Lower Yakima Valley Community 2025 Environmental Justice Report

Publication Information

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Executive Summary

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

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 Lower Yakima Valley 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 and long-term exposure to fine particulate matter ($PM_{2.5}$) year-round, with some contribution from 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: 157 sq. mi

Population: 56,628

County: Yakima, Benton

Municipal Government: Granger, Sunnyside, Grandview, Mabton, Prosser City Councils

Ecology Region: Central

Local Clean Air Authority: Yakima Regional Clean Air Agency, Benton Clean Air Agency

Local Health Jurisdiction: Yakima, Benton-Franklin Health Districts

Primary languages spoken: English, Spanish

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

Geographic characteristics

The Lower Yakima Valley encompasses a large portion of southern Yakima County and a small portion of neighboring Benton County. This community includes the cities of Granger, Sunnyside, Mabton, Grandview, and Prosser as well as the unincorporated communities of Outlook and Apricot. Most of the cities are situated along Interstate 82. The community boundaries do not include any of the territory of the Yakama Nation Reservation, much of which is geographically located within the Lower Yakima Valley.

[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

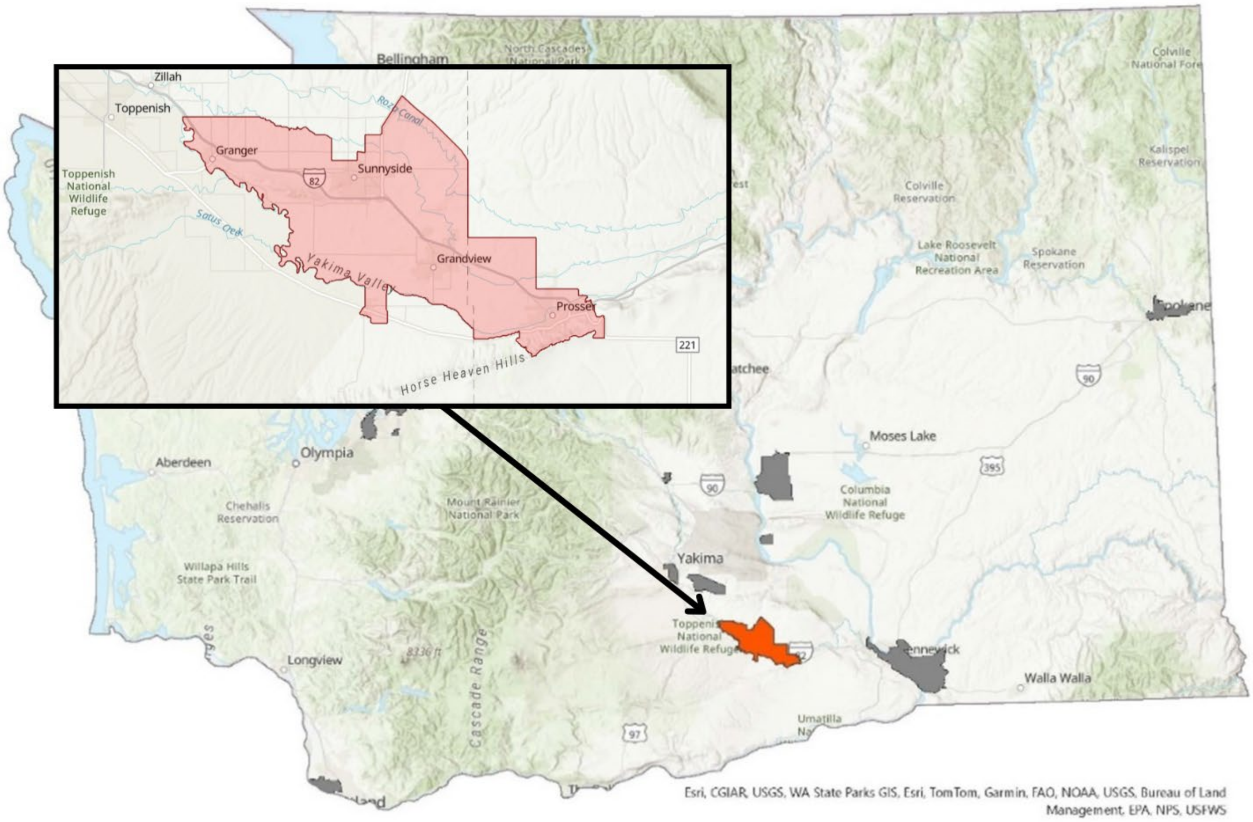

Figure 1. Map of the 16 overburdened communities highly impacted by air pollution (gray) in Washington state, with Lower Yakima Valley (red) highlighted.

Socioeconomic characteristics

The Lower Yakima Valley is primarily an agricultural community with a high density of dairy farms. One-fifth of workers are in farming, fishing, or forestry-related occupations, which is the third-highest share among the 16 designated communities. More than three-quarters of residents are Hispanic, and nearly two-thirds of households speak a language other than English at home, most commonly Spanish. [3,4]

Over a third of the population, the largest share among the communities in this report, are children under age 18. Children are particularly sensitive to the health impacts of air pollution. Additional factors such as poverty, linguistic isolation, and limited access to health care can

[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/

reduce opportunities for many community members to protect themselves from air pollution impacts. The share of residents who are uninsured is 17%, nearly triple the statewide average.

