

South King County Community 2025 Environmental Justice Report



Publication Information

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Executive Summary

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

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



Community Overview

The South King County community was identified as overburdened and highly impacted by air pollution (OBC) because it met the statewide screening criteria based on the Washington Environmental Health Disparities map¹ ranking, the EJScreen demographic index,² and experiences short-term exposure to fine particulate matter (PM_{2.5}) and cumulative criteria air pollution driven by PM_{2.5}, ozone (O₃) and nitrogen dioxide (NO₂) in some areas. Community identification is described in more detail in the [Overburdened Communities Highly Impacted by Air Pollution StoryMap](#).

Land Area: 67.6 sq. mi

Population: 211,445

County: King

Municipal Government: Kent, Renton, Federal Way, Auburn, Des Moines, SeaTac, Algona, Pacific City Councils

Ecology Region: Northwest

Local Clean Air Authority: Puget Sound Clean Air Agency

Local Health Jurisdiction: Seattle-King County Public Health

Primary languages spoken: English, Spanish, Russian, Vietnamese, Korean, Somali, Amharic, Chinese, Ukrainian

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



Geographic characteristics

The South King County community identified as overburdened and highly impacted by air pollution contains all or part of the following cities: Tukwila, Renton, Des Moines, SeaTac, Kent, Auburn, Algona, Pacific, and Federal Way. It is immediately adjacent to the designated South Seattle community. A corridor of manufacturing facilities, distribution centers, businesses, and rail lines run north-south through the center of this community. Other parts of the community are mostly residential, although there are some natural areas and agricultural land along the

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>

Green River. The community is bounded by the Puyallup Tribe Reservation to the southwest and the Muckleshoot Tribe Indian Reservation to the southeast, and contains a limited amount of off-reservation Tribal land.

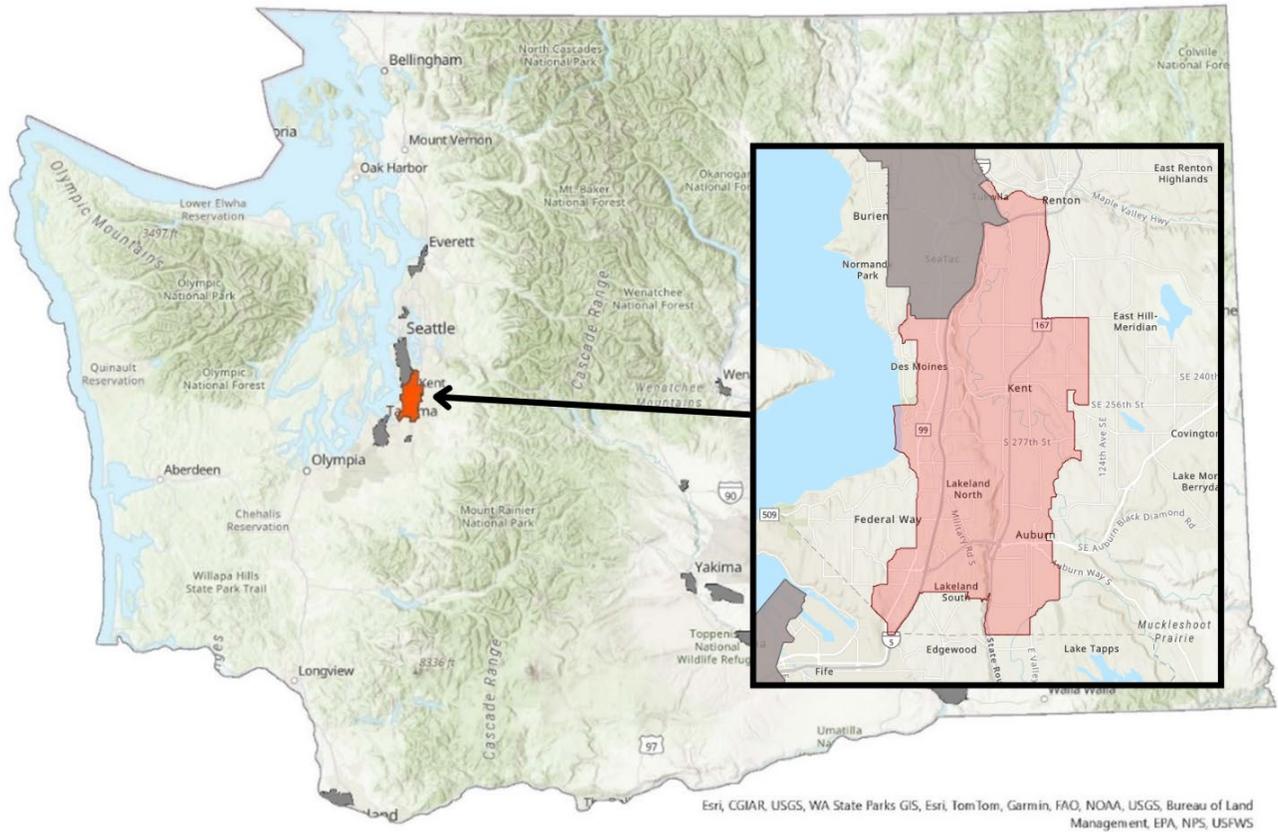


Figure 1. Map of the 16 overburdened communities highly impacted by air pollution in Washington State (gray), with South King County highlighted (red).

Socioeconomic characteristics

South King County is one of the most ethnically and culturally diverse communities and parts of the state. Over two-fifths of households speak one or more languages other than English at home. Over three-fifths of residents are people of color, including about one-fifth who are Asian, one-fifth who are Hispanic, and one-seventh who are Black. South King County has the

largest share of residents, about 1 in 25, who are Native Hawaiian or Pacific Islander among the 16 identified communities. A quarter of the population in this community are children.^{3,4}

