South and East Tacoma Community 2025 Environmental Justice Report

Publication Information

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Executive Summary

The South and East Tacoma Community Report provides community information, demographic data, greenhouse gas emissions data, and information about criteria air pollutant levels (CAPs) and their health impacts. This document provides information about air quality and health impacts to those who live, work, and play in the South and East Tacoma community.

For more information about the background and methodology of this document, please visit *2025 Environmental Justice Report: Overburdened Communities Highly Impacted by Air Pollution* (2025 EJ Report).

Community Overview

The South and East Tacoma community was identified as overburdened and highly impacted by air pollution because it met the statewide screening criteria based on the Washington Environmental Health Disparities map[1] ranking and the EJScreen demographic index.[2] It also experiences elevated levels of short-term exposure to fine particulate matter ($PM_{2.5}$) and cumulative criteria air pollution driven by $PM_{2.5}$, ozone (O_3) and nitrogen dioxide (NO_2). Community identification is described in more detail in the Overburdened Communities Highly Impacted by Air Pollution StoryMap.

Land Area: 28.4 sq. mi

Population: 144,325

County: Pierce

Municipal Government: Tacoma City Council

Ecology Region: Southwest Region Office

Local Clean Air Authority: Puget Sound Clean Air Agency

Local Health Jurisdiction: Tacoma-Pierce County Health Department

Primary languages spoken: English, Spanish, Vietnamese, Korean

Primary pollutant of concern: Short-term $PM_{2.5}$, cumulative criteria air pollution

Geographic characteristics

Tacoma is the third largest city in the state. The identified community includes all or part of the New Tacoma, Central, Eastside, South End, and South Tacoma neighborhoods. It also includes parts of the city of Lakewood and the unincorporated communities of Parkland and Midland to the south. The community includes the commercial, manufacturing, and industrial areas at the Port of Tacoma, in South Tacoma, and in downtown Tacoma. The rest of the identified community is primarily single-family residential. It does not include Puyallup Tribe reservation land.

[1] Washington Environmental Health Disparities map https://doh.wa.gov/data-and-statistical-reports/washington-tracking-network-wtn/washington-environmental-health-disparities-map

[2] EJScreen demographic index https://www.epa.gov/ejscreen

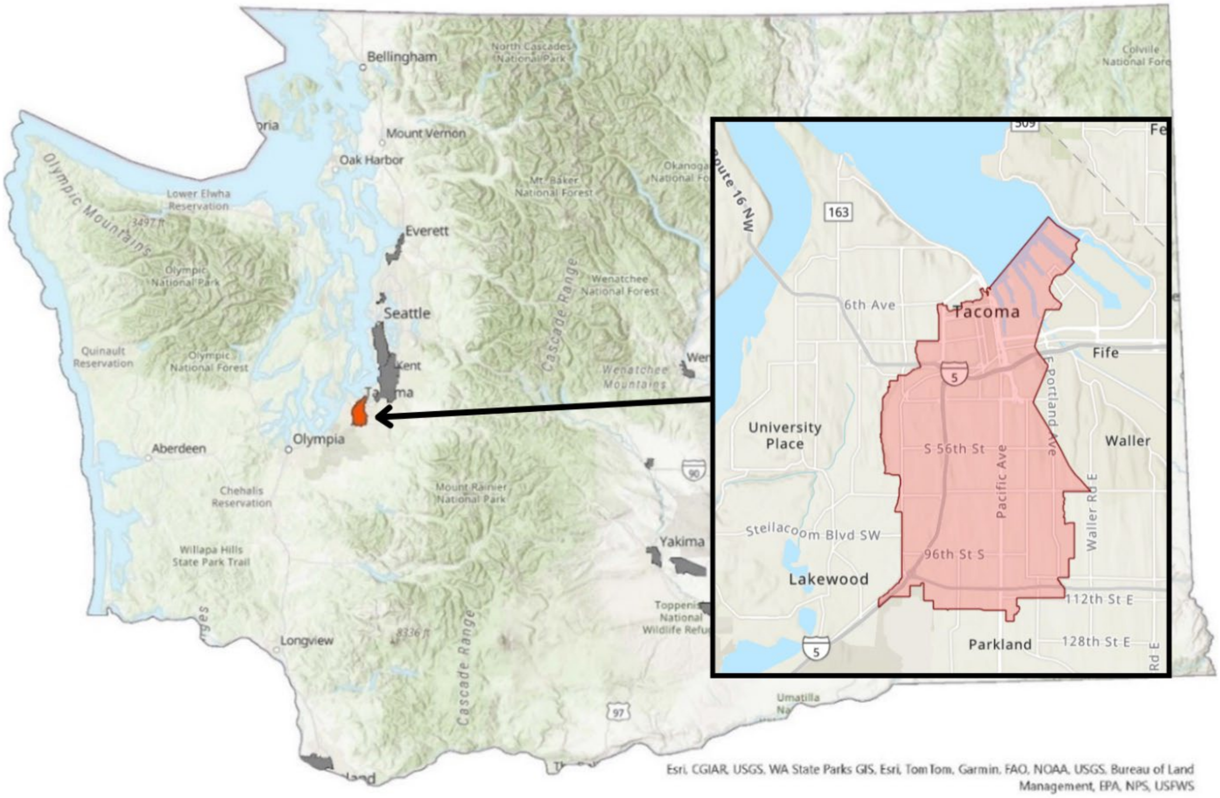


Figure 1. Map of the 16 overburdened communities highly impacted by air pollution (gray) in Washington state, with South and East Tacoma highlighted (red).

Socioeconomic characteristics

The South and East Tacoma community is racially and ethnically diverse, with nearly three-fifths of the population being people of color and over 1 in 10 identifying as multiracial, the largest share among the 16 identified communities.[3,4] It also has the second-largest share of residents who identify as Native Hawaiian or Pacific Islander. About a quarter of households speak a language other than English at home. A 2.5 million square foot warehouse facility is under construction in this community; its developer, Bridge Point Tacoma, has agreed to an $8.95 million settlement with Ecology to mitigate local traffic and air pollution.

[3] American Community Survey Data https://www.census.gov/programs-surveys/acs/data.html

[4] WA Office of Financial Management, Estimates of April 1 population by age, sex, race and Hispanic origin https://ofm.wa.gov/data-research/population-demographics/forecasts-projections/age-sex-race-and-hispanic-origin/information/

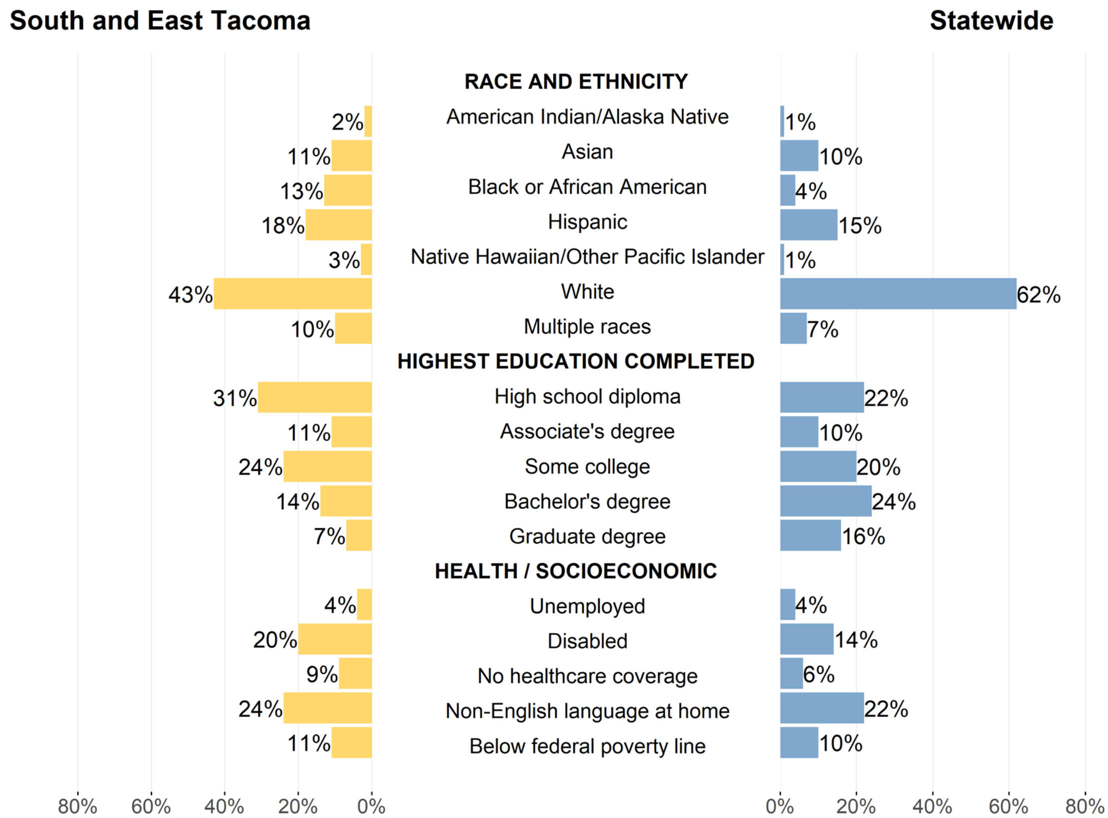


Figure 2. Sociodemographic characteristics of the South and East Tacoma community compared to statewide percentages, based on Washington State's 2024 estimated population of 8,035,700.[5]

Health characteristics

According to 2022 CDC health survey data,[6] South and East Tacoma has elevated prevalences of chronic health conditions among individuals aged 18 years and older relative to the statewide population, including asthma (12.9% vs. 11.4%), COPD (6.5% vs. 5.7%), diabetes (11.3% vs. 9.6%), and stroke (3.4% vs. 3.1%). These prevalences are not necessarily attributable to air pollution. Community and statewide prevalences that have overlapping 95% confidence intervals, as shown in Figure 3, might not be statistically significant.