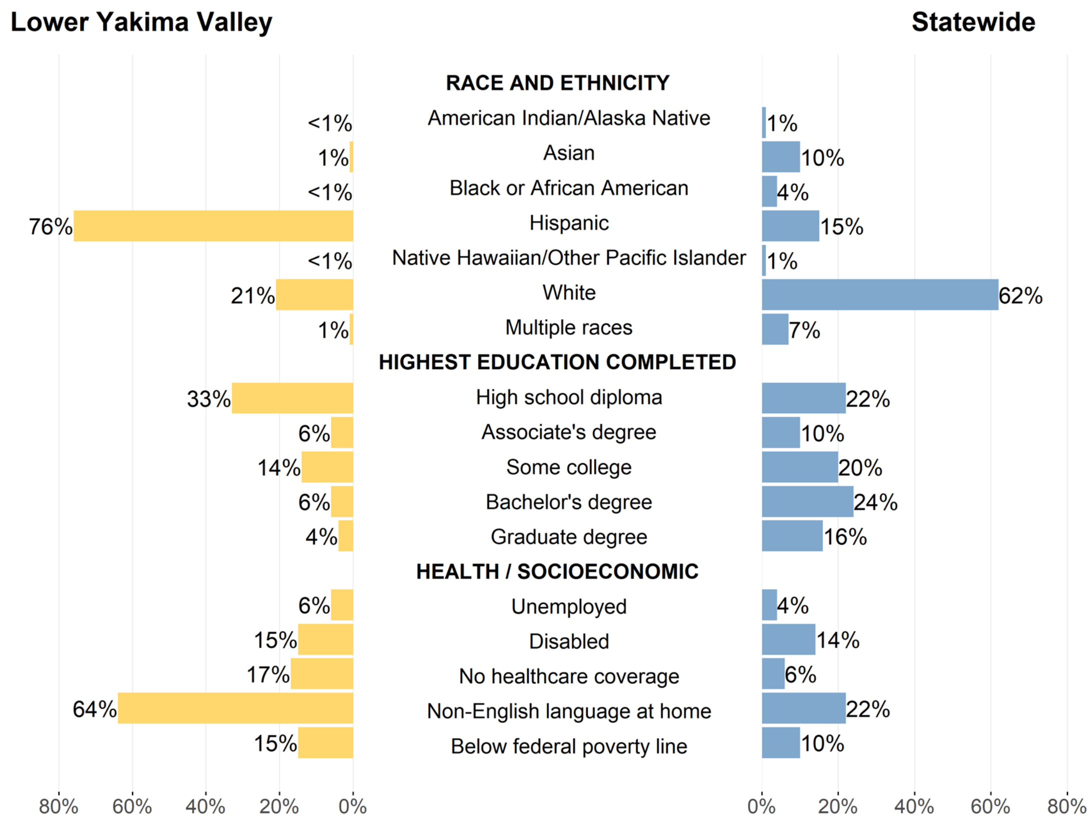

Figure 2. Sociodemographic characteristics of the Lower Yakima Valley community compared to statewide percentages, based on Washington State's 2024 estimated population of 8,035,700.[5]

Health characteristics

According to 2022 CDC health survey data,[6] the Lower Yakima Valley has elevated prevalences of chronic health conditions among individuals aged 18 years and older relative to the statewide population, including asthma (12.0% vs. 11.4%), cardiovascular disease (6.5% vs. 5.7%), COPD (6.7% vs. 5.7%), diabetes (13.6% vs. 9.6%), and stroke (3.8% vs. 3.1%). These prevalences are not necessarily attributable to air pollution. Community and statewide

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[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

prevalences that have overlapping 95% confidence intervals, as shown in Figure 3, might not be statistically significant.

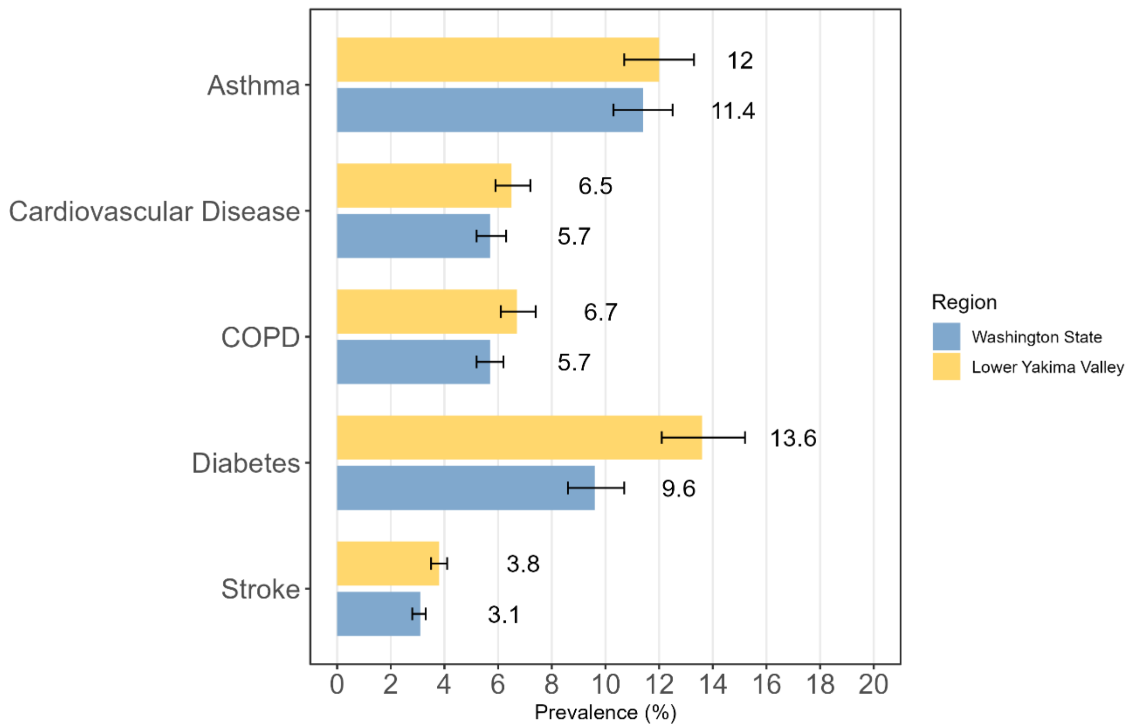

Figure 3. Prevalence of chronic health conditions among people ages 18 years and older in Lower Yakima Valley census tracts compared with Washington State.

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 five $PM_{2.5}$ monitors and sensors (SensWA) in the Lower Yakima Valley community. Ecology co-operates the Sunnyside-S 16th St regulatory $PM_{2.5}$ monitor with Yakima Regional Clean Air Agency (YRCAA) and co-operates the Prosser-Highland Dr non-regulatory $PM_{2.5}$ monitor with Benton Clean Air Agency (BCAA). Ecology installed two $PM_{2.5}$ non-regulatory monitors in Mabton and Granger, as well as one $PM_{2.5}$ sensor in Grandview in late 2025. Data from these sensors will be included in the next EJ Report. No other criteria air pollutants are currently monitored in the Lower Yakima Valley community.