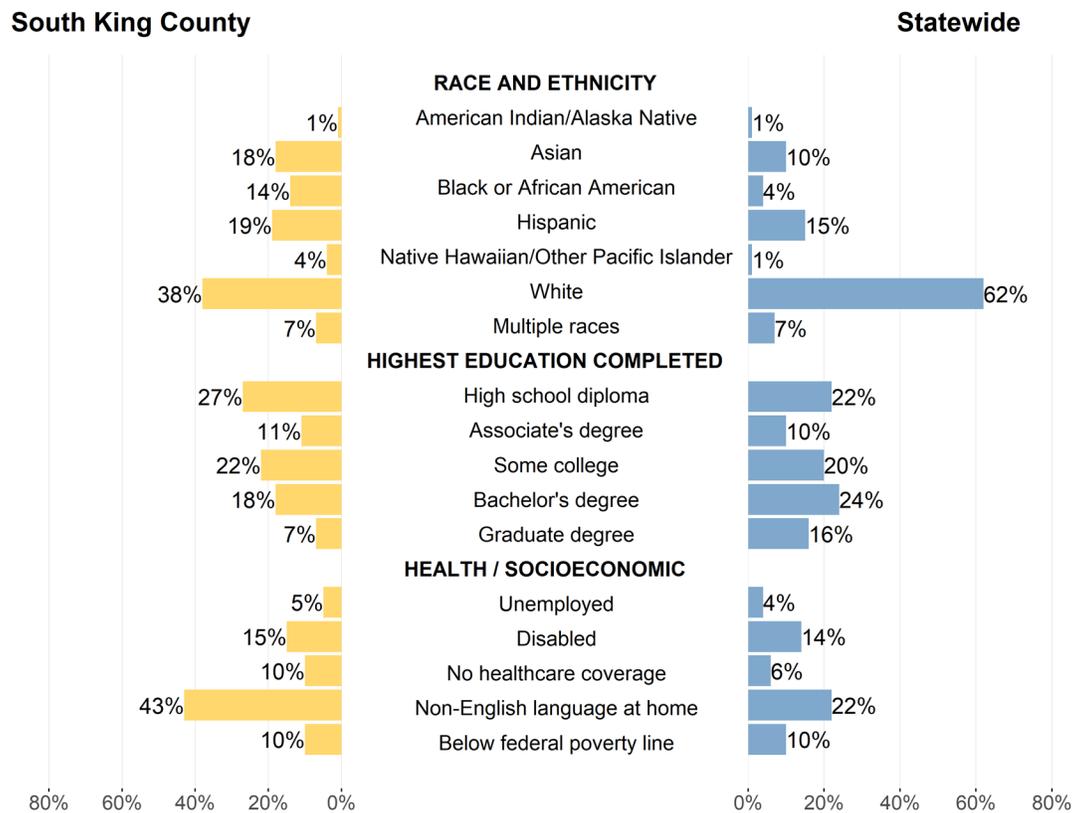


Figure 2. Sociodemographic characteristics of the South King County community compared to statewide percentages, based on Washington State's 2024 estimated population of 8,035,700.⁵

Health characteristics

According to 2022 CDC health survey data,⁶ South King County has lower prevalences of chronic health conditions among individuals aged 18 years and older relative to the statewide

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/>

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>

population, including asthma (10.8% vs. 11.4%), cardiovascular disease (5.2% vs. 5.7%), COPD (5.3% vs. 5.7%), and diabetes (9.4% vs. 9.6%). 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.

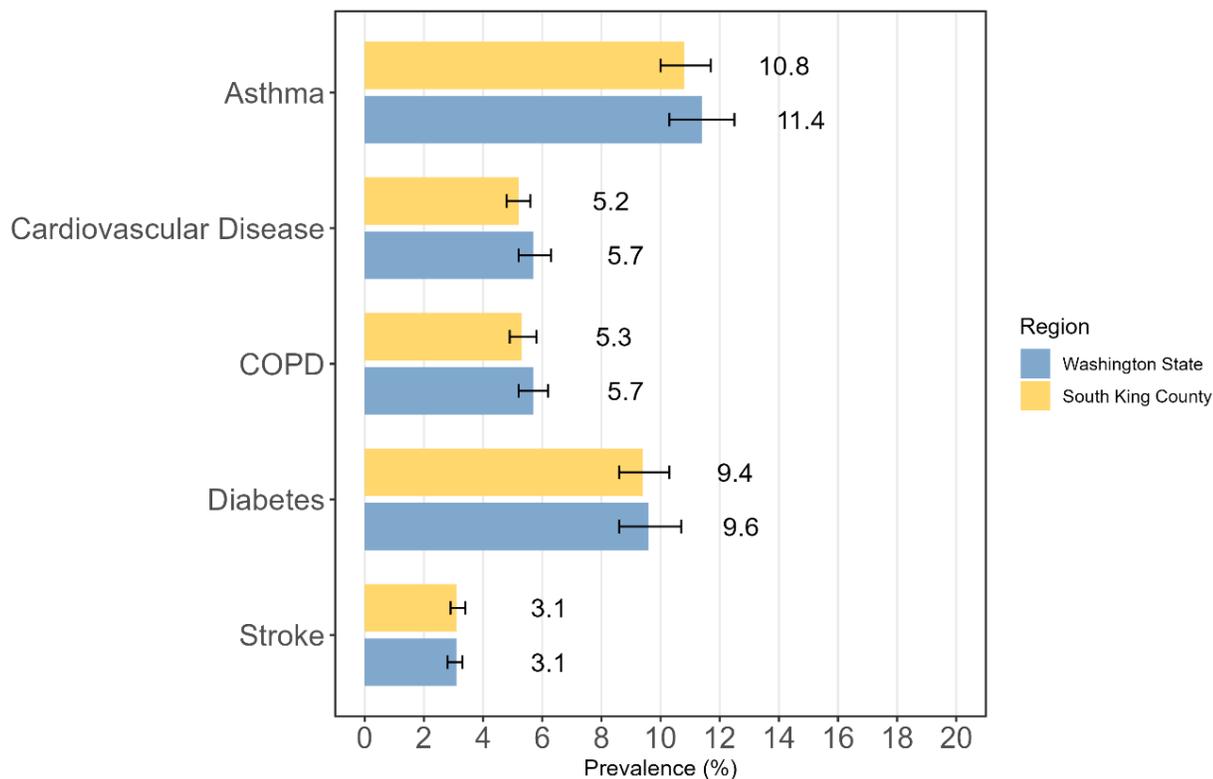


Figure 3. Prevalence of chronic health conditions among people ages 18 years and older in South King County census tracts compared with Washington State.

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

In the South King County community, Puget Sound Clean Air Agency (PSCAA) own and operate the Auburn-29th St PM_{2.5} monitor. The Kent-James and Central PM_{2.5} monitor was operational until June 2023. In 2025, three additional low-cost, high accuracy PM_{2.5} sensors (SensWA) were installed using Climate Commitment Act funds, and data from these sensors will be included in

the next biennial EJ Report (Figure 4). No other criteria air pollutants are currently monitored in the South King County community.

