

Figure 39. Percentage of Community in the Labor Force and Unemployed. Source: Census Table DP03, SELECTED ECONOMIC CHARACTERISTICS, 2020-2016: ACS 5-Year Estimates Subject Tables.
https://api.census.gov/data/2020/acs/acs5/profile.

IX. Age Distribution

The age distribution in the PTCA Community is slightly different than in Contra Costa County (see Figures 40 and 41 below). In the PTCA Community, there are fewer people over 55 years of age and more people under 30.
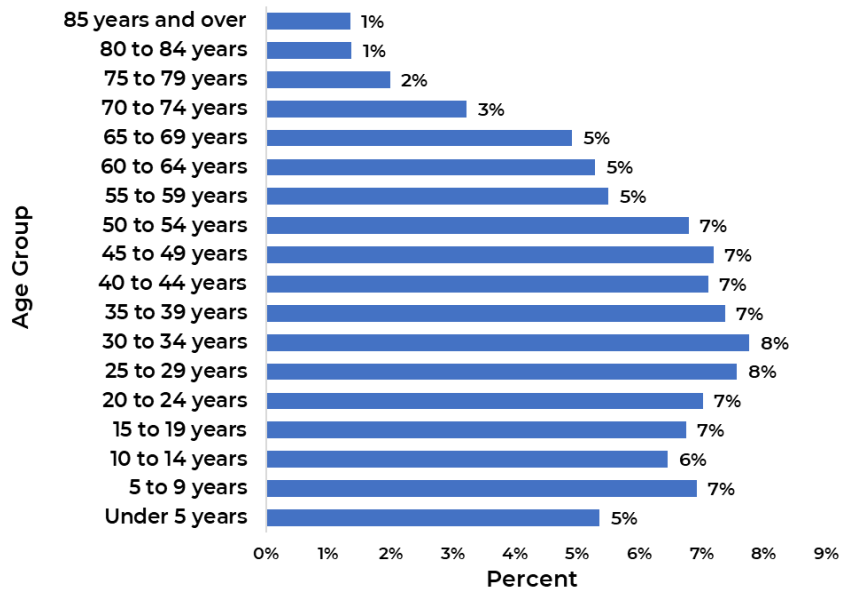

Figure 40. Age Distribution in PTCA Community. Source: Census Table S0101, AGE AND SEX, 2020-2016: ACS 5-Year Estimates Subject Tables.
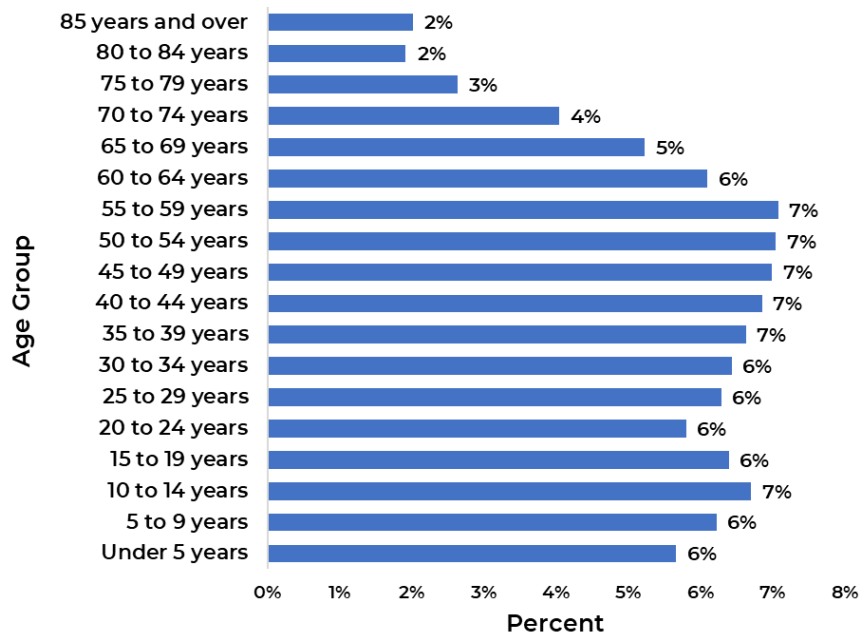

Figure 41. Age Distribution in Contra Costa County. Source: Census Table S0101, AGE AND SEX, 2020-2016: ACS 5-Year Estimates Subject Tables.