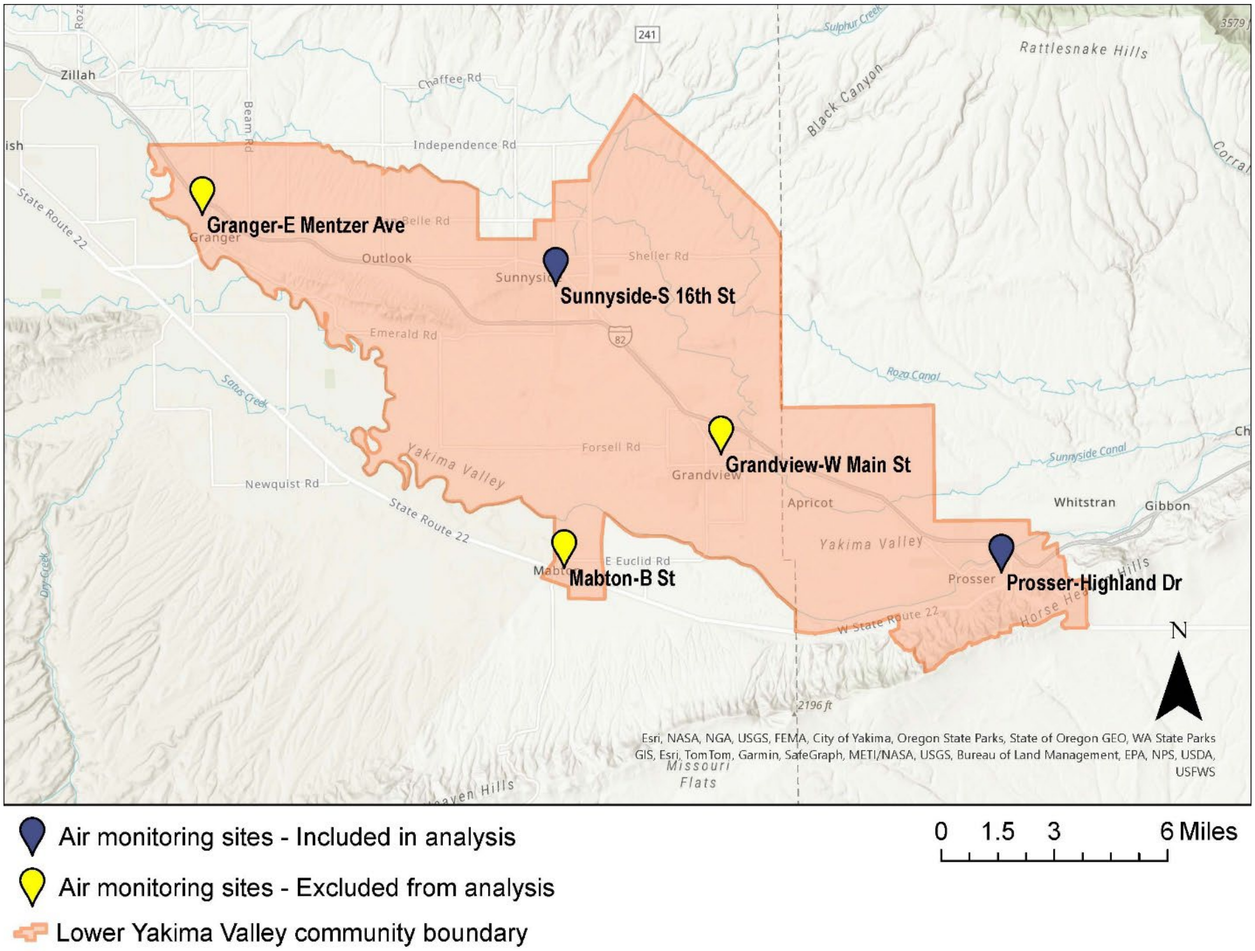

Figure 4. Map of Lower Yakima Valley air monitoring sites.

Table 1. Lower Yakima Valley criteria air pollutant monitors.

Monitoring Site	Type	Site Owner	Pollutants Monitored
Prosser-Highland Dr	Non-regulatory[1]	BCAA	$PM_{2.5}$
Sunnyside-S 16th St	Regulatory	YRCAA	$PM_{2.5}$

[1] Data from non-regulatory instruments are reported as estimates

Criteria Air Pollution

This report summarizes criteria air pollution (CAPs) concentrations in the Lower Yakima Valley community from 2022 through 2024. CAPs concentrations for $PM_{2.5}$ are calculated using data from the Washington Ambient Air Monitoring Network and reported according to the Environmental Protection Agency's (EPA) methodology. More information can be found in the background and methods sections 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 Lower Yakima Valley 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 Lower Yakima Valley community experienced an annual average of 4 days with unhealthy air quality (Figure 5). In comparison, from 2020-2022, the annual average was 10.7 days. Most of the unhealthy air quality days were primarily attributable to wildfire smoke.

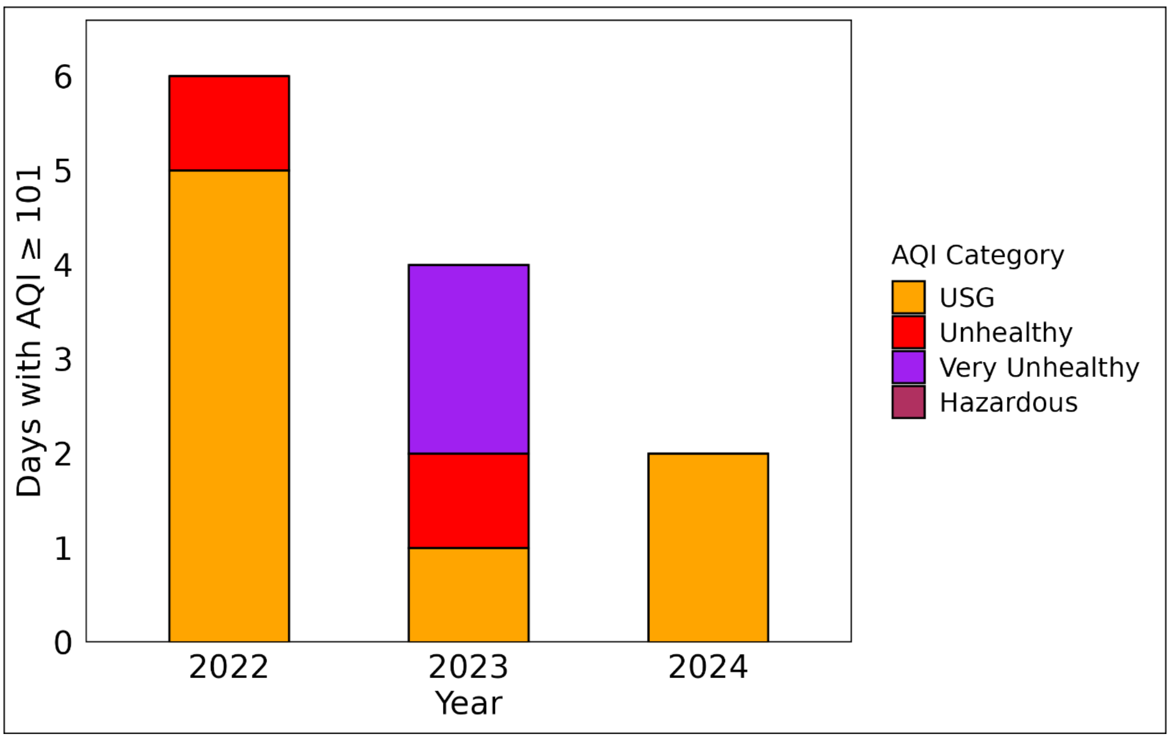

Figure 5*. Number of days 2022-2024 with unhealthy air quality. Includes days impacted by wildfire smoke*.