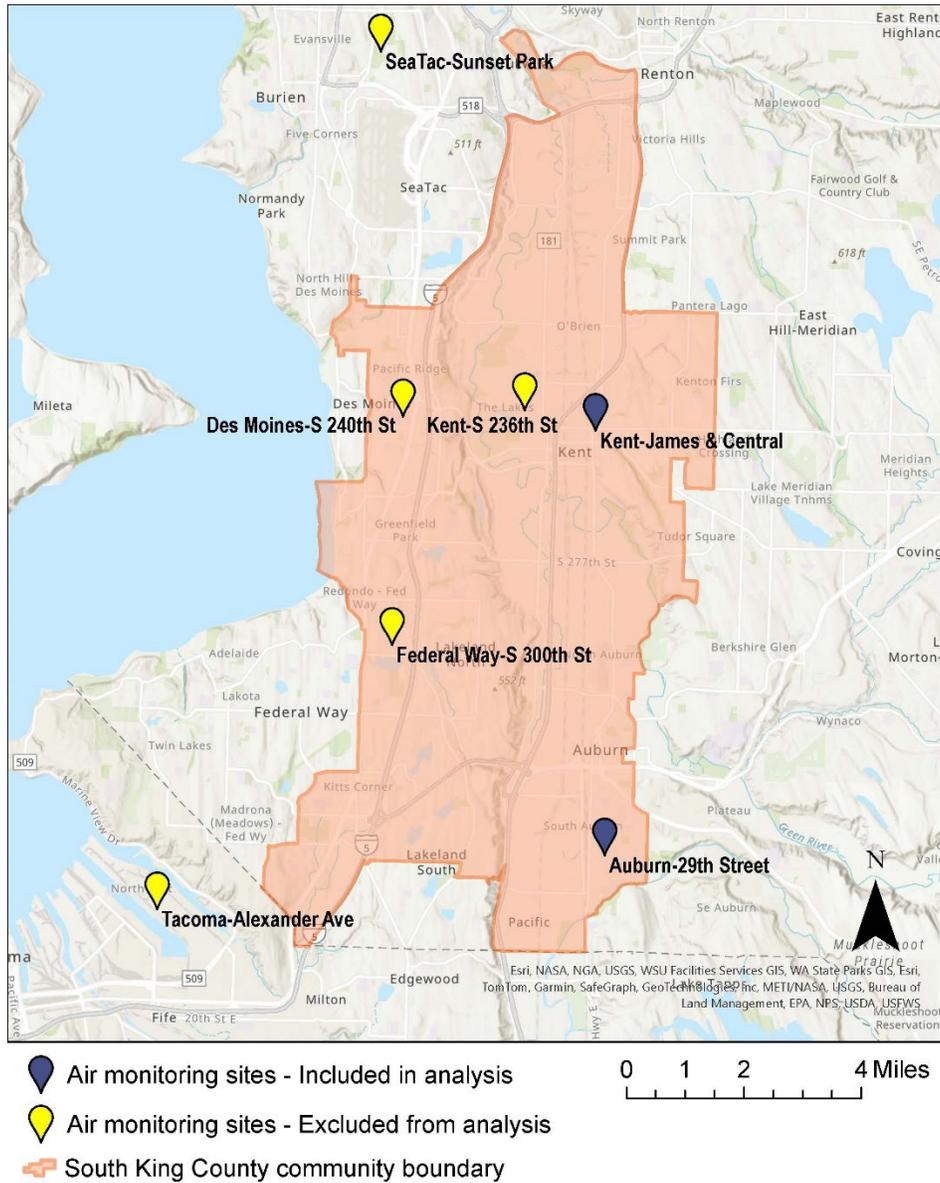


Figure 4. Map of South King County air monitoring sites.

Table 1. South King County criteria air pollutant monitors.

Monitoring Site	Type	Site Owner	Pollutants Monitored
Kent-James & Central	Non-regulatory	Discontinued in 2023	PM _{2.5}
Auburn-29th Street	Non-regulatory	PSCAA	PM _{2.5}

Criteria Air Pollution

This report summarizes criteria air pollutant (CAPs) concentrations in the South King County community from 2022 through 2024. CAPs concentrations for PM_{2.5} are reported using data from the Washington State Air Monitoring Network and calculated 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 King County 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 King County community experienced an average of 3.7 days with unhealthy air quality (Figure 5). In comparison, from 2020-2022, the annual average was 6.3 days. Although the Kent-James and Central monitor was discontinued in 2023, data was included from 2022 and part of 2023.

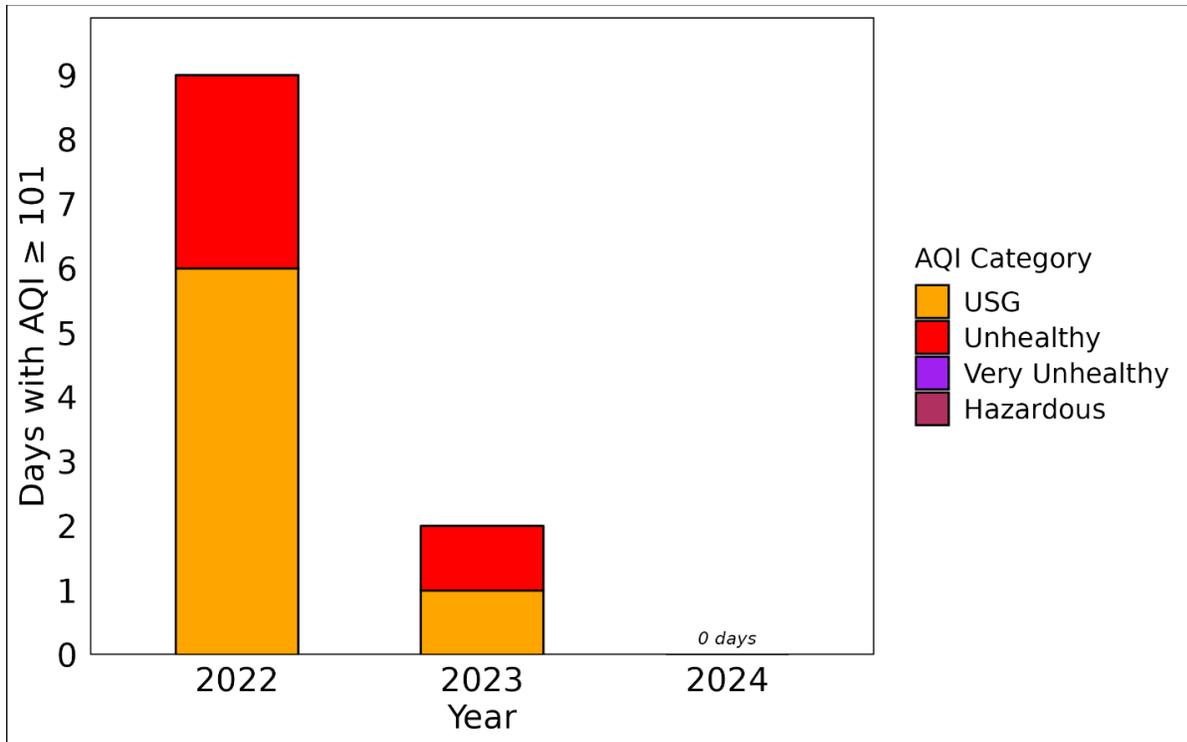


Figure 5. Number of days 2022-2024 with unhealthy air quality. Includes days impacted by wildfire smoke.