X. Unhoused Population

The Unhoused and Air Pollution Exposure

Ambient air pollution exposure is linked to severe health outcomes for morbidity as well as mortality.[76]

Morbidity refers to having symptoms of a disease, while mortality is related to the number or rate of deaths caused by a disease or health event.[77] Exposure for the unhoused is a pressing concern because this vulnerable population often lives in structures not intended for human habitation near mobile sources of pollution, such as under freeways and on the shoulders of railways, or near stationary sources of air pollution, such as near industrial sites that are removed from residential neighborhoods.[78] [79] Unlike those with housing, the unhoused cannot benefit from exposure-reducing strategies like indoor air filtration, meaning outdoor air pollution reduction is crucial for these populations.

With ambient air pollution expected to increase in the western United States due to wildfires and exacerbated by climate change, exposure will likely worsen for the unhoused. According to the U.S. Department of Housing and Urban Development (HUD), the proportion of unhoused individuals who experience unsheltered homelessness is increasing.[80] Unsheltered individuals are acutely vulnerable to poor air quality. While patterns of air pollution exposure among unhoused populations are understudied, research in this area is burgeoning.

The unhoused have greater pollution exposure from local sources in the PTCA Community than housed residents. To explore if the unhoused in our PTCA Community are experiencing elevated levels of local air pollution exposure, we compared the annual-average exposure per capita for the entire PTCA Community to the average for census blocks with homeless encampments or habitation (see Table 3 below). A census block is the smallest geographic unit used by the United States Census Bureau. In urban areas, census blocks look like city blocks and are bounded on all sides by streets. The averages are population-weighted and show four air quality metrics (see below). Where the unhoused live, cancer risk and particulate matter exposure attributable to local sources are about 50% higher, and the chronic hazard index and $PM_{2.5}$ concentration are 26% and 16% higher respectively, than for the entire PTCA Community. These averages are based on modeled exposures to local source emissions only and do not reflect source emissions that may be transported in from outside the PTCA Community, for instance from other cities or wildfires. For more information on the exposure data, see Chapter 5: Air Pollution Overview.

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[76] Lelieveld, Jos, et al. "The contribution of outdoor air pollution sources to premature mortality on a global scale." *Nature* 525.7569 (2015): 367-371.
[77] Hernandez, J. B. R. (2023). Epidemiology Morbidity And Mortality. *StatPearls*.
[78] Liu, Jia Coco, et al. "Particulate air pollution from wildfires in the Western U.S. under climate change." *Climatic change* 138.3 (2016): 655-666.
[79] Hong, Chaopeng, et al. "Impacts of climate change on future air quality and human health in China." *Proceedings of the National Academy of Sciences* 116.35 (2019): 17193-17200.
[80] *2018 AHAR: Part 1 - PIT Estimates of Homelessness in the U.S.* https://www.hudexchange.info/resource/5783/2018-ahar-part-1-pit-estimates-of-homelessness-in-the-us. Accessed 29 Apr. 2022.

	Blocks with Encampments	All PTCA Blocks	Difference	Percent Difference
CANCER RISK	122	84.3	38	45% higher
CHRONIC HAZARD INDEX	0.14	0.11	0.03	26% higher
DIESEL PARTICULATE MATTER	0.15	0.1	0.05	47% higher
PM$_{2.5}$	1.23	1.06	0.17	16% higher

Table 3. Comparison of Pollution Exposure in PTCA Community Blocks with Encampments and All PTCA Community Blocks.