Table 2 includes 24-hour $PM_{2.5}$ (98th percentile) 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 $PM_{2.5}$ (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.

From 2022 to 2024, the 24-hour $PM_{2.5}$ (98th percentile) concentrations at Prosser-Highland Dr and Sunnyside-S 16th St monitoring sites ranged from 20 to 34 µg/m³. Some annual data was missing from both monitor sites, which is indicated in Table 2. The 2024 design values were below the NAAQS threshold (Table 2; Figure 6). Calculations were made both including and excluding wildfire-impacted days when the 24-hour average $PM_{2.5}$ concentrations exceeded 35.4 µg/m³. Excluding these wildfire-impacted days reduced 24-hour $PM_{2.5}$ levels by approximately 10-15%.

Table 2. ***24-hour $PM_{2.5}$ (98th percentile) summary statistics, 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
Prosser-Highland Dr	*21.7* *[21.7]*[1]	20.1 [16.8]	*23.7* *[23.1]*	*22* *[21]*
Sunnyside-S 16th St	34.4 [32.3]	*29.5* *[20.1]*	25.2 [24.6]	*30* *[26]*

Italics indicate incomplete annual data, NAAQS = national ambient air quality standards, PM = particulate matter, µg/m³ = micrograms per cubic meter

[1] Value is an average of two months of data. Available data did not include wildfire season, so summary statistics excluding wildfire days were not changed.

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 data from three years, 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. The Prosser-Highland Dr and Sunnyside-S 16th St both had missing annual data that slightly affect the 2024 design values. Annual PM$_{2.5}$ means were below the NAAQS threshold of 9.0 µg/m^3 in 2024. Available data from the Sunnyside-S 16th St monitor shows that annual means exceeded the NAAQS in 2022 and 2023, as well as the Prosser-Highland Dr site in 2022. Sunnyside-S 16th St was below the NAAQS when wildfire-impacted days were excluded.

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

Monitoring Site	2022	2023	2024	2024 Design Value
Prosser-Highland Dr	*9.20* *[9.20]*[1]	7.32 [6.13]	*5.42* *[4.70]*	*7.3* *[6.7]*
Sunnyside-S 16th St	11.18 [7.09]	*9.05* *[7.25]*	6.79 [6.16]	*9.0* *[6.8]*

Italics indicate incomplete annual data, NAAQS = national ambient air quality standards, PM = particulate matter, $\mu g/m^3$ = micrograms per cubic meter

[1] Value is an average of two months of data. Available data did not include wildfire season, so summary statistics excluding wildfire days were not changed.

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 22 deaths by any cause (56 deaths per 100,000 population, Table B1) related to yearly PM2.5 exposure. Among older adults (65-99 year-olds), which is a smaller portion of the population, we estimated 16 total deaths (230 deaths per 100,000 population) each year associated with annual $PM_{2.5}$ 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 Hispanic people (9 deaths among 18–84-year-olds) as was the highest annual age-adjusted mortality rate (118 deaths per 100,000 population) when accounting for the ages of people in each racial and ethnic group[7]. Non-Hispanic Black people had the second highest annual age-adjusted mortality rate (65 deaths per 100,000 population).

[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.

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.

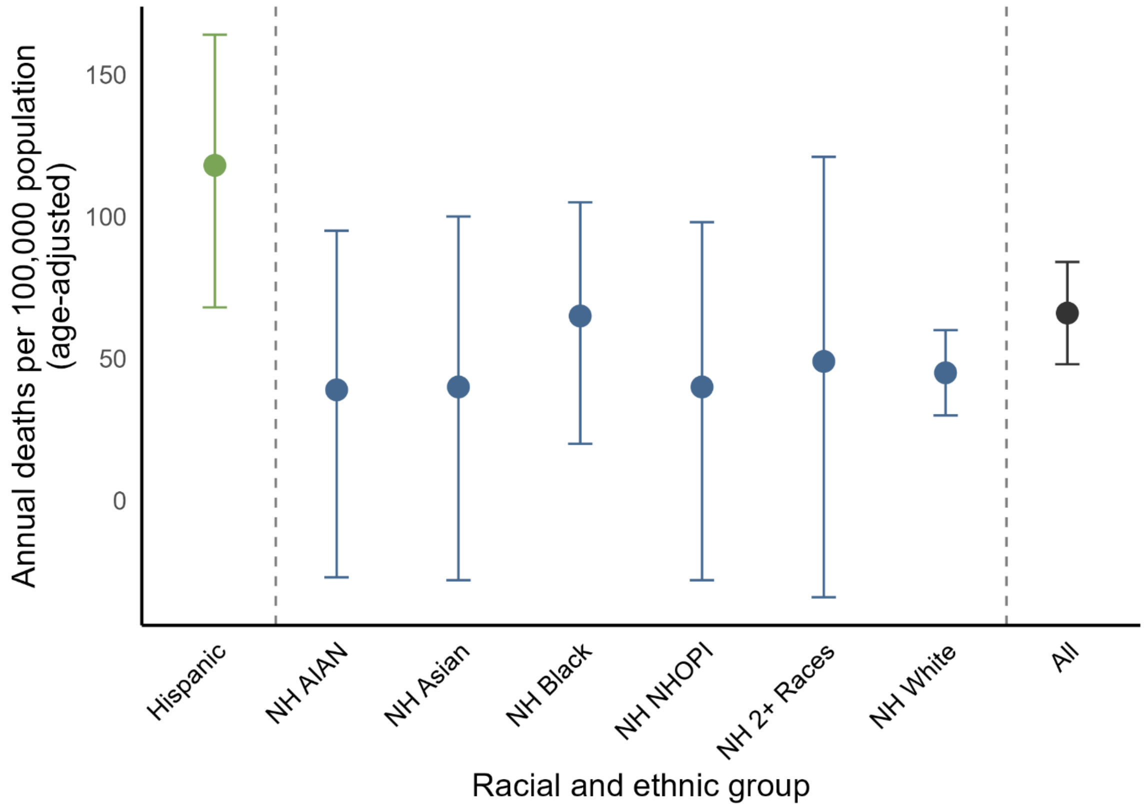

Figure 7. Age-adjusted annual death rates by any cause associated with annual $PM_{2.5}$ exposure among ages 18-84 by racial and ethnic group in Lower Yakima Valley.

When assessing specific causes of death related to yearly $PM_{2.5}$ concentrations (Table B3), we estimated 8 deaths due to cardiovascular disease (21 deaths per 100,000 population), 10 to 15 deaths due to ischemic heart disease (33 to 52 deaths per 100,000 population), and 1 death per year due to lung cancer (3 to 5 deaths per 100,000 population) among adults.