Table 2 includes 24-hour PM_{2.5} (98th percentile) summary statistics. 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} (98th percentile) is 35 µg/m³. The design value for 24-hour PM_{2.5} (98th 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.

In 2022, the 24-hour PM_{2.5} (98th percentile) concentration exceeded the NAAQS at the Auburn-29th St monitoring site (Table 2; Figure 6). Otherwise, 24-hour PM_{2.5} levels were below the NAAQS threshold. Values in brackets in Table 2 exclude wildfire-impacted days when the 24-hour average PM_{2.5} concentrations exceeded 35.4 µg/m³.

Table 2. 24-hour PM_{2.5} (98th percentile) summary statistics (2024) 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
Kent-James & Central	33.7 [32.7]	<i>16.0</i> [<i>16.0</i>]	DNC	*
Auburn-29th St	38.5 [26.2]	17.4 [17.0]	16.0 [16.0]	24 [20]

Italics indicate incomplete annual data, DNC = data not collected, NAAQS = national ambient air quality standards, PM = particulate matter, µg/m³ = micrograms per cubic meter, * = incomplete data for 3-year design value



Figure 6. **24-hour PM_{2.5} (98th percentile) summary statistics, 2022-2024.** Annual summary statistics calculated with and without days elevated from wildfire smoke. Dark blue bar includes three complete years of data, 2022-2024; light blue bars include average of available data from 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. Annual mean PM_{2.5} levels remained below the federal standard at both monitoring sites, except in 2022, when the annual mean exceeded 9.0 µg/m³ at the Kent-James and Central monitoring site (Table 3). Overall, there was a slight decrease in annual mean concentrations from 2022 to 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
Kent-James & Central	9.25 [8.97]	7.36 [7.36]	DNC	8.3 [8.2]
Auburn-29th St	8.88 [6.86]	6.93 [6.38]	5.99 [5.92]	7.3 [6.4]

Italics indicate incomplete annual data, DNC = data not collected, NAAQS = national ambient air quality standards, PM = particulate matter, µg/m³ = micrograms per cubic meter, * = incomplete data for 3-year design value

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 72 deaths by any cause (40 deaths per 100,000 population, Table B1) related to yearly PM_{2.5} exposure. Among older adults, we estimated 43 total deaths (134 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 the most PM_{2.5} related deaths by any cause per year among non-Hispanic White people (52 deaths among 18–84-year-olds). However, when accounting for the ages of people in each racial and ethnic group⁷, the

⁷ 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.

annual age-adjusted mortality rate was highest among Hispanic people (71 deaths per 100,000 population) and non-Hispanic Black people (69 deaths per 100,000 population).

Figure 7 is based on the study by Pope et al. (2019),⁸ 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.

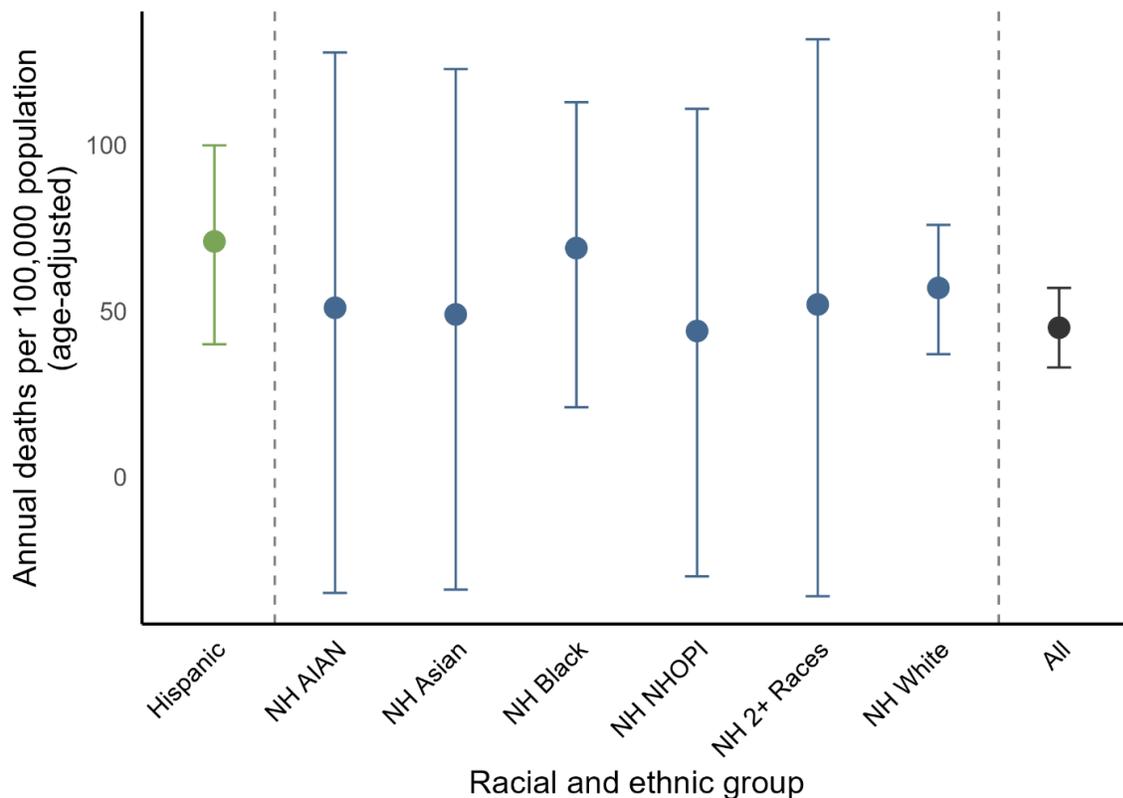


Figure 7. Age-adjusted annual death rates associated with long-term $PM_{2.5}$ exposure among ages 18-84 by racial and ethnic group in South King County.

When assessing specific causes of death related to yearly $PM_{2.5}$ concentrations (Table B3), we estimated 21 deaths due to cardiovascular disease (11 deaths per 100,000 population), 20 to 32 deaths due to ischemic heart disease (14 to 22 deaths per 100,000 population), and 4 to 6 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 36 hospital admissions (20 visits per 100,000 population) for acute non-fatal myocardial infarction were associated with

⁸ 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.

yearly PM_{2.5} concentrations among adults. Additionally, 24 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 4 (12 per 100,000 population) deaths by any cause among older adults ages 65 to 99. For non-fatal conditions, daily PM_{2.5} exposure was associated with 6 to 7 acute non-fatal myocardial infarction admissions (3 to 4 per 100,000 population) among all adults, 29 respiratory admissions (91 per 100,000 population) among older adults ages 65 to 99, 15 asthma hospital admissions (7 per 100,000 population) among people ages 0 to 64. Additionally, 50 to 94 asthma-related emergency department (ED) visits (21 to 39 per 100,000 population) among all people and 63 asthma-related ED visits (112 per 100,000 population) among youths ages 0 to 17 years were associated with daily PM_{2.5} exposure.