[5] WA Office of Financial Management, Nov 2024 Data Tables, Population by age and sex https://ofm.wa.gov/wp-content/uploads/sites/default/files/public/dataresearch/pop/stfc/stfc_2024.xlsx

[6] U.S. Centers for Disease Control and Prevention, PLACES Data Portal https://www.cdc.gov/places/tools/data-portal.html

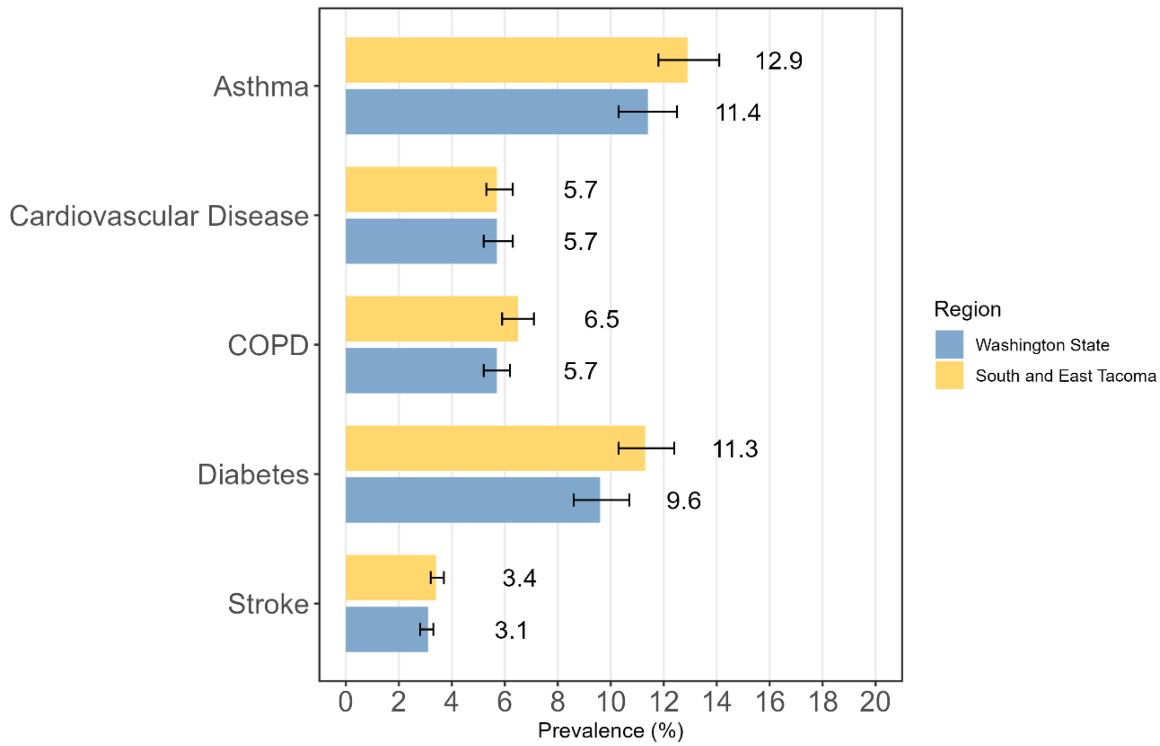


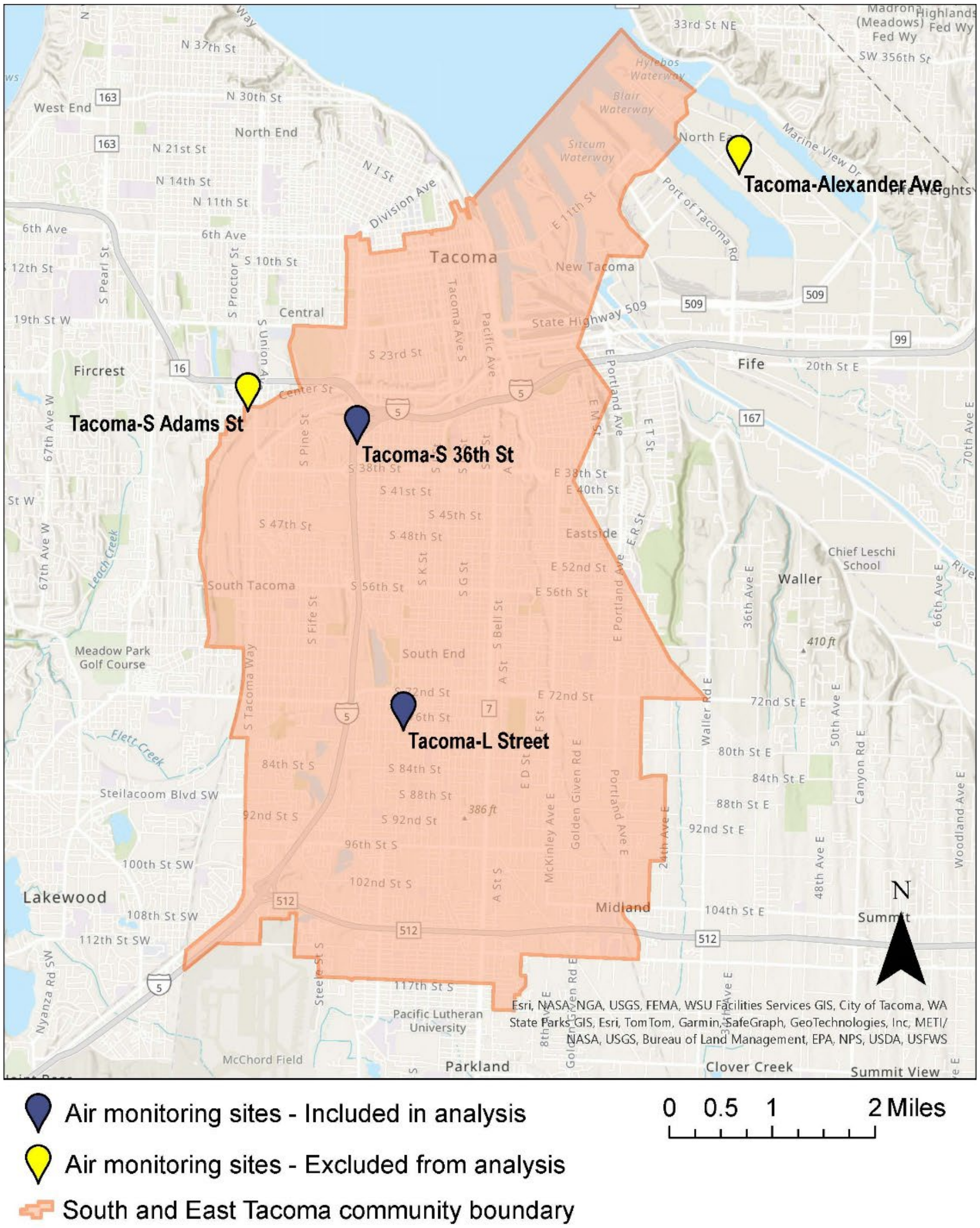
Figure 3. Prevalence of chronic health conditions among people ages 18 years and older in South and East Tacoma census tracts compared with Washington State.

Data come from CDC PLACES, 2024 release, which uses 2022 survey data.[6] Yellow and blue bars indicate the estimated prevalence of each condition. Black lines indicate the 95% confidence interval.

Air Monitoring

There are two regulatory $PM_{2.5}$ monitors in the South and East Tacoma community (Figure 4; Table 1). The Tacoma-L St monitor is operated by Puget Sound Clean Air Agency (PSCAA), while the Tacoma-S 36th monitor is operated by the Department of Ecology's Southwest Regional Office (SWRO). Additionally, NO_2 is monitored near the intersection of Interstate 5 and State Route 16, where heavy traffic contributes to higher NO_2 concentrations. Ecology is planning to install a low-cost, high accuracy $PM_{2.5}$ sensor (SensWA) at the University of Washington-Tacoma in early 2026.

The Tacoma-S Adams St monitoring site was funded by the Bridge Industrial settlement.[7] The Bridge Industrial Project is a proposal that will create 2.5 million square feet of light industrial and warehouse space in four large buildings in South Tacoma. Ecology has begun collecting air quality data and will continue after the warehouse operations begin.



[7] Bridge Point Development: Frequently asked questions https://ecology.wa.gov/ecologys-work-near-you/regional-work/southwest-region/bridge-point-development-tacoma-settlement/frequently-asked-questions

Figure 4. Map of South and East Tacoma air monitoring sites.

Table 1. South and East Tacoma criteria air pollutant monitors.

Monitoring Site	Type	Site Owner	Pollutants Monitored
Tacoma-S 36th St	Regulatory	Ecology-SWRO	$PM_{2.5}$, NO_2
Tacoma-L St	Regulatory	PSCAA	$PM_{2.5}$

Criteria Air Pollution

This report summarizes criteria air pollution (CAPs) concentrations in the South and East Tacoma community from 2022 through 2024. CAPs concentrations for $PM_{2.5}$ and NO_2 are calculated using data from the Washington Ambient Air Monitoring Network and reported according to the Environmental Protection Agency's (EPA) methodology. More information about the methods can be found in the methods section of the 2025 EJ Report.

In addition to analyzing monitored criteria air pollution concentrations, we calculated the number of days per year residents of the South and East Tacoma community experienced unhealthy air quality, according to EPA's Air Quality Index (AQI). The AQI is a six-category color-coded scale used to communicate daily air quality levels to the public. Days when an AQI above 100 are considered "unhealthy for sensitive groups" or worse.

Between 2022-2024, the South and East Tacoma community experienced an annual average of 5.7 days with unhealthy air quality (Table 5). In comparison, from 2020-2022, the annual average was 7.0 days. Some of the unhealthy air quality in 2022 and 2023 was attributable to wildfire smoke. In addition, Tacoma typically experiences elevated daily $PM_{2.5}$ concentrations on July 4 – 5 and New Year's Day due to pollution caused by fireworks.