Regarding non-fatal health outcomes (Table B3), we estimated that 9 hospital admissions (22 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, 3 lung cancer diagnoses per year were associated with yearly $PM_{2.5}$ exposure among all people (9 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 1 death by any cause (20 per 100,000 population) among older adults ages 65 to 99. For non-fatal conditions, daily $PM_{2.5}$ was associated with 2 acute non-fatal myocardial infarction admissions (4 per 100,000 population) among all adults, 6 respiratory admissions (81 per 100,000 population) among older adults ages 65 to 99, 2 asthma hospital admissions (3 per 100,000 population) among people ages 0 to 64. Additionally, 11 to 21 asthma-related emergency department (ED) visits (19 to 36 per 100,000 population) among all people and 20 asthma-related ED visits (111 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 4 seasonal deaths by any cause among older adults ages 65 to 99 (63 deaths per 100,000 population). Daily O_3 exposure was associated with 1 death by any cause (2 per 100,000 population), 20 asthma-related ED visits (36 per 100,000 population) among all people and 9 respiratory hospital admissions (129 per 100,000 population) among older adults ages 65–99.

Greenhouse Gas Emissions

Greenhouse gas results for the Lower Yakima Valley overburdened community highly impacted by air pollution include: 1) Emissions from greenhouse gas reporting entities per RCW 70A.65[9] 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 CCA's 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 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 Lower Yakima Valley community, three facilities (Figure 8; Table 4) within the community boundary reported their emissions in 2022 and 2023. The total reported emissions from these facilities were 61,768 MT CO_2e in 2022 and 62,347 MT CO_2e in 2023, a 1% year-to-year increase. Some facilities in other communities report biogenic carbon (biogenic CO_2) [14] 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. There were no facilities that reported biogenic CO_2 in Lower Yakima Valley. 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 CO_2 emissions. Some year-to-year fluctuations in emissions from individual facilities are expected.

There was one less reporting facility compared to the 2023 report,[15] in which a cattle feedlot reported their emissions. The Lower Yakima Valley is an agricultural community and is home to many dairy farms. Fuels used for agricultural purposes are exempt from the CCA. Concentrated animal feeding operations (CAFOs) and dairy farms are not required to report emissions to the greenhouse gas reporting program but can do so on a voluntary basis. In 2025, House Bill 1630[16] was introduced, which would require reporting of livestock emissions; however, it did not go forward.

[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 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.

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

[16] Livestock methane emissions https://app.leg.wa.gov/billsummary/?BillNumber=1630&Year=2025

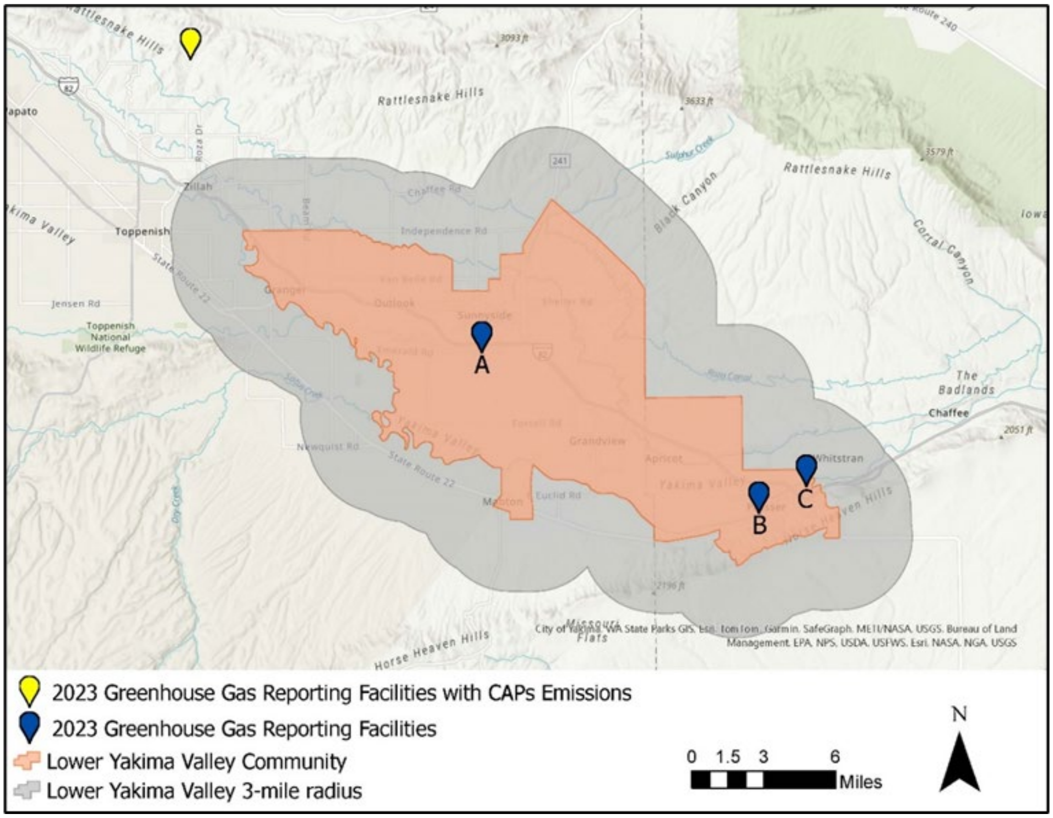

Figure 8. Reporting facilities as of 2023 that are in or near the Lower Yakima Valley community boundary. Facility letters correspond with Table 4.

The emissions in Table 4 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 Lower Yakima Valley 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	Darigold - Sunnyside	Food Production	Yes	Yes	No	36,877 [0]	36,711 [0]
B	Milne Fruit Products - Prosser	Food Production	Yes	No	No	10,321 [0]	7,387 [0]
C	Tree Top - Prosser	Food Production	Yes	No	No	14,570 [0]	18,249 [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