Ozone

We estimated that O₃ exposure during the warm season (Table B5) was associated with 4 seasonal deaths by any cause among older adults ages 65 to 99 (11 deaths per 100,000 population). Daily O₃ exposure was associated with 2 deaths by any cause (1 per 100,000 population), 64 asthma-related ED visits (27 per 100,000 population) among all people and 32 respiratory hospital admissions (102 per 100,000 population) among older adults ages 65–99.

Greenhouse Gas Emissions

Greenhouse gas emissions data for the South King County overburdened community highly impacted by air pollution include: 1) Emissions from greenhouse gas reporting entities per RCW 70A.65⁹ and WAC 173-441,¹⁰ -446;¹¹ and 2) Mobile source emissions.¹²

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

⁹ Greenhouse Gas Emissions – Cap-and-Invest Program <https://app.leg.wa.gov/RCW/default.aspx?cite=70A.65>

¹⁰ Reporting of Emissions of Greenhouse Gases <https://app.leg.wa.gov/WAC/default.aspx?cite=173-441>

¹¹ Climate Commitment Act – Program Rule <https://app.leg.wa.gov/WAC/default.aspx?cite=173-446>

¹² Environmental Justice Review <https://app.leg.wa.gov/RCW/default.aspx?cite=70A.65.020>

Program.¹³ Businesses that emit over 25,000 MT CO₂e are also subject to the Cap-and-Invest Program (covered sources). Each reporting facility is required to follow a compliance plan.

In the South King County community, three facilities (Figure 8; Table 4) within and near the community boundary reported their emissions in 2022 and 2023. The total reported emissions from these facilities was 66,302 MT CO₂e in 2022 and 64,784 MT CO₂e in 2023, a 2.3% year-to-year decrease. Some facilities in other communities report biogenic carbon (biogenic CO₂)¹⁴ emissions, which are expected to be partially recaptured as part of the natural carbon cycle. For reporting purposes, biogenic CO₂ is subtracted from total metric tons of CO₂e, even though it has the same atmospheric warming effect as non-biogenic CO₂. There were no facilities that reported biogenic CO₂ in South King County. Since 2020, total reported greenhouse gas emissions from facilities within and near OBCs have decreased by 20.3%, and by 6.3% after subtracting biogenic CO₂ emissions. Some year-to-year fluctuations in emissions from individual facilities are expected.

¹³ Mandatory greenhouse gas reports <https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/tracking-greenhouse-gases/mandatory-greenhouse-gas-reports>

¹⁴ 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 CO₂ acts the same way in the atmosphere as non-biogenic CO₂. Anthropogenic processes that include these emissions reduce a facility’s environmental impact.

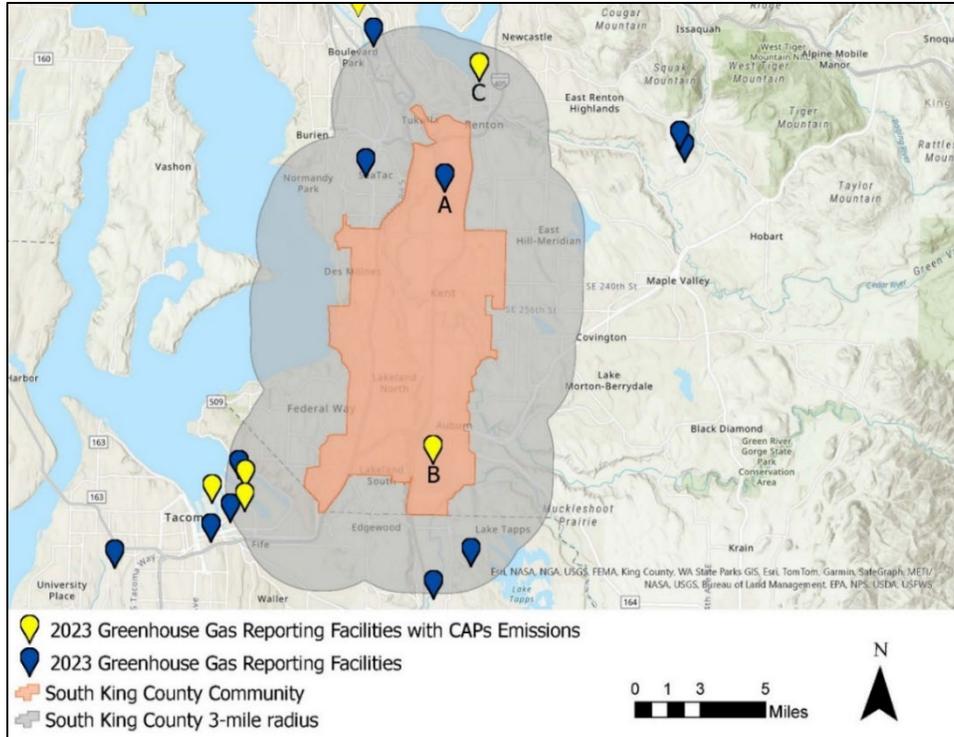


Figure 8. Reporting facilities as of 2023 that are in or near the South King County community boundary. Facility letters correspond with Table 4.

The sites in Figure 8 that are not labeled within the 3-mile radius around the South King County community are represented in neighboring overburdened communities highly impacted by air pollution.

The emissions in Table 4 are in MT CO₂e. Each greenhouse gas uses a conversion factor known as its Global Warming Potential (GWP), in this case AR4 GWP¹⁵, to convert emissions into CO₂e. 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).¹⁶ The Greenhouse Gas Reporting Program uses AR4 GWPs mainly for regulatory stability, consistency, and alignment with other federal programs.

¹⁵ Reporting of Emissions of Greenhouse Gases <https://app.leg.wa.gov/WAC/default.aspx?cite=173-441>

¹⁶ Intergovernmental Panel on Climate Change <https://www.ipcc.ch/>

Table 3. Facility emissions in or nearby¹⁷ the South King County community. Biogenic CO₂ is in brackets [].

	Facility Name/City	Facility Sector	Within Community Boundary	CCA-Covered Facility ¹⁸	Source of CAPs ¹⁹	2022 Emissions (MTCO ₂ e)	2023 Emissions (MTCO ₂ e)
A	Starbucks Kent Flexible Plant - Kent	Food Production	Yes	No	No	12,664 [0]	12,057 [0]
B	The Boeing Company - Auburn	Manufacturing	Yes	Yes	Yes	34,665 [0]	33,303 [0]
C	The Boeing Company - Renton	Manufacturing	Nearby	No	Yes	18,973 [0]	19,424 [0]

¹⁷ “Nearby” refers to facilities within a three-mile radius of the community boundary that were included in this analysis.