XI. Voter Participation

Low political participation may result in fewer opportunities, services, and social programs for disadvantaged groups, lowering the quality of life for already vulnerable populations. This may be especially true for undocumented communities. As the California Department of Public Health says, "Although there is no direct evidentiary connection between voter registration or participation and health, there is evidence that populations with higher levels of political participation also have greater social capital. Social capital is defined as resources accessed by individuals or groups through social networks that provide a mutual benefit."[81]

Voters in Contra Costa County are largely Democrats, about 50%, with Republicans comprising about 20% (Figure 42).
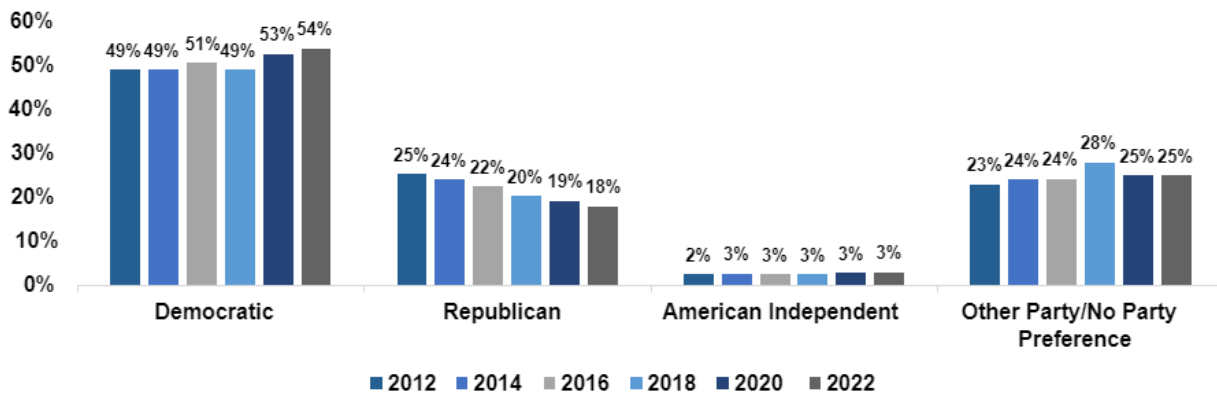

Figure 42. Political Party Distribution for Contra Costa County. Source: Elections Statistics: California Secretary of State, Voter Participation Statistics by County, General Election - 60-Day Report of Registration. https://www.sos.ca.gov/elections/voter-registration/voter-registration-statistics

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[81] Voter Registration - California Health and Human Services Open Data Portal. https://data.chhs.ca.gov/dataset/voter-registration-2002-2010. Accessed 17 May 2022.

Voter participation is measured by dividing the number of adults who voted in elections by those who registered. In Contra Costa County general elections, voter participation rose from 2010 to 2020 but decreased in 2022. For the presidential primary elections, voter participation has fallen since 2004 (Figure 43).
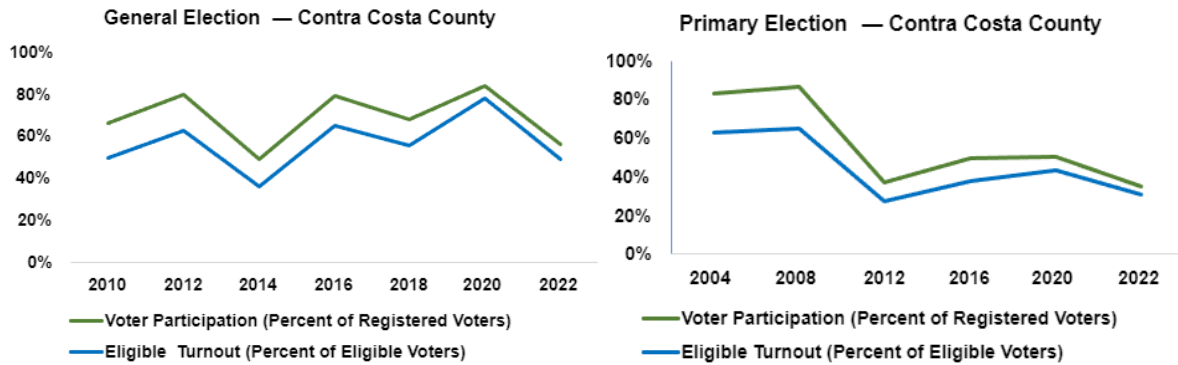