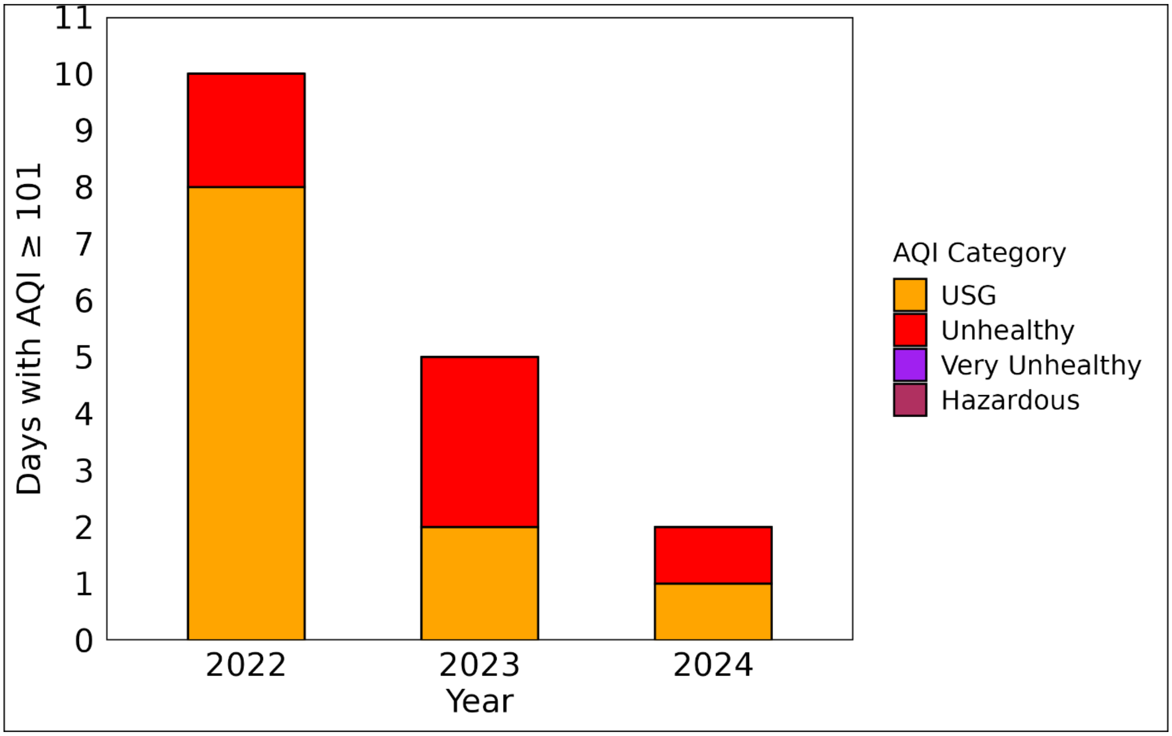


Figure 5. Number of days 2022-2024 with unhealthy air quality. Includes days impacted by wildfire smoke.

Table 2 includes 24-hour $PM_{2.5}$ (98^{th} percentile) concentrations. $PM_{2.5}$ concentrations are measured over 24-hour periods in micrograms per cubic meter (µg/m³). The EPA establishes national ambient air quality standards (NAAQS), which define the maximum allowable levels (thresholds) for each criteria pollutant. The NAAQS threshold for 24-hour $PM_{2.5}$ (98^{th} percentile) is 35 µg/m³. The design value for 24-hour $PM_{2.5}$ (98^{th} percentile) is a statistic that describes the air quality of a location relative to the NAAQS over a three-year period and is used to describe short-term fine particulate exposure.

At the Tacoma-S 36^{th} St and the Tacoma-L St monitoring sites, three-year $PM_{2.5}$ design values for 2022-2024 are provided. During this period, 24-hour $PM_{2.5}$ concentrations at the South and East Tacoma sites ranged from 14.9 to 38.1 µg/m³. Both Table 2 and Figure 6 show that the 24-hour $PM_{2.5}$ level at the Tacoma-L Street monitor exceeded the NAAQS threshold in 2022, primarily due to wildfire smoke. However, the three-year design values at both monitors remained well below the NAAQS. Values shown in brackets in Table 2 exclude wildfire-impacted days when the 24-hour average $PM_{2.5}$ concentration exceeded 35.4 µg/m³.

Table 2. ***24-hour $PM_{2.5}$ (98th percentile) concentrations and 2024 design values, 2022-2024.*** *Units are in µg/m³. Brackets [ ] exclude wildfire days when 24-hour average $PM_{2.5}$ concentration exceeded 35.4 µg/m³. 24-hour $PM_{2.5}$ (98th percentile) NAAQS is 35 µg/m³.*

Monitoring Site	2022 24-hour 98th Percentile	2023 24-hour 98th Percentile	2024 24-hour 98th Percentile	2024 Design Value
Tacoma-S 36th St	30.7 [25.7]	21.5 [19.5]	14.9 [14.9]	22 [20]
Tacoma-L St	38.1 [31.0]	28.5 [27.1]	19.0 [19.0]	29 [26]

NAAQS = national ambient air quality standards, PM = particulate matter, µg/m3 = micrograms per cubic meter

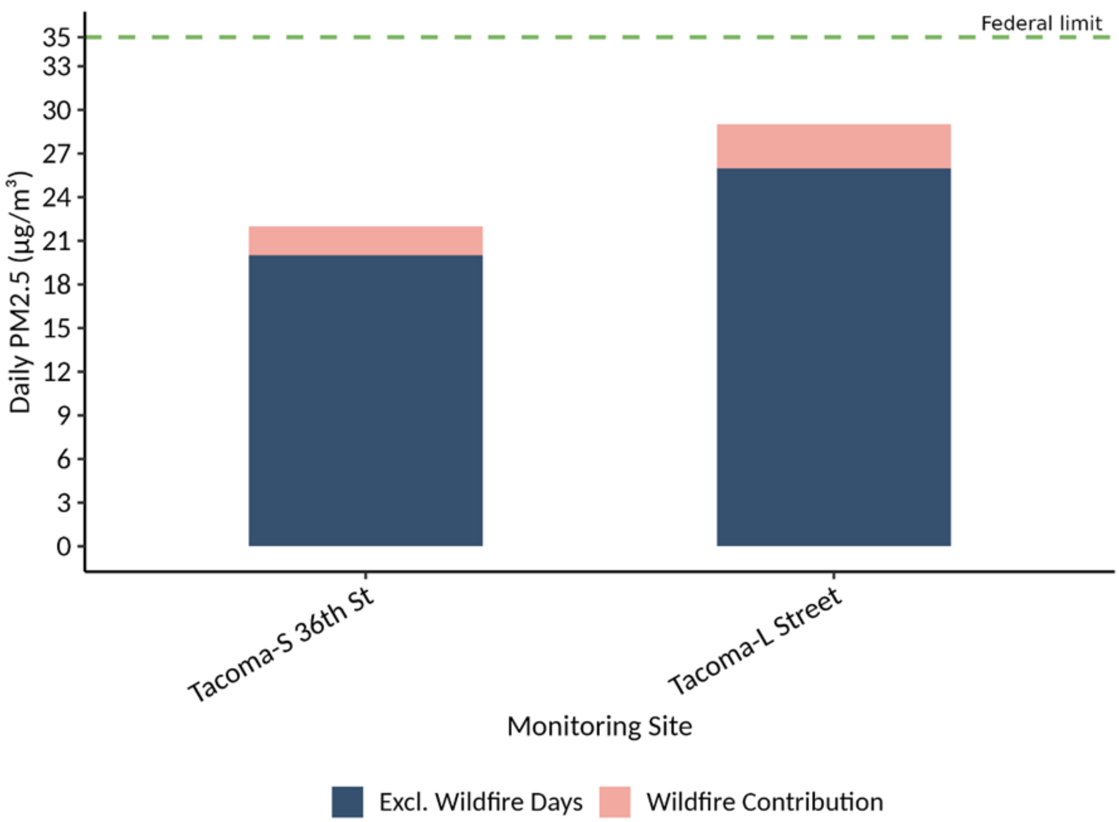


Figure 6. ***24-hour $PM_{2.5}$ (98th percentile) concentrations, 2022-2024.*** *Annual concentrations calculated with and without days elevated from wildfire smoke. Dark blue bar includes three complete years of data, 2022-2024; dashed line is the federal limit (NAAQS) for 24-hr $PM_{2.5}$.*

Table 3 includes annual mean $PM_{2.5}$ concentrations between 2022 to 2024 and 2024 design values. The annual $PM_{2.5}$ design value is a three-year average of annual mean concentrations used to describe long-term exposure. At both monitors in the South and East Tacoma community, annual mean $PM_{2.5}$ concentrations remained below the federal standard of 9.0 µg/m³ from 2022-2024. A slight decrease in annual mean $PM_{2.5}$ over this period may be attributed to lower levels of wildfire smoke in Washington in 2023 and 2024.

Table 3. ***Annual mean $PM_{2.5}$ concentrations and 2024 design values, 2022–2024****. Units are in µg/m³. Brackets [ ] exclude wildfire days when the average $PM_{2.5}$ concentration exceeded 15.0 µg/m³. Annual $PM_{2.5}$ NAAQS is 9.0 µg/m³.*

Monitoring Site	2022	2023	2024	2024 Design Value
Tacoma-S 36th St	8.34 [6.93]	6.43 [6.14]	4.71 [4.71]	6.5 [5.9]
Tacoma-L St	8.70 [7.23]	7.18 [6.89]	5.11 [5.07]	7.0 [6.4]

NAAQS = national ambient air quality standards, PM = particulate matter, µg/m³ = micrograms per cubic meter.

The NO_2 monitoring site in South and East Tacoma is near Interstate 5 and near an industrial area with heavy traffic. NO_2 concentrations at this site remained consistently below the NAAQS from 2022-2024 (Table 4).

Table 3. ***Annual summary statistics and design value for NO_2 (ppb), 2022-2024.***

Monitoring Site	Pollutant	2022	2023	2024	2024 Design Value	NAAQS Level	Form
Tacoma-S 36th St	NO_2	39.0	36.9	44.2	40	100 (ppb)	Annual 98th percentile of 1-hr daily max concentrations, averaged over 3 years

ppb = parts per billion

Health Impacts of Criteria Air Pollution

We estimated the number and rate of deaths and morbidities associated with $PM_{2.5}$ and ozone concentrations by age range and using health effect estimates from peer-reviewed studies (Appendix B, Table 2 in the 2025 EJ Report). All estimates are rounded to the nearest whole number. We present ranges of deaths or morbidities where multiple studies assessed that health outcome.

$PM_{2.5}$

We estimated 64 deaths by any cause (54 deaths per 100,000 population, Table B1) related to yearly $PM_{2.5}$ exposure. Among older adults, which is a smaller portion of the population, we estimated 32 total deaths (163 deaths per 100,000 population) each year associated with yearly $PM_{2.5}$ exposure (Table B2).