¹⁸ Large emitters of greenhouse gases, specifically those emitting 25,000 or more MT CO₂e annually in Washington State that are part of the Cap-and-Invest program established by the Climate Commitment Act.

¹⁹ 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>

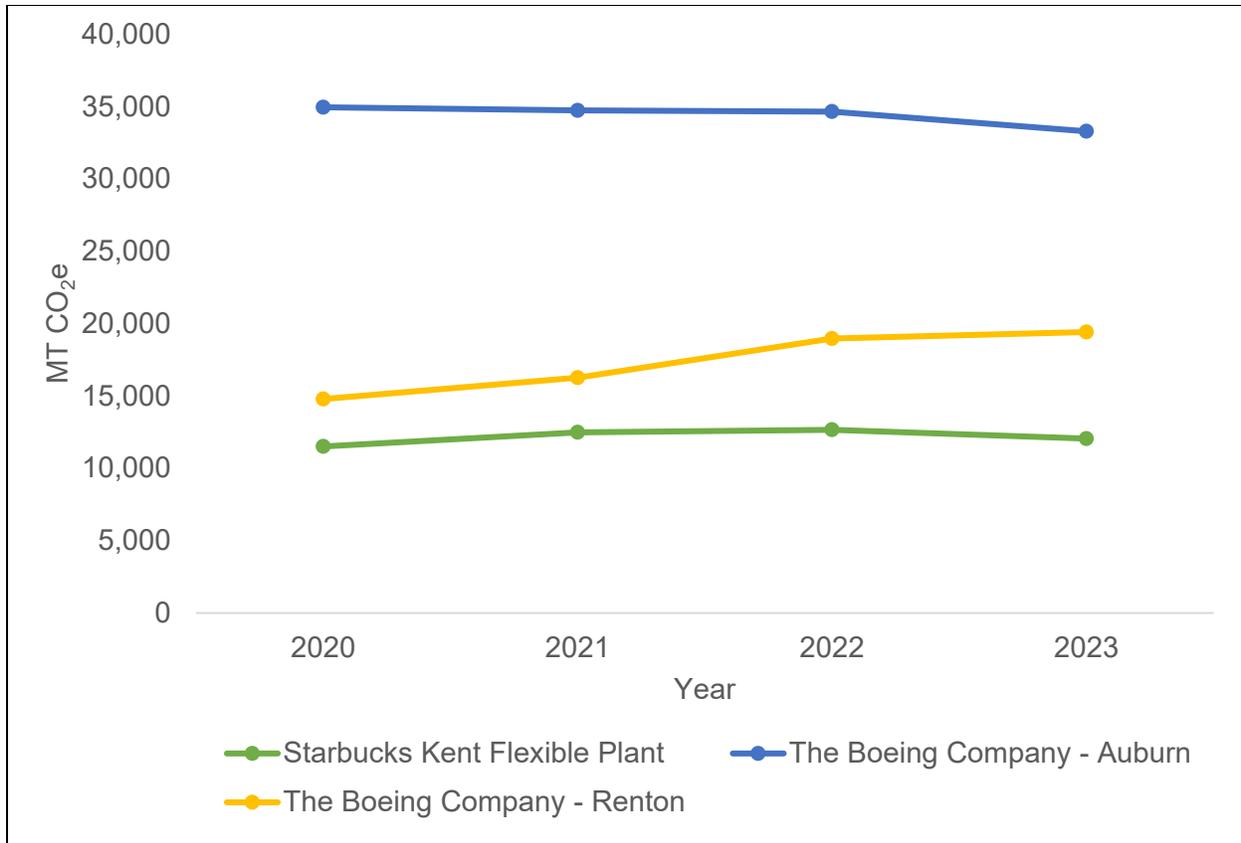


Figure 9. Greenhouse gas reporting facilities and their emissions from 2020-2023.

Mobile sources

In the South King County community, greenhouse gas emissions from mobile sources increased by 21% from 2020 to 2021 (Table 5), but have decreased by 5.4% between 2019 to 2021.²⁰ 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.^{21,22}

Similar to Table 4, the results in Table 5 use AR5 GWPs to convert greenhouse gas emissions into CO₂e. In 2013-2014, the IPCC published AR5 GWPs and AR6 GWPs in 2021-2022. The

²⁰ Improving Air Quality in Overburdened Communities Highly Impacted by Air Pollution 2023 Report <https://apps.ecology.wa.gov/publications/SummaryPages/2302115.html>

²¹ Washington State Greenhouse Gas Emissions Inventory: 1990-2021, Jan 2025 <https://apps.ecology.wa.gov/publications/SummaryPages/2414077.html>

²² 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>

Washington Greenhouse Gas Emissions Inventory²³ uses AR5 GWPs in mobile source emission estimates, as the inventory models for greenhouse gas accounting are revised as science improves.

Table 4. Greenhouse gas emissions from mobile sources per capita from 2020-2021.

Population	2020 Emissions (MT CO ₂ e)	2020 Per Capita MT CO ₂ e	2021 Emissions (MT CO ₂ e)	2021 Per Capita MT CO ₂ e
204,300	749,471	3.7	906,637	4.4