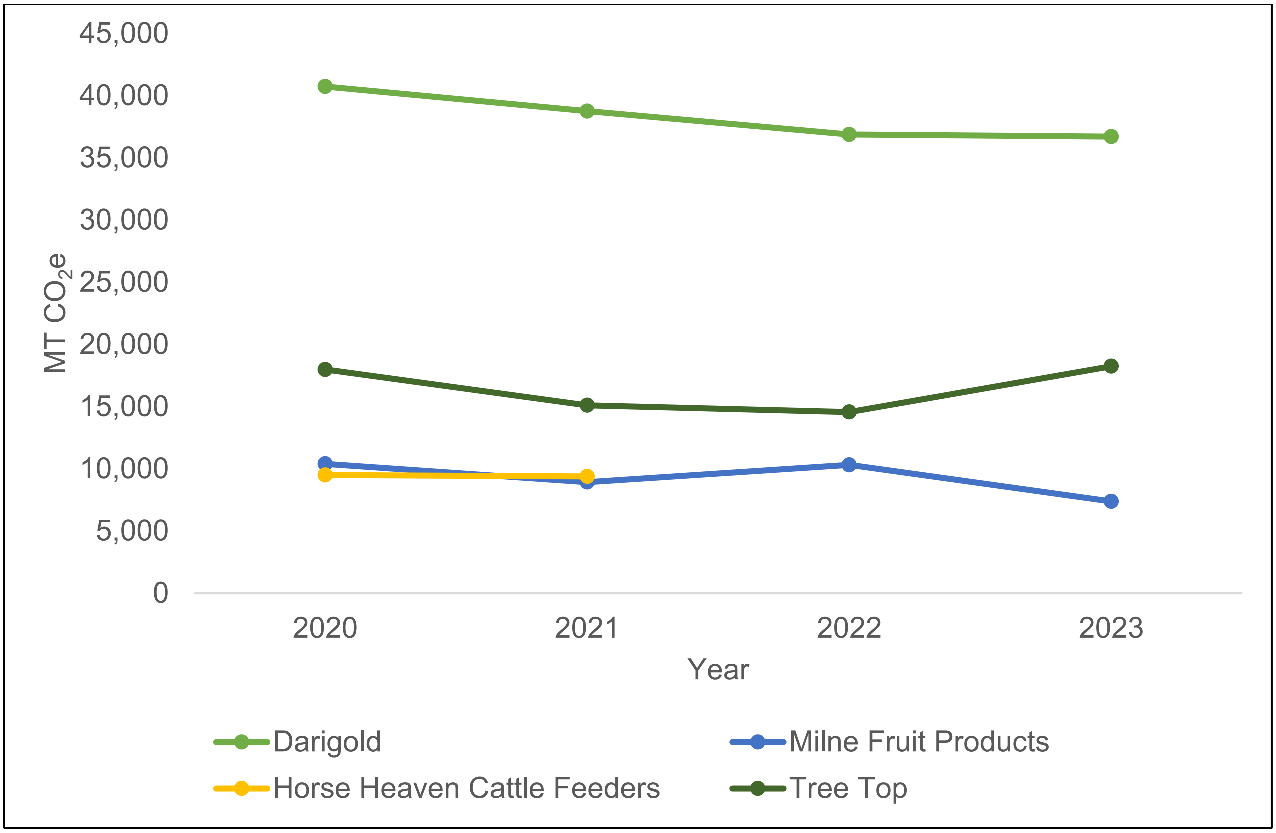

Figure 9. Greenhouse gas reporting facilities and their emissions from 2020-2023.

Mobile sources

In the Lower Yakima Valley 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.[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]

Similar to Table 4, the results in Table 5 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

[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, Jan 2025 https://apps.ecology.wa.gov/publications/SummaryPages/2414077.html

[24] Reducing Greenhouse Gas Emissions from the Transportation Sector through Climate Planning, Dec 2024 https://www.epa.gov/system/files/documents/2024-12/420f24042.pdf

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
54,838	239,091	4.5	289,229	5.4

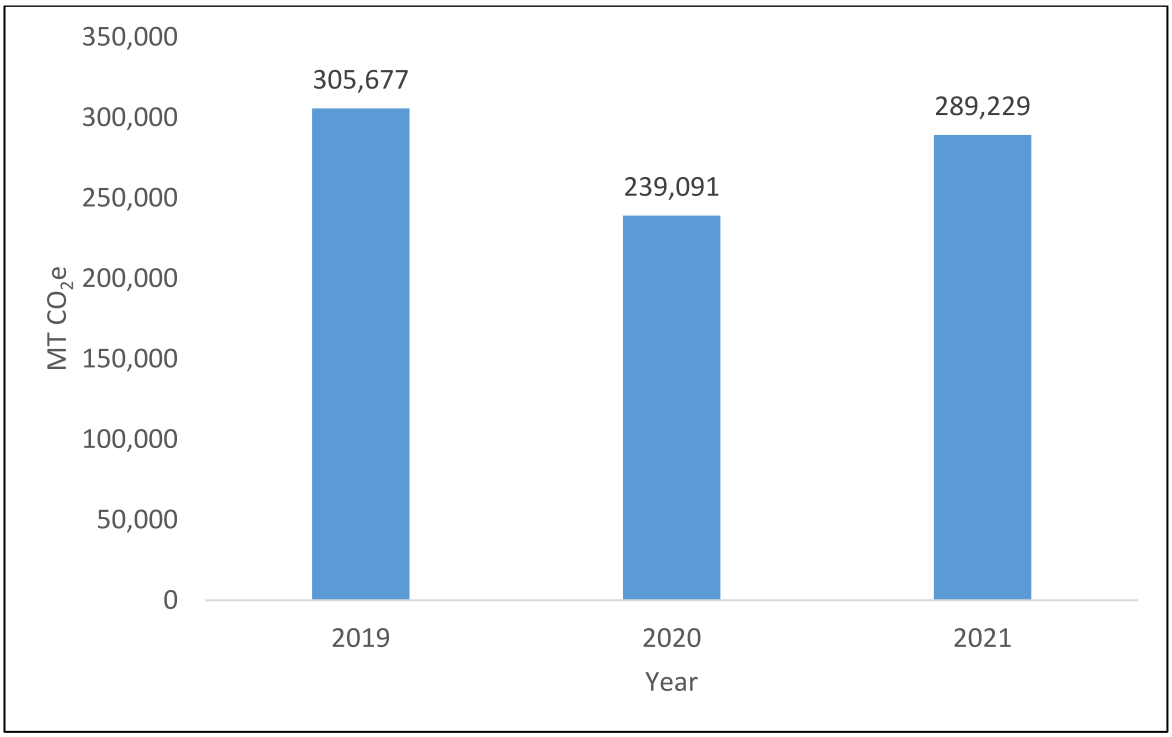

Figure 10. *Annual greenhouse gas emissions from mobile sources in the Lower Yakima Valley community, 2019-2021.*

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

Listening session

Department of Ecology and Department of Health staff conducted a pilot listening session in Sunnyside in June 2025 with farm and agricultural workers. Farm workers are an occupational group that is more frequently exposed to air pollution in overburdened communities and elsewhere. The listening session lasted 90 minutes and consisted of a brief presentation about the EJ report followed by facilitated conversation about topics including air pollution sources, health impacts of concern, highly exposed or highly sensitive populations, information needs, and useful communication channels. The session took place entirely in Spanish and sixteen people who live in surrounding areas participated. The following includes a summary of the discussion and translated quotes from discussion participants.