Among different racial and ethnic groups (Figure 7), we estimated most $PM_{2.5}$ related deaths by any cause per year to be among non-Hispanic White people (38 deaths among 18–84-year-olds). However, when accounting for the ages of people in each racial and ethnic group[8], the annual age-adjusted mortality rate was highest among Hispanic people (90 deaths per 100,000 population) and non-Hispanic Black people (93 deaths per 100,000 population).

Figure 7 is based on the study by Pope et al. (2019),[9] where AIAN refers to American Indian and Alaska Native; NH to non-Hispanic; and NHOPI to Native Hawaiian and Other Pacific Islander. The bars indicate the 95% confidence interval (CI) for each rate.

[8] Age-adjusted mortality rates represent the mortality rate if the age distribution in that race category matched the age distribution of the total Washington State population. This allows for better comparability given that different race groups can have different age distributions and the risk of death is higher in older age groups. We see higher age-adjusted rates for race categories other than the non-Hispanic White group given that these groups are generally younger in overburdened communities compared to the statewide age distribution; when we standardize these groups to the state age distribution (which has a higher proportion of older people) the estimated mortality rates are higher. More information about our age-adjustment methods can be found in the 2025 EJ Report.

[9] Pope, C.A., 3rd, Lefler, J.S., Ezzati, M., Higbee, J.D., Marshall, J.D., Kim, S.Y., Bechle, M., Gilliat, K.S., Vernon, S.E., Robinson, A.L., & Burnett, R.T. (2019). Mortality Risk and Fine Particulate Air Pollution in a Large, Representative Cohort of U.S. Adults. *Environmental Health Perspectives*, 127(7), 77007.

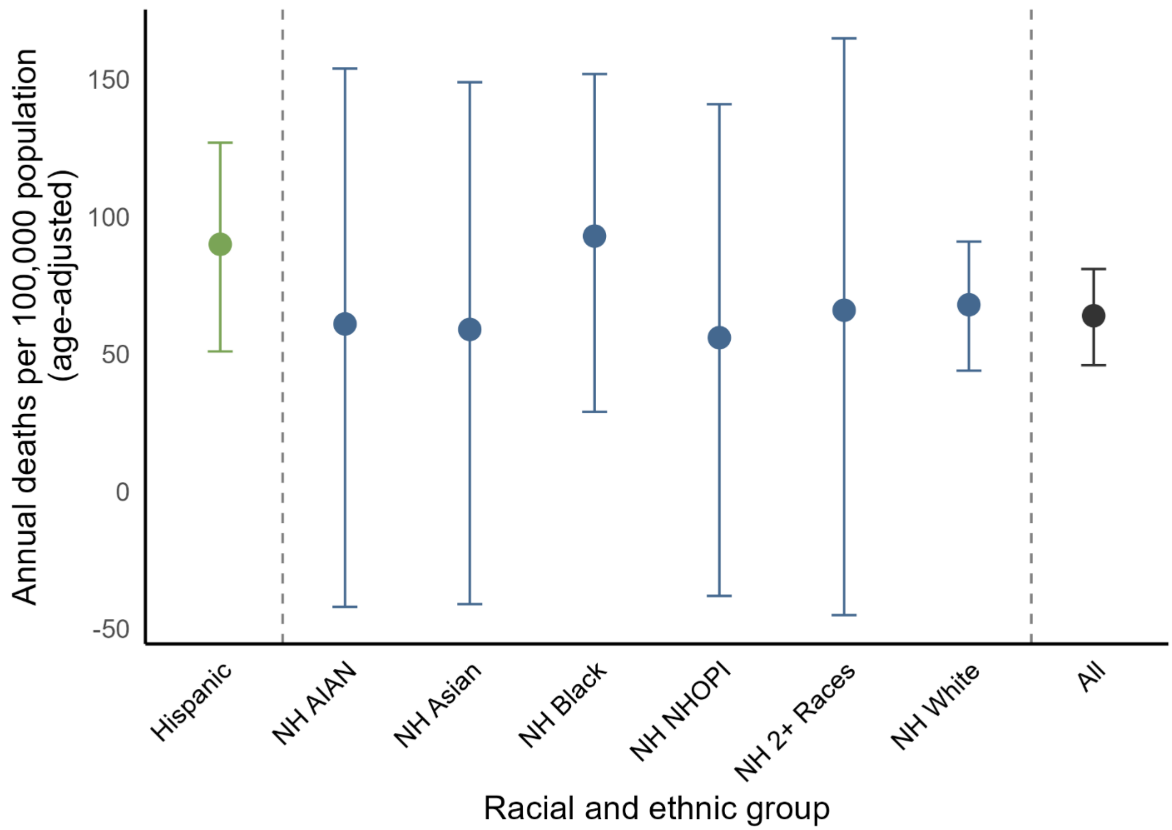


Figure 7. Age-adjusted annual death rates by any cause associated with annual $PM_{2.5}$ exposure among ages 18-84 by racial and ethnic group in South and East Tacoma.

When assessing specific causes of death related to yearly $PM_{2.5}$ concentrations (Table B3), we estimated 17 deaths due to cardiovascular disease (14 deaths per 100,000 population), 16 to 25 deaths due to ischemic heart disease (17 to 27 deaths per 100,000 population), and 3 to 4 deaths per year due to lung cancer (3 to 4 deaths per 100,000 population) among adults.

Regarding non-fatal health outcomes (Table B3), we estimated that 28 hospital admissions (23 visits per 100,000 population) for acute non-fatal myocardial infarction were associated with yearly $PM_{2.5}$ concentrations among adults. Additionally, 15 lung cancer diagnoses per year were associated with yearly $PM_{2.5}$ exposure among all people (17 diagnoses per 100,000 population).

Daily $PM_{2.5}$ exposure (Table B4) was associated with 1 death by any cause (1 per 100,000 population) among all people and 3 deaths by any cause (14 per 100,000 population) among older adults ages 65 to 99. For non-fatal conditions, daily $PM_{2.5}$ was associated with 5 to 6 acute non-fatal myocardial infarction admissions (4 to 5 per 100,000 population) among all adults, 9 respiratory admissions (43 per 100,000 population) among older adults ages 65 to 99, 18 asthma hospital admissions (13 per 100,000 population) among people ages 0 to 64.

Additionally, 70 to 95 asthma-related emergency department (ED) visits (70 to 132 per 100,000 population) among all people and 95 asthma-related ED visits (273 per 100,000 population) among youths ages 0 to 17 years were associated with daily $PM_{2.5}$ exposure.

Ozone

We estimated that O_3 exposure during the warm season (Table B5) was associated with 3 deaths by any cause among older adults ages 65 to 99 (17 deaths per 100,000 population). Daily O_3 exposure was associated with 2 deaths by any cause (1 per 100,000 population), 103 asthma-related ED visits (66 per 100,000 population) among all people, and 31 respiratory hospital admissions (152 per 100,000 population) among older adults ages 65–99.

Greenhouse Gas Emissions

Greenhouse gas results for the South and East Tacoma overburdened community highly impacted by air pollution include: 1) Emissions from greenhouse gas reporting entities per RCW 70A.65[10] and WAC 173-441,[11] -446;[12] and 2) Mobile source emissions.[13]

We did not collect information or model greenhouse gas emissions from other sources at this time. The greenhouse gas information provided in this report aligns with the Climate Commitment Act's (CCA) requirements. For further information on methods and statewide results, refer to the 2025 EJ Report.

Facilities

Washington State requires certain businesses that emit more than 10,000 metric tons of carbon dioxide equivalents (MT CO_2e) to report to the Washington Greenhouse Gas Reporting Program.[14] Businesses that emit over 25,000 MT CO_2e are also subject to the Cap-and-Invest Program (covered sources). Each reporting facility is required to follow a compliance plan.

In the South and East Tacoma community, seven facilities (Figure 8; Table 5) within and near the community boundary reported their emissions in 2023, compared to six in 2022. The total reported emissions from these facilities was 978,344 MT CO_2e in 2022 and 681,798 MT CO_2e in

[10] Greenhouse Gas Emissions – Cap-and-Invest Program https://app.leg.wa.gov/RCW/default.aspx?cite=70A.65
[11] Reporting of Emissions of Greenhouse Gases https://app.leg.wa.gov/WAC/default.aspx?cite=173-441
[12] Climate Commitment Act – Program Rule https://app.leg.wa.gov/WAC/default.aspx?cite=173-446
[13] Environmental Justice Review https://app.leg.wa.gov/RCW/default.aspx?cite=70A.65.020
[14] Mandatory greenhouse gas reports https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/tracking-greenhouse-gases/mandatory-greenhouse-gas-reports

2023, a 30.3% year-to-year decrease. Two facilities reported biogenic carbon (biogenic CO_2) [15] emissions, which are expected to be partially recaptured as part of the natural carbon cycle. For reporting purposes, biogenic CO_2 is subtracted from total metric tons of CO_2e, even though it has the same atmospheric warming effect as non-biogenic CO_2. Excluding biogenic CO_2, total emissions were 339,300 MT CO_2e in 2022 and 352,174 MT CO_2e in 2023, a 3.8% year-to-year increase. Since 2020, total reported greenhouse gas emissions from facilities within or near OBCs have decreased by 20.3%, and by 6.3% after subtracting biogenic CO_2 emissions.[16] Some year-to-year fluctuations in emissions from individual facilities are expected.

Most of the major stationary sources in the South and East Tacoma community are around the Port of Tacoma, which is a historically industrial area. As of September 2022, Darling Ingredients, a rendering and meat byproduct processing facility, has not been operating; as of 2023, WestRock CP LLC, a kraft paperboard mill, closed.

The Tacoma LNG facility opened in February 2022 after nearly ten years of development. It is located at the Port of Tacoma and operated by Puget Sound Energy. Tacoma LNG provides liquefied natural gas (LNG) for marine transportation and reserves for residential and commercial heating.

[15] Biogenic carbon refers to greenhouse gases released from the combustion, decomposition, or processing of materials derived from biological sources – such as wood, paper, biomass fuels, agriculture residues, food waste, or biogas. Under the Washington Greenhouse Gas Reporting Program, these emissions are reported separately from fossil-derived emissions because they result from carbon that circulates within the short-term natural carbon cycle rather than long-term carbon stores. Biogenic CO_2 acts the same way in the atmosphere as non-biogenic CO_2. Anthropogenic processes that include these emissions reduce a facility's environmental impact.