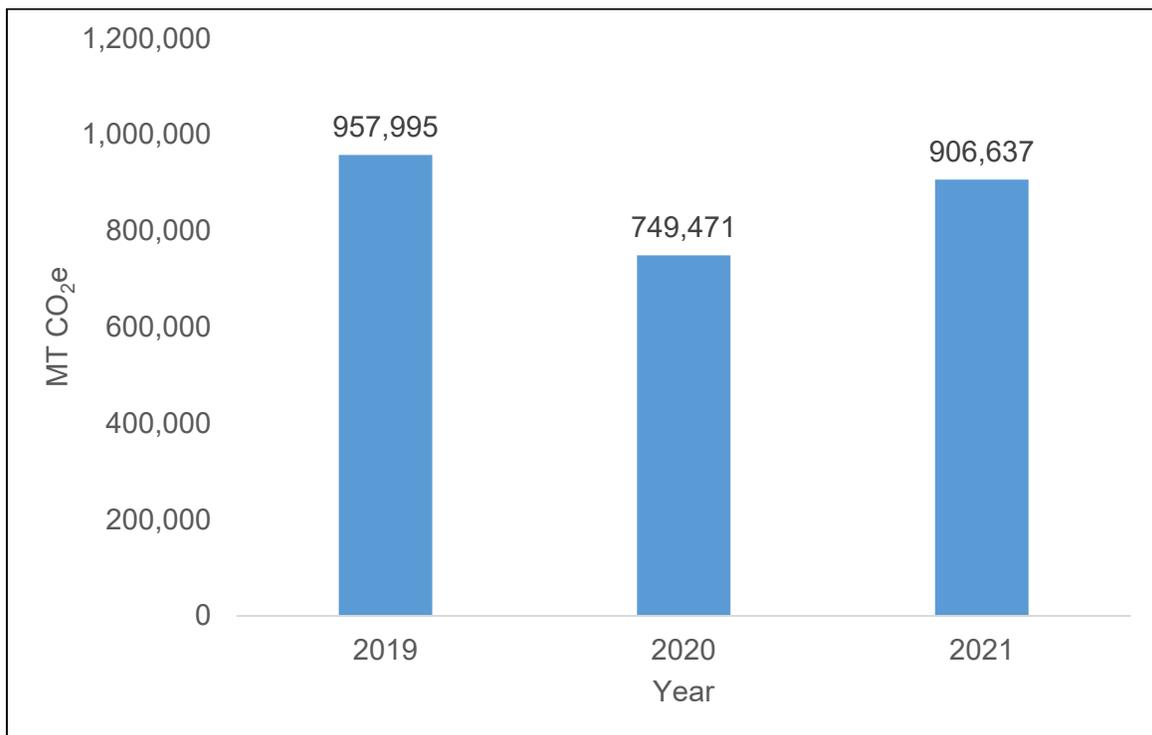


Figure 10. Annual greenhouse gas emissions from mobile sources in the South King County community, 2019-2021.

²³ 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 King County community:

- [King County Community Health Needs Assessment information](#)²⁴
- [Virginia Mason Franciscan Health - Community Health Needs Assessment information](#)²⁵
- [King County Hospitals for a Healthier Community 2024-2025 Community Health Needs Assessment](#)²⁶
- [Providence Swedish 2024 King County Community Health Needs Assessment](#)²⁷
- [Seattle Children's 2022 Community Health Assessment](#)²⁸
- [Public Health-Seattle/King County - Community Health Indicators](#)²⁹
- [Public Health-Seattle/King County - Public health data](#)³⁰
- [Communities Count - Data for King County Communities](#)³¹
- [Zero-emission and electric vehicles mapping tool | WSDOT](#)³²
- [Climate Pollution Reduction Grant \(CPRG\) Overview | Puget Sound Clean Air Agency, WA](#)³³
- [Home | Washington Climate Action](#)³⁴

²⁴ <https://kingcounty.gov/en/dept/dph/about-king-county/about-public-health/chna>

²⁵ <https://www.vmfh.org/about-vmfh/why-choose-vmfh/reports-to-the-community/community-health-needs-assessment>

²⁶ <https://cdn.kingcounty.gov/-/media/king-county/depts/dph/documents/reports/chna/2024-2025-hhc-chna-report.pdf?rev=8f9684eda4ea4a0f93b0981d7ca00ffd&hash=6575EAE5EDBE57F8E3A4538E989AD8DA>

²⁷ <https://www.swedish.org/-/media/project/psjh/providence/socal/files/about/community-benefit/pdfs/2024-2025-chna-report.pdf?rev=86cd9bd48c764b15962deddf1484892d&hash=A1A7ED2E0F4E011981325A7E7C90FEAF>

²⁸ <https://www.seattlechildrens.org/globalassets/documents/about/community/2022-community-health-assessment-cha.pdf>

²⁹ <https://kingcounty.gov/en/dept/dph/about-king-county/about-public-health/data-reports/population-health-data/community-health-indicators>

³⁰ <https://kingcounty.gov/en/dept/dph/about-king-county/about-public-health/data-reports>

³¹ <https://www.communitiescount.org/>

³² <https://wsdot.wa.gov/business-wsdot/grants/zero-emission-vehicle-grants/zero-emission-and-electric-vehicles-mapping-tool>

³³ <https://pscleanair.gov/677/Climate-Pollution-Reduction-Grant>

³⁴ <https://climate.wa.gov/>

Appendix A. Criteria Air Pollution

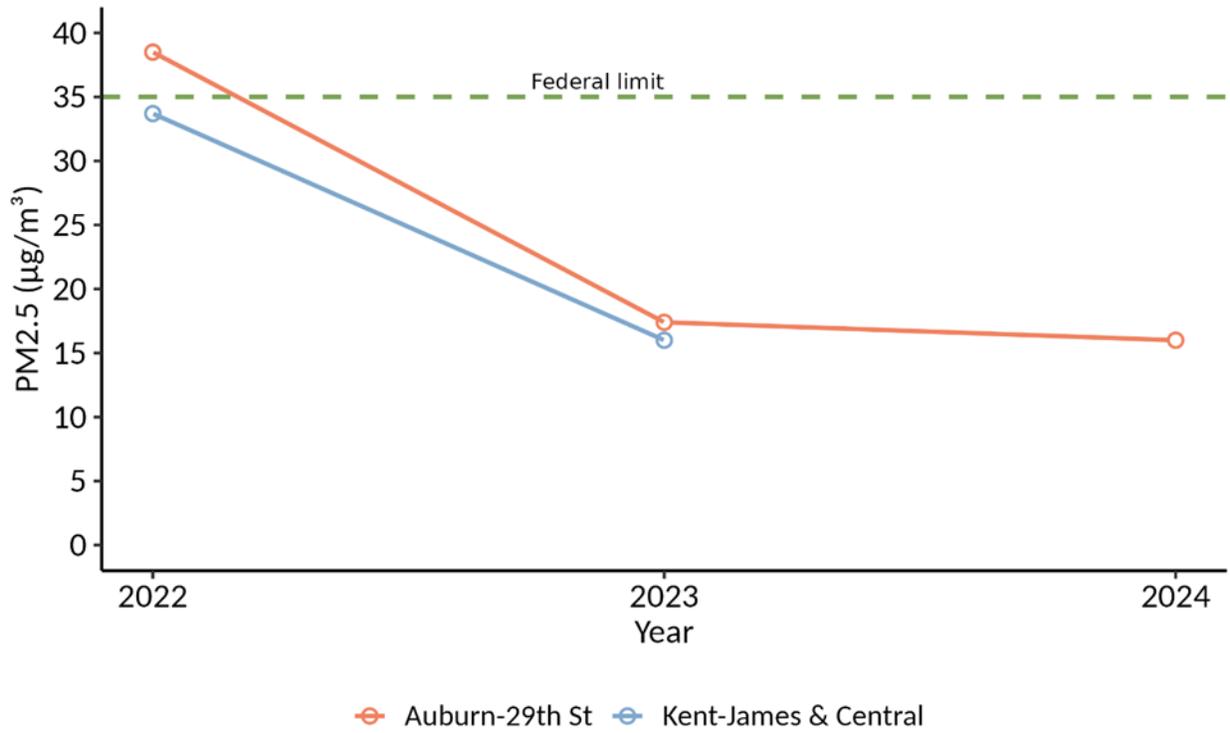


Figure A1. 24-hour $PM_{2.5}$ (98th percentile) concentrations at South King County monitoring sites. Days impacted by wildfire smoke are included. Dashed line is the federal limit for 24-hr $PM_{2.5}$ (35 $\mu g/m^3$).