Figure 43. Contra Costa County Voter Participation in Presidential Primary (Left) and General Election (Right). Source: Elections Statistics: California Secretary of State, Voter Participation Statistics by County, https://www.sos.ca.gov/elections/statistics/voter-participation-stats-county

Geographic data for census tracts were only found for the general election years 2016 and 2018. While voter participation has decreased from 2016 to 2018 in the County, the PTCA Community and the City of Antioch appear to have the lowest participation rates in the County (Figures 44 and 45).
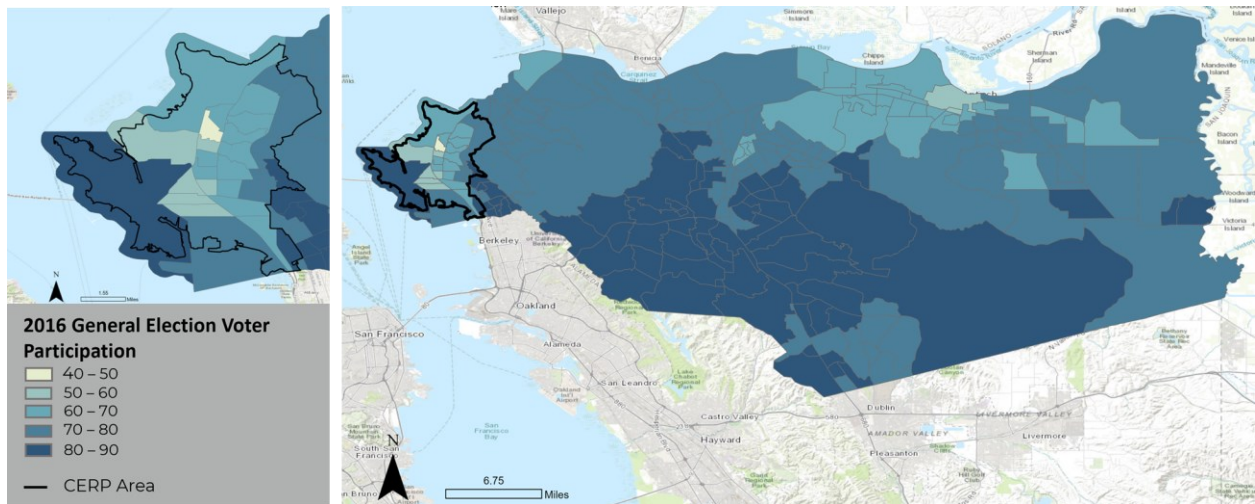