[16] Improving Air Quality in Overburdened Communities Highly Impacted by Air Pollution 2023 Report https://apps.ecology.wa.gov/publications/SummaryPages/2302115.html

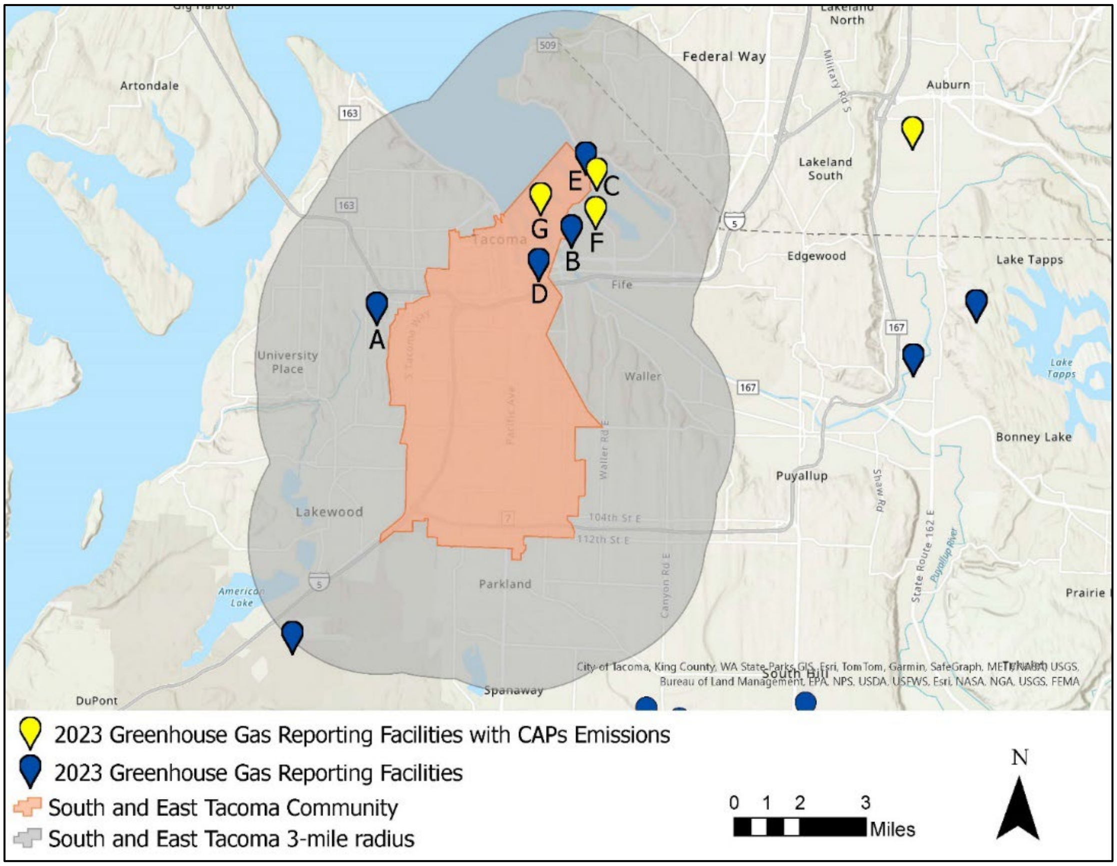


Figure 8. Reporting facilities as of 2023 that are in or near the South and East Tacoma community boundary. Facility letters correspond with Table 5.

The emissions in Table 5 are in MT CO_2e. Each greenhouse gas uses a conversion factor known as its Global Warming Potential (GWP), in this case AR4 GWP[17], to convert emissions into CO_2e. A GWP describes how much heat a greenhouse gas traps in the atmosphere relative to carbon dioxide over a specific time horizon (20, 100, or 500 years). AR4 GWPs are published in the 2007 Intergovernmental Panel on Climate Change (IPCC).[18] The Greenhouse Gas Reporting Program uses AR4 GWPs mainly for regulatory stability, consistency, and alignment with other federal programs.

[17] Reporting of Emissions of Greenhouse Gases https://app.leg.wa.gov/WAC/default.aspx?cite=173-441
[18] Intergovernmental Panel on Climate Change https://www.ipcc.ch/

Table 4. Facility emissions in or nearby[19] the South and East Tacoma community. Biogenic CO_2 is in brackets [ ].

	Facility Name/City	Facility Sector	Within Community Boundary	CCA-Covered Facility[20]	Source of CAPs[21]	2022 Emissions ($MTCO_2e$)	2023 Emissions ($MTCO_2e$)
A	City of Tacoma Solid Waste Facility - Tacoma	Waste	Nearby	Exempt	No	13,811 [6,013]	12,503 [5,555]
B	Darling Ingredients Inc. - Tacoma	Food Production	Nearby	No	No	7,176 [0]	0 [0]
C	Georgia-Pacific Gypsum LLC - Tacoma	Manufacturing	Nearby	Yes	Yes	49,915 [0]	49,843 [0]
D	Greif, Tacoma Mill - Tacoma	Pulp and Paper	Yes	No	No	13,203 [0]	13,060 [0]
E	Tacoma LNG Facility - Tacoma	Natural Gas Systems	Yes	No	No		15,537 [0]
F	U.S. Oil and Refining Co. – Tacoma	Petroleum Systems	Nearby	Yes	Yes	130,279 [0]	148,012 [0]

[19] "Nearby" refers to facilities within a three-mile radius of the community boundary that were included in this analysis.
[20] Large emitters of greenhouse gases, specifically those emitting 25,000 or more MT CO_2e annually in Washington State that are part of the Cap-and-Invest program established by the Climate Commitment Act.
[21] Major sources of criteria air pollutants are designated in the Air Operating Permit program. A major source is any stationary source that has the actual or potential to emit ≥100 tons per year for any air pollutant. Many sources emit far below the threshold. More information can be found at https://ecology.wa.gov/regulations-permits/permits-certifications/air-quality-permits/air-operating-permit

G	WestRock CP, LLC – Tacoma	Pulp and Paper	Yes	Yes	Yes	978,344 [847,415]	681,798 [563,024]

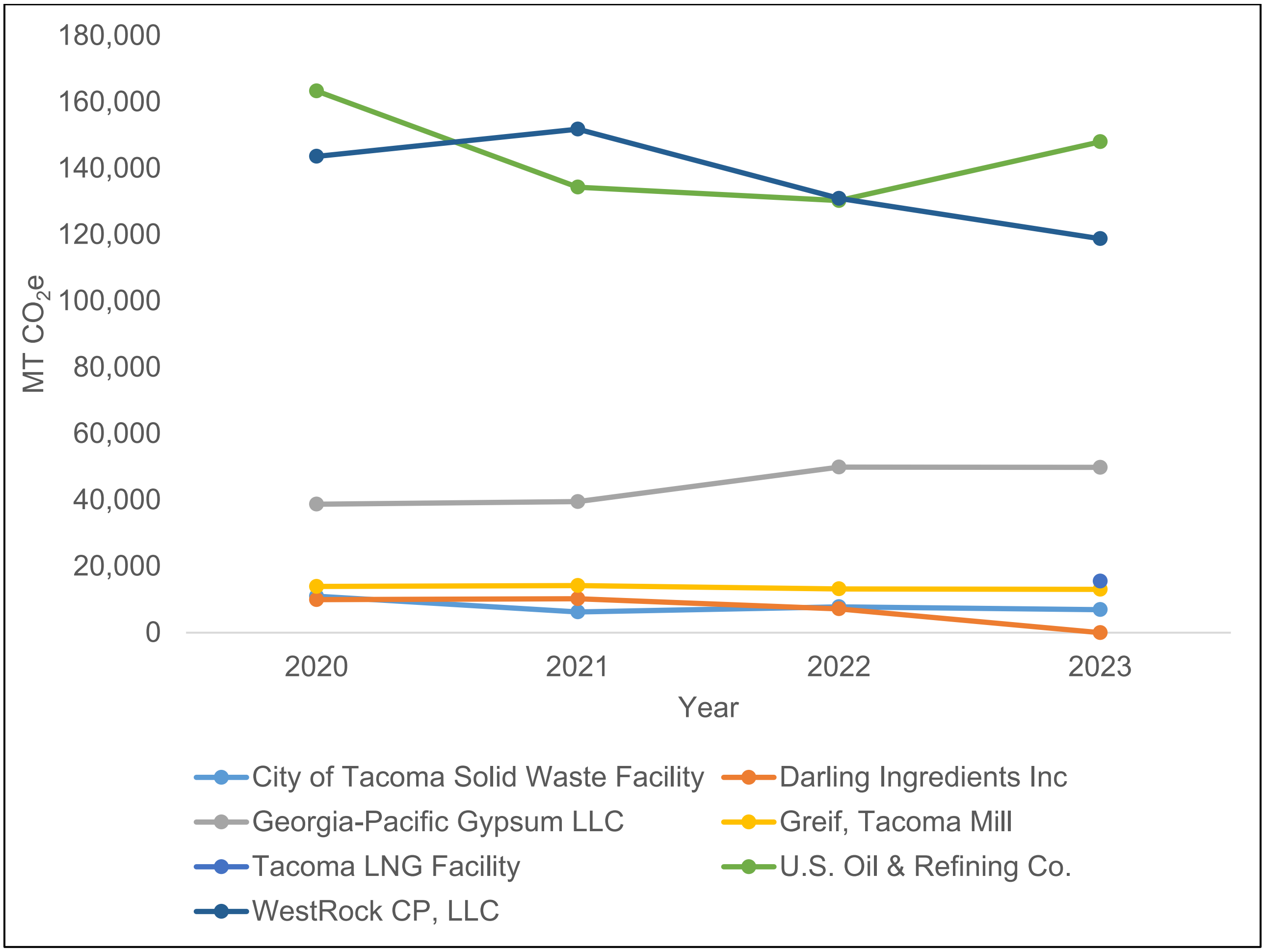


Figure 9. Greenhouse gas reporting facilities and their emissions from 2020-2023, excluding biogenic CO_2.