Participants noted that air quality seems worse during wildfire smoke events, during industrial activities such as waste removal at dairies or pesticide application, and when strong winds disperse dust and other pollutants. They mentioned low visibility, smoke, dust and strong odors as signs of poor air quality. Participants also expressed that air pollution is typically worse in the summer than in the winter, as well as during hotter days. Among pollution sources of concern, they mentioned wildfire smoke, agricultural burning, freight trucks, pesticide application and drift, agricultural waste lagoons, and dairy farms.

> "In this time of year what I get is asthma with all the dust. I work where there's a lot of dust and then I start having problems in my lungs."
>
> "Like the gentleman said, about 3 years ago I worked in the field and there was a strong wind that kicked up a lot of dust. At that time, I had asthma and by midday, the wind was still blowing. So what happened? My nose started bleeding. So yes, definitely all that dust and the polluted air get to you."

Most of the participants reported suffering from asthma and described how it is aggravated by air pollution. They also mentioned eye irritation, allergies and other respiratory issues as health impacts of concern, as well as the negative mental health effects of needing to stay indoors when air quality deteriorates. Health care costs are also a significant impact that participants mentioned, particularly for those who do not have health insurance. They described colds, coughs, headaches, stomach aches, rashes and nosebleeds as symptoms related to air pollution.

Among groups more exposed to air pollution, Sunnyside session participants mentioned farm workers and people living near industrial sites and agricultural land. They also listed children, elderly people, and people suffering from asthma as particularly sensitive to health impacts from air pollution. They shared that they were largely unaware of available community resources to protect their health from air pollution, and that they primarily protect themselves during poor air quality events by staying indoors and wearing face masks.

> "In the winter, I got sick with an asthma attack and I just went one night for a little while and the bill came back at almost $4,000. They just had me there a little while, they put the inhaler, the machine on me and sent me home with an inhaler they gave me, and that cost me $3,800. Do you think I'm going to earn that in one day working, to pay for all that? Now, those of us who suffer from that… an inhaler costs $100 or $125 and a person who's already affected by that spends on four inhalers in one month. Imagine that."

> "I think everyone agrees; farmworkers are the ones who are constantly absorbing all the pollution and all those chemicals. You get sick in your stomach. We get rashes; we get asthma. Colds, coughs, all the illnesses from so much environmental pollution, everything produced by the chemicals."

Participants mentioned word of mouth, brochures, community events and presentations, and community organizations including Nuestra Casa, KHIMSTONIK and ELLA as effective channels to disseminate information. They emphasized the importance of training and informing community leaders who can then share information more widely. One participant mentioned that employers are increasingly providing information to workers about environmental safety hazards, but then sometimes instruct them to work where they are directly or indirectly exposed to those hazards.

Regarding information about air pollution and health, participants expressed interest in knowing more about:

- What emissions industries are generating and how they impact health
- Where monitoring sites are located and how to find the information they gather
- Where to make complaints

> "I have lived in the Yakima Valley for 40 years and we had never had information like this—there's pollution, there's this. We had never been oriented with information like what we're receiving now. Thankfully, now we have different resources like this and thanks to that, we are learning."

> "We realized that with everything that's because of the environment, we're on the same page. We all see that the things that affect one community are affecting many of us. It's not individual. It's not just that she's being affected by something, but I realized that it affects all of us. In our group, I realized that all of us think similarly;

in most places, we agreed that everything affecting the environment is a factor, at least in this community."

Community Resources

These resources provide more information about air quality and health in the Lower Yakima Valley community:

- Yakima Health District data and reports page[26]
- Astria Health 2022-2024 Lower Yakima Valley Community Health Needs Assessment[27]
- Yakima Memorial Hospital 2022 Community Health Needs Assessment[28]
- Yakima Valley Trends - Health indicators[29]
- Zero-emission and electric vehicles mapping tool | WSDOT[30]
- Home | Washington Climate Action[31]
- Climate Resilience Plan for Washington Agriculture | Washington State Department of Agriculture[32]

[26] https://www.yakimacounty.us/277/Community
[27] https://doh.wa.gov/sites/default/files/2022-11/CHNA-198-2021.pdf?uid=65255ee224dd7
[28] https://www.multicare.org/wp-content/uploads/2024/05/yakima-chna-2022.pdf
[29] https://yakimavalleytrends.org/category.cfm?id=7
[30] https://wsdot.wa.gov/business-wsdot/grants/zero-emission-vehicle-grants/zero-emission-and-electric-vehicles-mapping-tool
[31] https://climate.wa.gov/
[32] https://agr.wa.gov/washington-agriculture/climate-resilience-plan-for-washington-agriculture

Appendix A. Criteria Air Pollution

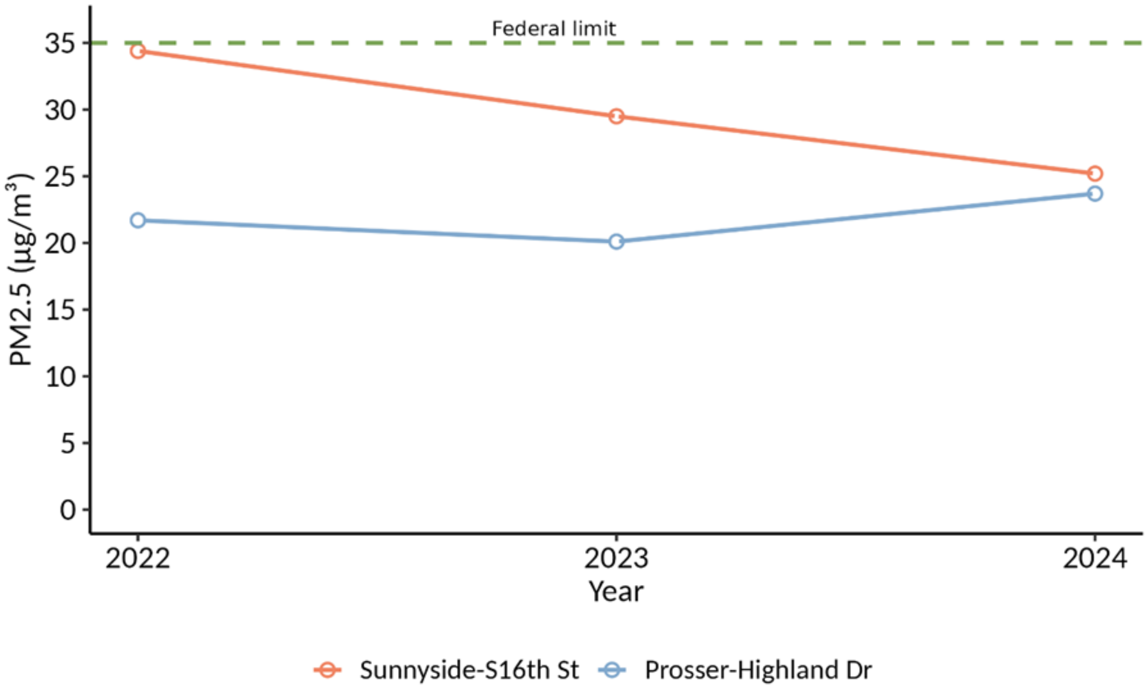

Figure A1. 24-hour PM2.5 (98th percentile) concentrations at Lower Yakima Valley monitoring sites. Days impacted by wildfire smoke are included. Dashed line is the 24-hr PM2.5 NAAQS (35 µg/m³).