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 King County by racial and ethnic group from 2022 to 2023 (based on effect estimates in a study by Pope, et al., 2019⁸).

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	180,757	72 [52 to 91]	40 [29 to 50]	45 [33 to 57]
Hispanic	28,258	10 [5 to 14]	34 [19 to 48]	71 [40 to 100]
Non-Hispanic AIAN	1,314	1 [0 to 1]	42 [-29 to 107]	51 [-35 to 128]
Non-Hispanic Asian	33,241	14 [-9 to 35]	42 [-28 to 104]	49 [-34 to 123]
Non-Hispanic Black	23,957	12 [4 to 19]	49 [15 to 80]	69 [21 to 113]
Non-Hispanic NHOPI	6,070	1 [-1 to 4]	24 [-16 to 60]	44 [-30 to 111]
Non-Hispanic 2+ races	10,559	3 [-2 to 8]	31 [-21 to 77]	52 [-36 to 132]
Non-Hispanic White	77,356	52 [34 to 69]	67 [43 to 89]	57 [37 to 76]

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 King County by racial and ethnic group from 2022 to 2023 (based on effect estimates in study by Di, et al., 2017³⁵).

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	31,849	43 [41 to 44]	134 [130 to 137]	132 [128 to 135]
Hispanic	1,584	3 [2 to 3]	161 [139 to 182]	182 [158 to 206]
AIAN	325	1 [0 to 1]	158 [97 to 216]	174 [107 to 238]
Asian	5,299	9 [7 to 10]	160 [127 to 193]	163 [129 to 196]
Black	2,714	8 [8 to 9]	310 [298 to 322]	347 [334 to 360]
NHOPI	412	1 [0 to 1]	128 [79 to 175]	157 [96 to 215]
2+ races	1,191	2 [1 to 3]	179 [110 to 245]	194 [119 to 266]
White	21,908	30 [29 to 31]	136 [131 to 141]	131 [126 to 136]

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.

³⁵ 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 King County, 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 ³⁶	31,849	43 [41 to 44]	134 [130 to 137]
Deaths – Any cause	18 to 84	Pope et al., 2019 ³⁷	180,757	72 [52 to 91]	40 [29 to 50]
Deaths – Cardiovascular disease	18 to 99	Alexeeff et al., 2023 ³⁸	184,126	21 [8 to 33]	11 [4 to 18]
Deaths – Ischemic heart disease	30 to 99	Jerrett et al., 2017 ³⁹	144,436	21 [16 to 26]	15 [11 to 18]
Deaths – Ischemic heart disease	30 to 99	Krewski et al., 2009 ⁴⁰	144,436	32 [26 to 38]	22 [18 to 26]
Deaths – Ischemic heart disease	30 to 99	Pope et al., 2019 ⁴¹	144,436	20 [14 to 25]	14 [10 to 17]

³⁶ 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.

³⁷ 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.

³⁸ 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.

³⁹ 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.

⁴⁰ 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

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.

Deaths – Lung Cancer	30 to 99	Krewski, et al., 2009 ⁴²	144,436	6 [2 to 8]	4 [2 to 6]
Deaths – Lung Cancer	30 to 99	Turner et al., 2016 ⁴³	144,436	4 [1 to 6]	3 [1 to 4]
Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Alexeeff, et al., 2023 ⁴⁴	184,126	36 [20 to 51]	20 [11 to 28]
Lung Cancer Diagnoses	30 to 99	Gharibvand et al., 2016 ⁴⁵	144,436	24 [8 to 38]	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.

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

⁴² 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

⁴³ 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.

⁴⁴ 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.

⁴⁵ 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

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 ⁴⁶	240,474	1 [0 to 3]	1 [0 to 1]
Deaths – Any cause	65 to 99	Zanobetti et al., 2014 ⁴⁷	31,849	4 [2 to 5]	12 [8 to 16]
Deaths – Cardiovascular disease	0 to 99	Liu et al., 2022 ⁴⁸	240,474	2 [0 to 4]	1 [0 to 2]
Deaths – Respiratory	0 to 99	Liu et al., 2022 ⁴⁹	240,474	3 [0 to 6]	1 [0 to 3]
Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Sullivan et al., 2005 ⁵⁰	184,126	6 [-8 to 20]	3 [-4 to 11]
Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Zanobetti et al., 2009 ⁵¹	184,126	7 [3 to 11]	4 [2 to 6]

⁴⁶ 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>

⁴⁷ 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.

⁴⁸ 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.

⁴⁹ 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.

⁵⁰ 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.

⁵¹ 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.

Hospital Admissions – All Respiratory	65 to 99	Zanobetti et al., 2009 ⁵²	31,849	29 [17 to 41]	91 [52 to 129]
Hospital Admissions – Asthma	0 to 64	Sheppard et al., 2003 ⁵³	208,626	15 [6 to 24]	7 [3 to 12]
ED Visits – Asthma	0 to 99	Mar et al., 2010 ⁵⁴	240,474	94 [23 to 160]	39 [10 to 66]
ED Visits – Asthma	0 to 99	Slaughter, J. C., et al., 2005 ⁵⁵	240,474	50 [-43 to 136]	21 [-18 to 57]
ED Visits – Asthma	0 to 17	Norris, G., et al., 1999 ⁵⁶	56,348	63 [32 to 91]	112 [57 to 161]

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.

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.

⁵² 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.

⁵³ 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.

⁵⁴ 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.

⁵⁵ 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

⁵⁶ 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.

Table B5. Annual mortality and morbidity associated with seasonal and daily ozone exposure (seasonal and daily 8-hour maximum concentrations) in South King County from 2022 to 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 ⁵⁷	31,849	4 [2 to 5]	11 [8 to 15]
Deaths – Any cause (Daily)	0 to 99	Zanobetti and Schwartz, 2008 ⁵⁸	240,474	2 [1 to 3]	1 [0 to 1]
ED Visits – Asthma (Daily)	0 to 99	Mar and Koenig, 2009 ⁵⁹	240,474	64 [15 to 107]	27 [6 to 44]
Hospital Admissions – All Respiratory (Daily)	65 to 99	Schwartz, 1995 ⁶⁰	31,849	32 [9 to 54]	102 [29 to 169]

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 O₃ 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.

⁵⁷ 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.

⁵⁸ 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.

⁵⁹ 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.

⁶⁰ Schwartz, J., 1995. Short term fluctuations in air pollution and hospital admissions of the elderly for respiratory disease. *Thorax*, 50(5), pp.531-538.

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.