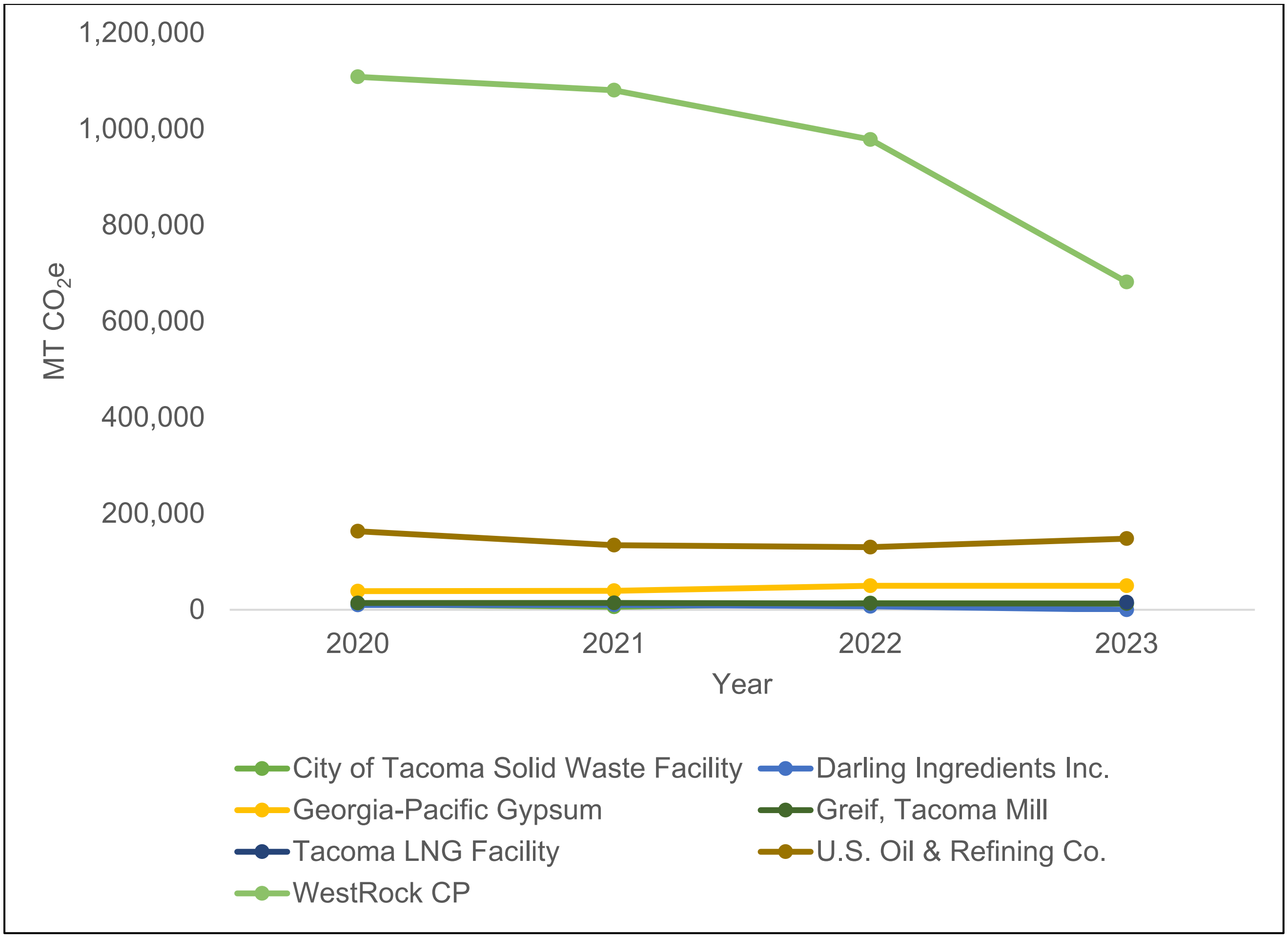


Figure 10. Greenhouse gas reporting facilities and their emissions from 2020-2023, including biogenic CO_2.

Mobile sources

In the South and East Tacoma community, greenhouse gas emissions from mobile sources increased by 21% from 2020 to 2021 (Table 6), but have decreased by 5.4% between 2019 to 2021.[22] Mobile sources consist of on-road and non-road emissions. The drop in emissions in 2020 was largely due to a decrease in vehicle traffic that was attributed to the COVID-19 pandemic.[23,24]

[22] Improving Air Quality in Overburdened Communities Highly Impacted by Air Pollution 2023 Report https://apps.ecology.wa.gov/publications/SummaryPages/2302115.html
[23] Washington State Greenhouse Gas Emissions Inventory: 1990-2021, published Jan 2025 https://apps.ecology.wa.gov/publications/SummaryPages/2414077.html
[24] Reducing Greenhouse Gas Emissions from the Transportation Sector through Climate Planning, published Dec 2024 https://www.epa.gov/system/files/documents/2024-12/420f24042.pdf

Similar to Table 5, the results in Table 6 use AR5 GWPs to convert greenhouse gas emissions into CO_2e. In 2013-2014, the IPCC published AR5 GWPs and AR6 GWPs in 2021-2022. The Washington Greenhouse Gas Emissions Inventory[25] uses AR5 GWPs in mobile source emission estimates, as the inventory models for greenhouse gas accounting are revised as science improves.

Table 5. Greenhouse gas emissions from mobile sources per capita from 2020-2021.

Population	2020 Emissions (MT CO_2e)	2020 Per Capita MT CO_2e	2021 Emissions (MT CO_2e)	2021 Per Capita MT CO_2e
133,463	468,277	3.5	566,476	4.2

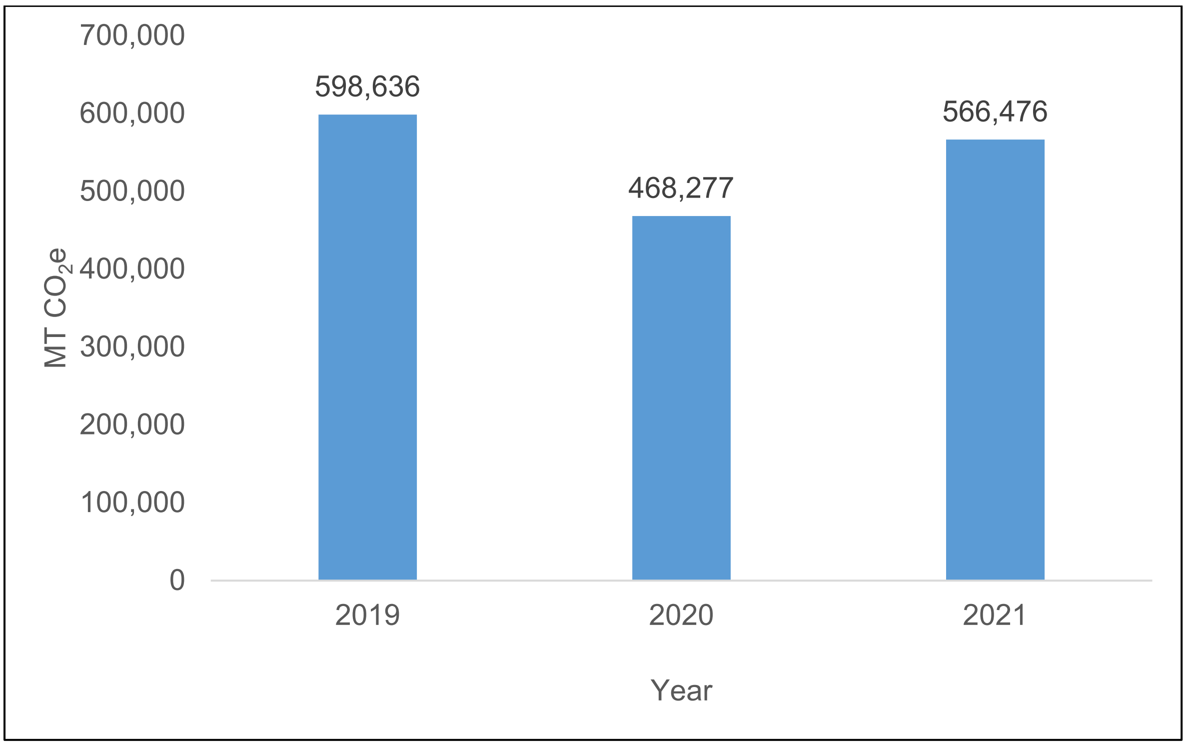


Figure 11. Annual greenhouse gas emissions from mobile sources in the South and East Tacoma community, 2019-2021.

[25] Washington State Greenhouse Gas Emissions Inventory: 1990-2021, Jan 2025 https://apps.ecology.wa.gov/publications/SummaryPages/2414077.html

Community Resources

These resources provide more information about air quality and health in the South and East Tacoma community:

- Pierce County 2019 Community Health Assessment[26]
- Pierce County 2020 Community Health Improvement Plan[27]
- Pierce County 2020 Community Health Improvement Plan At-A-Glance[28]
- Tacoma-Pierce County Health District Community Health Improvement Plan information page[29]
- Tacoma-Pierce County Health District public health data page[30]
- Virginia Mason Franciscan Health 2022 Pierce County Community Health Needs[31]
- Virginia Mason Franciscan Health Community Health Needs Assessment Information Page[32]
- Sustainability in Pierce County | Pierce County, WA - Official Website[33]
- 2030 Climate Action Plan | City of Tacoma[34]
- 2021 Puget Sound Maritime Air Emissions Inventory Puget Sound Maritime Air Forum[35]
- West Coast Collaborative: Partnering to Reduce Diesel Emissions | US EPA[36]
- Zero-emission and electric vehicles mapping tool | WSDOT[37]
- Home | Washington Climate Action[38]

[26] https://tpchd.org/wp-content/uploads/2023/12/CHA-2019.pdf
[27] https://tpchd.org/wp-content/uploads/2023/12/2020-Pierce-County-CHIP.pdf
[28] https://tpchd.org/wp-content/uploads/2023/12/CHIP-At-A-Glance-2020.pdf
[29] https://tpchd.org/info/data/community-health-improvement-plan/
[30] https://tpchd.org/info/data/
[31] https://doh.wa.gov/sites/default/files/2023-06/CHNA-081.pdf
[32] https://www.vmfh.org/about-vmfh/why-choose-vmfh/reports-to-the-community/community-health-needs-assessment
[33] https://www.piercecountywa.gov/2058/Sustainability-2030
[34] https://tacoma.gov/government/departments/environmental-policy-and-sustainability-office/climate-action/2030-climate-action-plan/
[35] https://pugetsoundmaritimeairforum.org/
[36] https://www.epa.gov/wcc
[37] https://wsdot.wa.gov/business-wsdot/grants/zero-emission-vehicle-grants/zero-emission-and-electric-vehicles-mapping-tool
[38] https://climate.wa.gov/