Figure 44. 2016 General Election Voter Participation. Source: 2016 Voter Registration - California Health and Human Services Open Data Portal. https://data.chhs.ca.gov/dataset/voter-registration-2002-2010. Accessed 17 May 2022.
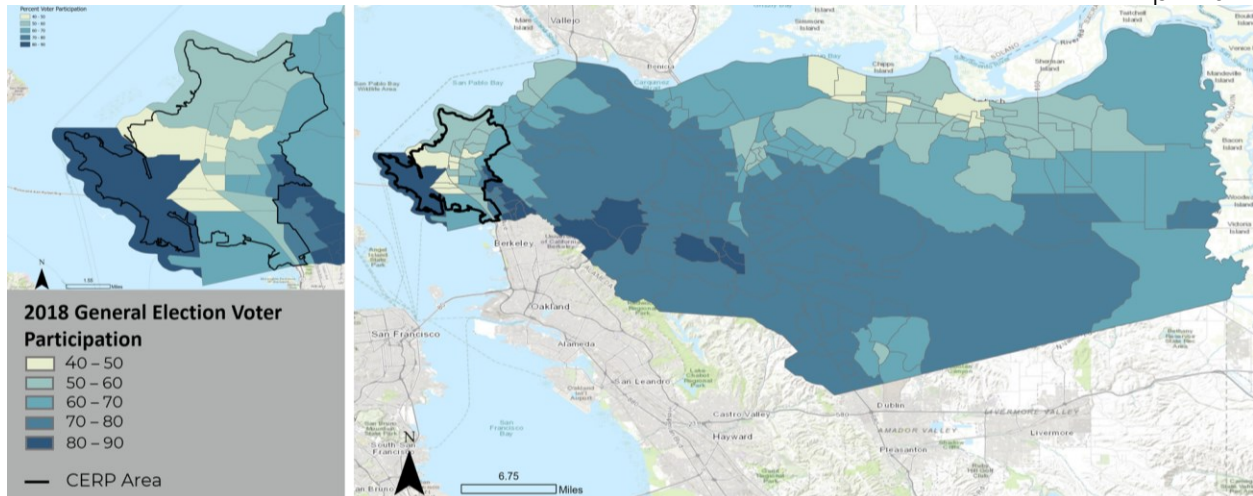
Figure 45. 2018 General Election Voter Participation. Source: 2018 Voter Registration - California Health and Human Services Open Data Portal. https://data.chhs.ca.gov/dataset/voter-registration-2002-2010. Accessed 17 May 2022.

XII. Community Concerns

Community concerns were gathered from a Town Hall event, the Community Assets and Air Pollution Mapping Project, and a virtual ideas wall. There were six overarching community concerns that emerged. For the full report on community concerns visit this document.

Community Concern: Addressing Public Health and Reducing Exposure

Throughout the Community Assets and Air Pollution Mapping Project, health-related words and physical reactions to air pollution were the most commonly recurring themes. This section includes concerns about populations that are more vulnerable to air pollution and opportunities to prevent exposure.

 Here is feedback on concerns from the community:

- Solar panels (affordable) with batteries, hybrid cars, EV, get rid of electrical outages from PG&E.

- We need more information disseminated about health impacts from pollution (air+water), especially in our communities. info is just being made available.

- The wildfires were the worst air pollution while living here. the red electrical storms and last year, there was a lot of ash that fell on my yard and plants.

- There is a lot of sites that need remediation. There used to be gas stations, laundromats, or short-term infrastructure, and started to get mold and other unhealthy conditions.

- Seniors having a lot of respiratory issues.

- How many children are suffering from asthma and how many school days are missed from asthma? We could use more health education for communities.

- The campfires from unhoused encampments.

Community Concern: Fuel Refining, Support Facilities, Storage, and Distribution

Community members expressed concern about how neighborhoods across the PTCA Community are impacted by sources of air pollution from the Chevron refinery sources/operations (including non-stack sources such as tank storage, bioreactor, and current or former refinery ponds). This thematic area also includes other related businesses that support the processing, distribution, and storage of fuel and fuel-related products.

Here are stories we have heard from the community:

- Flaring. Visibly being able to see them. There are times when I'm driving it looks like a house is burning, but then I realize it's just flaring. That really pulls on people's fear (flaring was a frequently recurring comment).

- I am aware during an acute event like a fire or flaring then when I am outside like running or riding a bike – or when I visit other communities and feel the difference in how it is to breathe there as opposed to here in Richmond.

- Smoke coming out of the many refineries in the Richmond community. The smell is sometimes unbearable, and I tend to go inside to avoid it.

- Leaks that have happened as well.

- Oil leaking in our local beach.

Community Concern: Industrial and Commercial Sources Near Communities

Emissions of air pollutants from some businesses and activities can have a significant exposure impact on the nearby areas, even if they contribute a small percentage of the region's total emissions of that pollutant. This can be especially true for businesses located near where people live or spend time. There also are larger industrial operations that contribute to both local and area-wide impacts, depending on the activity at the facility generating the emissions. Industrial sites and sources of concern are solid waste and recycling facilities, scrap metal facilities, auto body shops, aggregate facilities or materials handling, concrete production facilities, restaurants and food trucks, dust on local roadways, shipping terminals, dry cleaners, backup generators; commercial kitchens, bakeries, wineries, breweries, coffee roasteries; dust from construction, demolition, nurseries, and vacant lots; contaminated soil from hazardous waste clean-up sites; and construction and heavy diesel equipment.