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 Lower Yakima Valley by racial and ethnic group, 2022–2023 (based on effect estimates in study by Pope, et al., 2019[8]).

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	39,003	22 [16 to 28]	56 [41 to 71]	66 [48 to 84]
Hispanic	27,900	20 [11 to 27]	71 [41 to 98]	118 [68 to 164]
Non-Hispanic AIAN	215	<1 [range <1]	33 [-23 to 82]	39 [-27 to 95]
Non-Hispanic Asian	273	<1 [range <1]	47 [-33 to 116]	40 [-28 to 100]
Non-Hispanic Black	96	<1 [range <1]	62 [19 to 100]	65 [20 to 105]
Non-Hispanic NHOPI	12	<1 [range <1]	39 [-28 to 97]	40 [-28 to 98]
Non-Hispanic 2+ races	535	<1 [0 to 1]	47 [-33 to 115]	49 [-34 to 121]
Non-Hispanic White	9,971	7 [4 to 9]	68 [44 to 90]	45 [30 to 60]

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 Lower Yakima Valley by racial and ethnic group, 2022–2023. Based on effect estimates in study by Di, et al., 2017.[33]

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	6,940	16 [16 to 16]	230 [224 to 236]	224 [218 to 230]
Hispanic	2,921	9 [8 to 10]	316 [274 to 356]	339 [294 to 382]
AIAN	313	<1 [range <1]	75 [47 to 102]	87 [53 to 118]
Asian	129	<1 [range <1]	105 [83 to 126]	95 [75 to 114]
Black	104	<1 [range <1]	221 [212 to 229]	179 [173 to 186]
NHOPI	22	<1 [range <1]	71 [44 to 97]	81 [50 to 110]
2+ races	696	1 [0 to 1]	97 [60 to 132]	102 [63 to 139]
White	5,676	4 [4 to 4]	70 [67 to 73]	67 [64 to 69]

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.

[33] 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 Lower Yakima Valley, 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[34]	6,940	16 [16 to 16]	230 [224 to 236]
Deaths – Any cause	18 to 84	Pope et al., 2019[35]	39,003	22 [16 to 28]	56 [41 to 71]
Deaths – Cardiovascular disease	18 to 99	Alexeeff et al., 2023[36]	39,719	8 [3 to 13]	21 [8 to 32]
Deaths – Ischemic heart disease	30 to 99	Jerrett et al., 2017[37]	29,646	10 [8 to 13]	35 [26 to 43]
Deaths – Ischemic heart disease	30 to 99	Krewski et al., 2009[38]	29,646	15 [13 to 18]	52 [43 to 61]
Deaths – Ischemic heart disease	30 to 99	Pope et al., 2019[39]	29,646	10 [7 to 12]	33 [24 to 41]

[34] 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.

[35] 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.

[36] 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.

[37] 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.

[38] 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

[39] 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[40]	29,646	1 [1 to 2]	5 [2 to 7]
Deaths – Lung Cancer	30 to 99	Turner et al., 2016[41]	29,646	1 [0 to 1]	3 [1 to 5]
Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Alexeeff, et al., 2023[42]	39,719	9 [5 to 12]	21 [12 to 30]
Lung Cancer Diagnoses	30 to 99	Gharibvand et al., 2016[43]	29,646	3 [1 to 4]	9 [3 to 14]

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.

[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] 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.

[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] 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 Lower Yakima Valley, 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[44]	57,317	<1 [0 to 1]	1 [0 to 2]
Deaths – Any cause	65 to 99	Zanobetti et al., 2014[45]	6,940	1 [1 to 2]	20 [13 to 27]
Deaths – Cardiovascular disease	0 to 99	Liu et al., 2022[46]	57,317	1 [0 to 2]	2 [0 to 3]
Deaths – Respiratory	0 to 99	Liu et al., 2022[47]	57,317	1 [0 to 2]	2 [0 to 3]
Hospital Admissions – Acute Non-Fatal Myocardial Infarction	18 to 99	Sullivan et al., 2005[48]	39,719	2 [-2 to 5]	4 [-5 to 12]

[44] 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

[45] 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.

[46] 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.

[47] 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.

[48] 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[49]	39,719	2 [1 to 3]	4 [2 to 6]
Hospital Admissions – All Respiratory	65 to 99	Zanobetti et al., 2009[50]	6,940	6 [3 to 8]	81 [46 to 114]
Hospital Admissions – Asthma	0 to 64	Sheppard et al., 2003[51]	50,377	2 [1 to 3]	3 [1 to 5]
ED Visits – Asthma	0 to 99	Mar et al., 2010[52]	57,317	21 [5 to 35]	36 [9 to 61]
ED Visits – Asthma	0 to 99	Slaughter, J. C., et al., 2005[53]	57,317	11 [-10 to 30]	19 [-17 to 52]
ED Visits – Asthma	0 to 17	Norris, G., et al., 1999[54]	17,598	20 [10 to 28]	111 [58 to 158]

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.

[49] 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.
[50] 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.
[51] 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.
[52] 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.
[53] 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
[54] 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.

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 B5. Annual mortality and morbidity associated with seasonal and daily O_3 exposure (seasonal and daily 8-hour maximum concentrations) in Lower Yakima Valley, 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[55]	6,940	4 [3 to 6]	63 [43 to 82]
Deaths – Any cause (Daily)	0 to 99	Zanobetti and Schwartz, 2008[56]	57,317	1 [1 to 2]	2 [1 to 3]
ED Visits – Asthma (Daily)	0 to 99	Mar and Koenig, 2009[57]	57,317	20 [5 to 34]	36 [8 to 59]
Hospital Admissions – All Respiratory (Daily)	65 to 99	Schwartz, 1995[58]	6,940	9 [3 to 15]	129 [37 to 212]

[55] 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.
[56] 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.
[57] 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.
[58] Schwartz, J., 1995. Short term fluctuations in air pollution and hospital admissions of the elderly for respiratory disease. *Thorax*, 50(5), pp.531-538.

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.

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.