Appendix A. Criteria air pollution

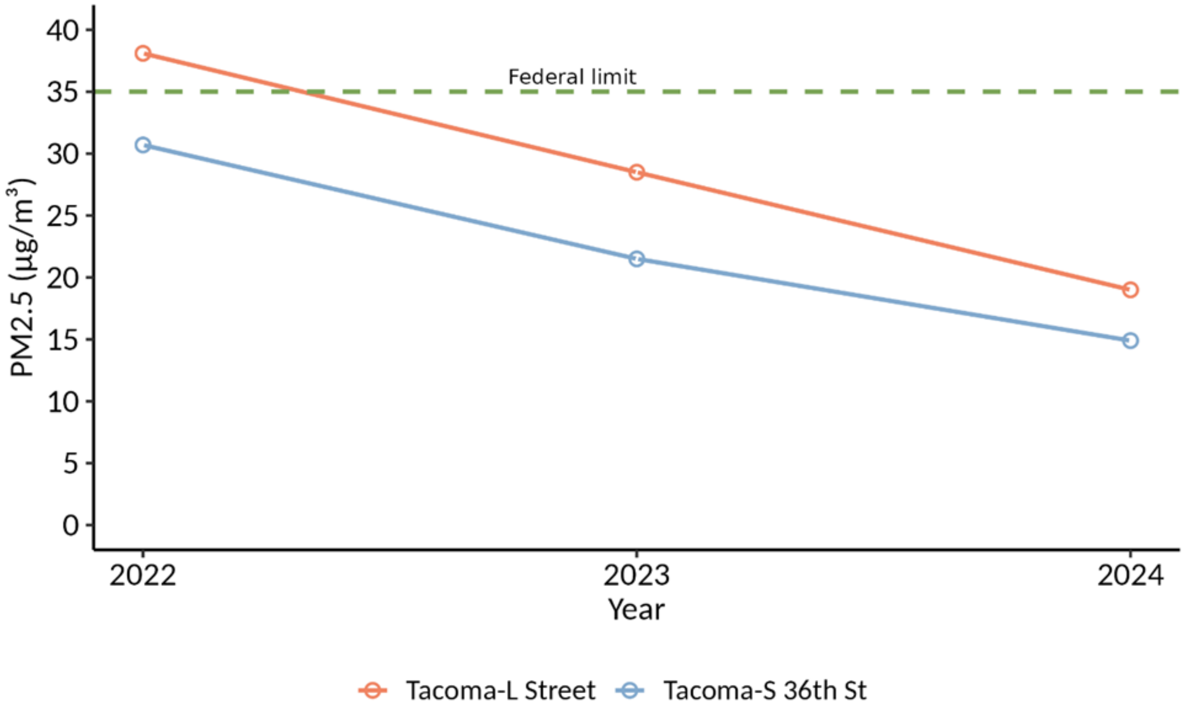


Figure A1. 24-hour $PM_{2.5}$ (98^{th} percentile) concentrations at South and East Tacoma monitoring sites. Days impacted by wildfire smoke are included. Dashed line is the federal limit (NAAQS) for 24-hr $PM_{2.5}$ (35 µg/m³).

Appendix B. Supplemental Health Impacts Tables

Table B1. Estimated annual deaths by any cause related to yearly $PM_{2.5}$ exposure among 18–84-year-olds in South and East Tacoma by racial and ethnic group, 2022–2023 (based on effect estimates in study by Pope, et al., 2019[9]).

Racial and Ethnic Group	Population (18-84-year-olds)	Estimated Annual Deaths [95% CI]	Estimated annual deaths per 100,000 population [95% CI]	Estimated age-adjusted annual deaths per 100,000 population [95% CI]
All	118,469	64 [46 to 81]	54 [39 to 68]	64 [46 to 81]
Hispanic	17,542	8 [4 to 11]	44 [25 to 62]	90 [51 to 127]
Non-Hispanic AIAN	1,958	1 [-1 to 3]	51 [-35 to 128]	61 [-42 to 154]
Non-Hispanic Asian	13,745	8 [-6 to 21]	60 [-41 to 152]	59 [-41 to 149]
Non-Hispanic Black	15,672	12 [4 to 19]	75 [23 to 123]	93 [29 to 152]
Non-Hispanic NHOPI	3,583	1 [-1 to 3]	31 [-21 to 78]	56 [-38 to 141]
Non-Hispanic 2+ races	9,670	4 [-3 to 9]	38 [-26 to 95]	66 [-45 to 165]
Non-Hispanic White	56,299	38 [25 to 51]	68 [44 to 90]	68 [44 to 91]

AIAN: American Indian and Alaska Native; CI: confidence interval; NHOPI: Native Hawaiian and Other Pacific Islander.

Race categories only include people who identify as non-Hispanic to reflect the race categories used in the study by Pope, et al.

Population is the average of the 2022 and 2023 Washington State Office of Financial Management estimates for the census tracts that comprise this overburdened community.

The age-adjusted rate indicates the expected rate if the age distribution in this overburdened community matched that of Washington State.

Table B2. Estimated annual deaths by any cause related to yearly $PM_{2.5}$ exposure among 65–99-year-olds in South and East Tacoma by racial and ethnic group, 2022–2023 (based on effect estimates in study by Di, et al., 2017[39]).

Racial and Ethnic Group	Population (65-99-year-olds)	Estimated Annual Deaths [95% CI]	Estimated annual deaths per 100,000 population [95% CI]	Estimated age-adjusted annual deaths per 100,000 population [95% CI]
All	20,399	32 [31 to 33]	158 [154 to 163]	163 [159 to 167]
Hispanic	1,024	2 [2 to 2]	178 [154 to 201]	198 [171 to 224]
AIAN	394	1 [0 to 1]	178 [109 to 243]	207 [127 to 283]
Asian	3,262	7 [5 to 8]	208 [164 to 250]	208 [164 to 250]
Black	2,404	10 [10 to 10]	412 [396 to 427]	443 [426 to 460]
NHOPI	286	1 [0 to 1]	177 [108 to 241]	213 [131 to 292]
2+ races	998	2 [1 to 3]	197 [121 to 269]	222 [137 to 304]
White	13,055	19 [18 to 20]	147 [141 to 153]	148 [142 to 154]

AIAN: American Indian and Alaska Native; CI: confidence interval; NHOPI: Native Hawaiian and Other Pacific Islander.

Race categories include people who identify as Hispanic and non-Hispanic to reflect the race categories used in the study by Di, et al.

Population is the average of the 2022 and 2023 Washington State Office of Financial Management estimates for the census tracts that comprise this overburdened community.

The age-adjusted rate indicates the expected rate if the age distribution in this overburdened community matched that of Washington State.

[39] Di, Q., Wang Y., Zanobetti, A., Wang, Y., Koutrakis, P., Choirat, C., Dominici, F., Schwartz, J.D. 2017. Air Pollution and Mortality in the Medicare Population. *The New England Journal of Medicine*, 376(26), pp. 2513-2522.

Table B3. Annual mortality and morbidity associated with yearly $PM_{2.5}$ exposure (yearly 24-hour average concentrations) in South and East Tacoma, 2022-2023. Brackets [ ] include 95% confidence interval.

Health Outcome	Age Group	Source of Risk Estimate	Population	Estimated Annual Number [95% CI]	Estimated annual rate per 100,000 population [95% CI]
Deaths – Any cause	65 to 99	Di et al., 2017[40]	20,399	32 [31 to 33]	158 [154 to 163]
Deaths – Any cause	18 to 84	Pope et al., 2019[41]	118,469	64 [46 to 81]	54 [39 to 68]
Deaths – Cardiovascular disease	18 to 99	Alexeeff et al., 2023[42]	120,396	17 [7 to 27]	14 [6 to 23]
Deaths – Ischemic heart disease	30 to 99	Jerrett et al., 2017[43]	92,246	17 [13 to 21]	18 [14 to 22]
Deaths – Ischemic heart disease	30 to 99	Krewski et al., 2009[44]	92,246	25 [21 to 30]	27 [22 to 32]
Deaths – Ischemic heart disease	30 to 99	Pope et al., 2019[45]	92,246	16 [11 to 20]	17 [12 to 21]

[40] Di, Q., Wang Y., Zanobetti, A., Wang, Y., Koutrakis, P., Choirat, C., Dominici, F., Schwartz, J.D. 2017. Air Pollution and Mortality in the Medicare Population. *The New England Journal of Medicine*, 376(26), pp. 2513-2522.
[41] Pope, C.A., 3rd, Lefler, J.S., Ezzati, M., Higbee, J.D., Marshall, J.D., Kim, S.Y., Bechle, M., Gilliat, K.S., Vernon, S.E., Robinson, A.L., & Burnett, R.T. (2019). Mortality Risk and Fine Particulate Air Pollution in a Large, Representative Cohort of U.S. Adults. *Environmental Health Perspectives*, 127(7), 77007.
[42] Alexeeff SED, K.Van Den Eeden, S.Schwartz, J.Liao, N. S.Sidney, S. Association of Long-term Exposure to Particulate Air Pollution with Cardiovascular Events in California. *JAMA Network Open*. 2023;6(2):e230561.
[43] Jerrett, 2017. Comparing the Health Effects of Ambient Particulate Matter Estimated Using Ground-Based Versus Remote Sensing Exposure Estimates. *Environmental Health Perspectives*. 2017 Apr;125(4):552-559. doi: 10.1289/EHP575. Epub 2016 Sep 9.
[44] Krewski D, Jerrett M, Burnett R, et al. 2009. Extended Follow-Up and Spatial analysis of the American Cancer Society Linking Particulate Air Pollution and Mortality. Health Effects Institute, Cambridge MA
[45] Pope, C.A., 3rd, Lefler, J.S., Ezzati, M., Higbee, J.D., Marshall, J.D., Kim, S.Y., Bechle, M., Gilliat, K.S., Vernon, S.E., Robinson, A.L., & Burnett, R.T. (2019). Mortality Risk and Fine Particulate Air Pollution in a Large, Representative Cohort of U.S. Adults. *Environmental Health Perspectives*, 127(7), 77007.