Here are stories we have heard from the community:

- Park Blvd near the landfill or the Recycle plant near Jackson – there are small and large industrial activities. I wonder about County oversight.

- The landfill is used as a transfer station[82] and can impact the community.

- Industrial fires. There was a fire at Simms Metal, and there was so much released in the air.

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[82] Note: A transfer station is a site with the capacity to store, consolidate, and aggregate garbage or recyclables.

- Fine black dust that appears in the neighborhood (this comment was shared by a few community members).

- Rise of sea level (release of pollutants due to change of sea level) and its effect on harmful pollutants that are currently in an area away from the sea.

- Chemical explosion that happened in North Richmond that harmed many. "Anything could blow at any time".

Community Concern: Odors from Industries

Odors from industrial activities are a major concern throughout the different neighborhoods in the PTCA area. Certain land use types are more likely to result in odor impacts, including wastewater treatment plants; landfill, recycling, and composting facilities; petroleum refineries, fuel storage, and distribution; chemical plants; cannabis growing and processing; and food services. Odors can have a major quality of life and health risk impact. Reactions to odors can range from psychological to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache). Learn more about environmental odors and health effects at the Agency for Toxic Substances and Disease Registry Environmental Odors FAQ page.[83]

Here are stories we have heard from the community:

- On warm days you can still smell the landfill. North Richmond always had problems with the landfill.

- Smells from landfill are heightened during the wildfires.

- Odors on certain days of the year and times of day.

- Sense of odors are desensitized because people get used to the odors.

Community Concern: Vehicles and Trucks, Streets and Freeways, and Logistics and Warehouses

The PTCA Community has many sources of vehicle and truck traffic that impact neighborhoods throughout the focus area via a multitude of mechanisms. Goods movement hubs and logistics centers act as magnet sources that draw in vehicles and require the use of heavy-duty diesel equipment, causing mobile source emissions. Travel on I-580 and I-80, busy and congested traffic in neighborhoods and public spaces, and trips to and from warehouses and other truck-related businesses result in significant emissions.

Here are stories we have heard from the community:

- There are multiple massive fulfillment centers and warehouses that are expecting 100s of vehicles in and out per day. That is a serious threat to health in North Richmond and Richmond (there were a few comments that mentioned warehouses).

- Unintended impact of the bypass is that traffic is being rerouted and causing pollution in the area.

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[83] https://www.atsdr.cdc.gov/odors/faqs.html

- Traffic on bridge backup days is pretty bad.

- Cut through traffic trying to get around the lights on the Richmond Parkway.

- Number of trucks driving through the neighborhood and neighborhood streets.

- When traffic is backed up on Fred Jackson Way, and I have to walk down that road or ride my bike home my lungs burn.

- Finally being able to breathe when far away from major highways.

Community Concern: Marine and Rail

From massive cargo ships to smaller harbor craft such as ferries and tugboats, marine vessels impact California's air quality, especially in communities near ports. Locomotive diesel exhaust comprises particulate matter, smog-forming oxides of nitrogen, sulfur dioxide, greenhouse gases, and toxic chemicals. Marine and rail equipment tend to have quite long useful lives, meaning that they can be older and dirtier equipment that is less likely to have been upgraded and replaced despite the existence of more modern technology. Tugboats and ferries that run on diesel fuel were a concern for the community, along with rail-going trains and rail yards.

Here are stories we have heard from the community:

- Richmond lives close to the port and gets a lot of particulate exposure. Very visible.

- Port sources are also a large contributor.

- There is a rail freight line that runs right behind the terra hills mobile manor senior park; according to her research, it is an illegally close distance to the residences.