Deaths – Lung Cancer	30 to 99	Krewski, et al., 2009[46]	92,246	4 [2 to 6]	4 [2 to 6]
Deaths – Lung Cancer	30 to 99	Turner et al., 2016[47]	92,246	3 [1 to 4]	3 [1 to 5]
Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Alexeeff, et al., 2023[48]	120,396	28 [16 to 39]	23 [13 to 33]
Lung Cancer Diagnoses	30 to 99	Gharibvand et al., 2016[49]	92,246	15 [5 to 24]	17 [5 to 26]

CI: confidence interval. CIs are inversely proportional to population sizes reflecting higher uncertainty when estimating effects with smaller numbers of people. CIs that include 0 indicate that it is plausible that no deaths are associated with $PM_{2.5}$ in this group in this community.

Population is the average of the 2022 and 2023 Washington State Office of Financial Management estimates for the census tracts that comprise this overburdened community.

The age-adjusted rate indicates the expected rate if the age distribution in this overburdened community matched that of Washington State.

Health outcomes were selected based on the availability of effect estimates for that outcome relevant to the Washington population in the scientific literature. Where multiple effect estimates exist, we listed the model results separately for each. See the 2025 EJ Report for more information.

[46] Krewski D, Jerrett M, Burnett R, et al. 2009. Extended Follow-Up and Spatial analysis of the American Cancer Society Linking Particulate Air Pollution and Mortality. Health Effects Institute, Cambridge MA

[47] Turner, M.C., Jerrett, M., Pope, C.A., III, Krewski, D., Gapstur, S.M., Diver, W.R., Beckerman, B.S., Marshall, J.D., Su, J., Crouse, D.L., & Burnett, R.T. (2016). Long-term ozone exposure and mortality in a large prospective study. *American Journal of Respiratory Critical Care Medicine* 193(10): 1134-1142.

[48] Alexeeff SED, K.Van Den Eeden, S.Schwartz, J.Liao, N. S.Sidney, S. Association of Long-term Exposure to Particulate Air Pollution with Cardiovascular Events in California. *JAMA Network Open*. 2023;6(2):e230561.

[49] Gharibvand, L., Shavlik, D., Ghamsary, M., Beeson, W.L., Soret, S., Knutsen, R., & Knutsen, S.F. (2016). The association between ambient fine particulate air pollution and lung cancer incidence: results from the AHSMOG-2 study. *Environmental Health Perspectives* 125 (3): 378?384

Table B4. Annual mortality and morbidity associated with daily $PM_{2.5}$ exposure (daily 24-hour average concentrations) in South and East Tacoma, 2022-2023. Brackets [ ] include 95% confidence interval.

Health Outcome	Age Group	Source of Risk Estimate	Population	Estimated Annual Number [95% CI]	Estimated annual rate per 100,000 population [95% CI]
Deaths – Any cause	0 to 99	Ito et al., 2013[50]	155,114	1 [0 to 2]	1 [0 to 1]
Deaths – Any cause	65 to 99	Zanobetti et al., 2014[51]	20,399	3 [2 to 4]	14 [9 to 19]
Deaths – Cardiovascular disease	0 to 99	Liu et al., 2022[52]	155,114	2 [0 to 3]	1 [0 to 2]
Deaths – Respiratory	0 to 99	Liu et al., 2022[53]	155,114	3 [0 to 5]	2 [0 to 4]
Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Sullivan et al., 2005[54]	120,396	5 [-6 to 15]	4 [-5 to 13]

[50] Ito, K., Ross, Z., Zhou, J., Nádas, A., Lippmann, M. and Thurston, G.D., 2013. NPACT Study 3. Time-series analysis of mortality, hospitalizations, and ambient $PM_{2.5}$ and its components. National Particle Component Toxicity (NPACT) Initiative. https://www.healtheffects.org/publication/national-particle-component-toxicity-npact-initiative-integrated-epidemiologic-and

[51] Zanobetti, A., Dominici, F., Wang, Y. and Schwartz, J.D., 2014. A national case-crossover analysis of the short-term effect of $PM_{2.5}$ on hospitalizations and mortality in subjects with diabetes and neurological disorders. *Environmental Health*, 13(1), p.38.

[52] Liu, R.A., Wei, Y., Qiu, X., Kosheleva, A. and Schwartz, J.D., 2022. Short term exposure to air pollution and mortality in the US: a double negative control analysis. *Environmental Health*, 21(1), p.81.

[53] Liu, R.A., Wei, Y., Qiu, X., Kosheleva, A. and Schwartz, J.D., 2022. Short term exposure to air pollution and mortality in the US: a double negative control analysis. *Environmental Health*, 21(1), p.81.

[54] Sullivan, J., L. Sheppard, A. Schreuder, N. Ishikawa, D. Siscovick and J. Kaufman. 2005. Relation between short-term fine-particulate matter exposure and onset of myocardial infarction. Epidemiology. Vol. 16 (1): 41-8.

Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Zanobetti et al., 2009[55]	120,396	6 [3 to 8]	5 [2 to 7]
Hospital Admissions – All Respiratory	65 to 99	Zanobetti et al., 2009[56]	20,399	26 [15 to 36]	126 [72 to 178]
Hospital Admissions – Asthma	0 to 64	Sheppard et al., 2003[57]	134,716	18 [7 to 28]	13 [5 to 21]
ED Visits – Asthma	0 to 99	Mar et al., 2010[58]	155,114	132 [33 to 224]	85 [21 to 145]
ED Visits – Asthma	0 to 99	Slaughter, J. C., et al., 2005[59]	155,114	70 [-61 to 191]	45 [-39 to 123]
ED Visits – Asthma	0 to 17	Norris, G., et al., 1999[60]	34,718	95 [49 to 137]	273 [140 to 393]

ED: emergency department; CI: confidence interval. CIs are inversely proportional to population sizes reflecting higher uncertainty when estimating effects with smaller numbers of people. CIs that include 0 indicate that it is plausible that no deaths are associated with $PM_{2.5}$ in this group in this community.

Population is the average of the 2022 and 2023 Washington State Office of Financial Management estimates for the census tracts that comprise this overburdened community.

[55] Zanobetti, A., Franklin, M., Koutrakis, P. and Schwartz, J., 2009. Fine particulate air pollution and its components in association with cause-specific emergency admissions. *Environmental Health*, 8(1), p.58.
[56] Zanobetti, A., Franklin, M., Koutrakis, P. and Schwartz, J., 2009. Fine particulate air pollution and its components in association with cause-specific emergency admissions. *Environmental Health*, 8(1), p.58.
[57] Sheppard, L. Ambient Air Pollution and Nonelderly Asthma Hospital Admissions in Seattle, Washington, 1987-1994. In: Revised Analyses of Time-Series Studies of Air Pollution and Health. 2003, Health Effects Institute: Boston, MA. p. 227-230.
[58] Mar, T. F., J. Q. Koenig and J. Primomo. 2010. Associations between asthma emergency visits and particulate matter sources, including diesel emissions from stationary generators in Tacoma, Washington. *Inhalation Toxicology*. Vol. 22 (6): 445-8.
[59] Slaughter, J. C., E. Kim, L. Sheppard, J. H. Sullivan, T. V. Larson and C. Claiborn. 2005. Association between particulate matter and emergency room visits, hospital admissions and mortality in Spokane, Washington. *Journal of Exposure Analysis and Environmental Epidemiology*. Vol. 15
[60] Norris, G., et al. An association between fine particles and asthma emergency department visits for children in Seattle. *Environmental Health Perspectives*, 1999. 107(6): p. 489-93.

The age-adjusted rate indicates the expected rate if the age distribution in this overburdened community matched that of Washington State.

Health outcomes were selected based on the availability of effect estimates for that outcome relevant to the Washington population in the scientific literature. Where multiple effect estimates exist, we listed the model results separately for each. See the 2025 EJ Report for more information.

Table B5. Annual mortality and morbidity associated with seasonal and daily O_3 exposure (seasonal and daily 8-hour maximum concentrations) in South and East Tacoma, 2022-2023. Brackets [ ] include 95% confidence interval.

Health Outcome	Age Group	Source of Risk Estimate	Population	Estimated Annual Number [95% CI]	Estimated annual rate per 100,000 population [95% CI]
Deaths – Any cause (Seasonal)	65 to 99	Di, et al. 2017[61]	20,399	3 [2 to 5]	17 [11 to 22]
Deaths – Any cause (Daily)	0 to 99	Zanobetti and Schwartz, 2008[62]	155,114	2 [1 to 3]	1 [1 to 2]
ED Visits – Asthma (Daily)	0 to 99	Mar and Koenig, 2009[63]	155,114	103 [24 to 172]	66 [16 to 111]
Hospital Admissions – All Respiratory (Daily)	65 to 99	Schwartz, 1995[64]	20,399	31 [9 to 51]	152 [43 to 251]

ED: emergency department; CI: confidence interval. CIs are inversely proportional to population sizes reflecting higher uncertainty when estimating effects with smaller numbers of people. CIs that include 0 indicate that it is plausible that no deaths are associated with O_3 in this group in this community.

[61] Di, Q., Wang Y., Zanobetti, A., Wang, Y., Koutrakis, P., Choirat, C., Dominici, F., Schwartz, J.D. 2017. Air Pollution and Mortality in the Medicare Population. *The New England Journal of Medicine*, 376(26), pp. 2513-2522.

[62] Zanobetti, A. and Schwartz, J., 2008. Mortality displacement in the association of ozone with mortality: an analysis of 48 cities in the United States. *American Journal of Respiratory and Critical Care Medicine*, 177(2), pp.184-189.

[63] Mar, T.F. and Koenig, J.Q. (2009). Relationship between visits to emergency departments for asthma and ozone exposure in greater Seattle, Washington. *Annals of Allergy, Asthma & Immunology*, 103, 474-479.

[64] Schwartz, J., 1995. Short term fluctuations in air pollution and hospital admissions of the elderly for respiratory disease. *Thorax*, 50(5), pp.531-538.

Population is the average of the 2022 and 2023 Washington State Office of Financial Management estimates for the census tracts that comprise this overburdened community.

Age-adjusted rate indicates the expected rate if the age distribution in this overburdened community matched that of Washington State.

Health outcomes were selected based on the availability of effect estimates for that outcome relevant to the Washington population in the scientific literature. Where multiple effect estimates exist, we listed the model results separately for each. See the 2025 EJ Report for more information.