

Zoom Basics

Please note this session will be recorded and later shared publicly. The question and answer period at the end will not be recorded.

If you have concerns about this recording, please send a chat to Kris Johnson.

This presentation will be 30-35 min with additional time for questions at the end. Thank you for saving questions until the end.

Please scan the controls panel to see the chat icon – clicking it brings up the chat window (you can also raise a hand virtually to ask a question, though sending questions through the chat box is preferred).

Kris Johnson is monitoring the chat box.

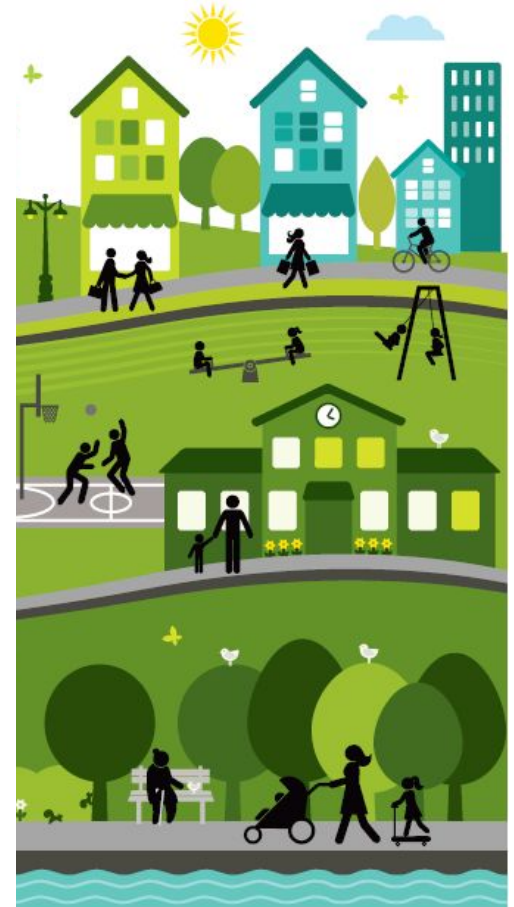
Please mute your microphone (bottom left) when not talking.

Community Health Impacts of Airports

A brief review of the relevant research
to-date.

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In partnership with Kris Johnson at Public Health Seattle King County
and Molly Firth and Aaron Katz at the UW Center for Health Innovation
and Policy Science

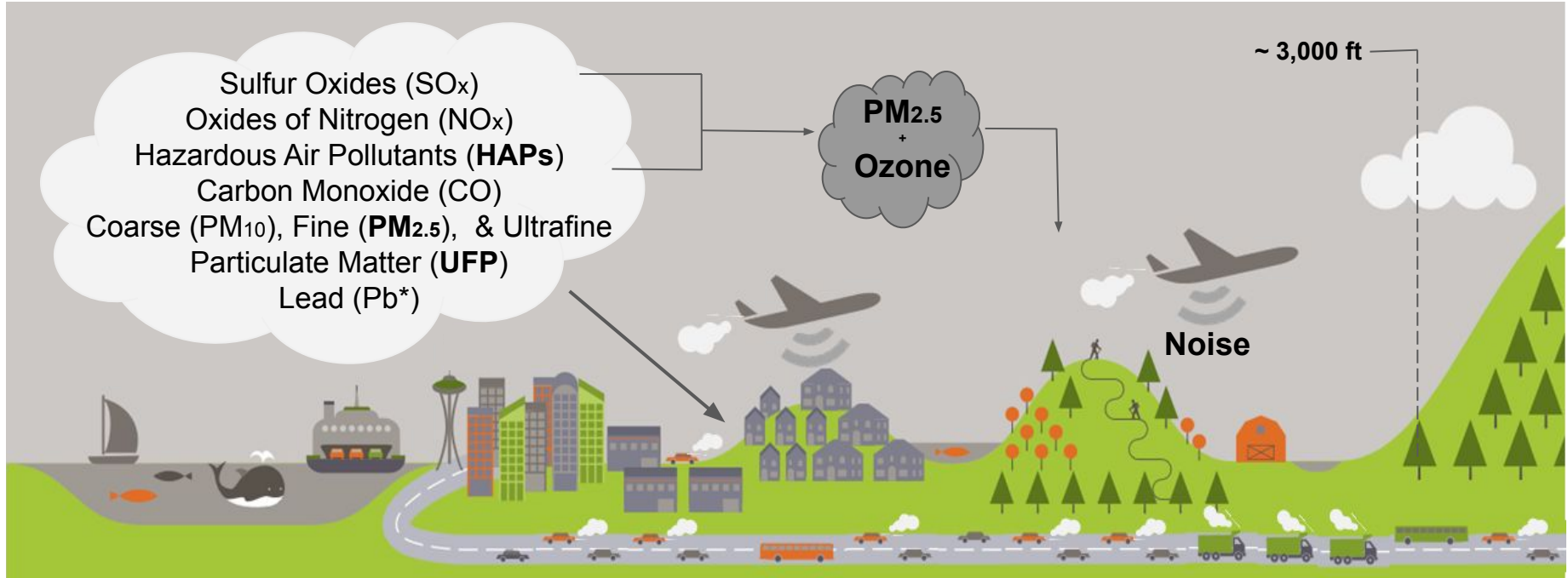


Today's agenda:

- What are the pollutants we are concerned about near airports?
- What are the effects on health?
- Which communities are most impacted?
- What do we know locally?
- Summary
- Time for discussion and questions.



Pollution from Airports



Health Impacts - Rating the Evidence

Exposure Duration	Outcomes	PM10-2.5	PM2.5	UFP	Ozone	CO	NOx	SOx	Lead
Short-term	Heart								
	Lungs								
	Metabolic								
	Brain								
Long-term	Heart								
	Lungs								
	Metabolic								
	Reproductive								
	Birth Outcomes								
	Cancer								
	Brain								

Causal	Likely Causal	Suggestive	Inadequate Evidence	Not Likely Causal	Not Assessed
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How does air pollution impact health?

Short-term

PM_{2.5}, Ozone, NO_x, SO_x

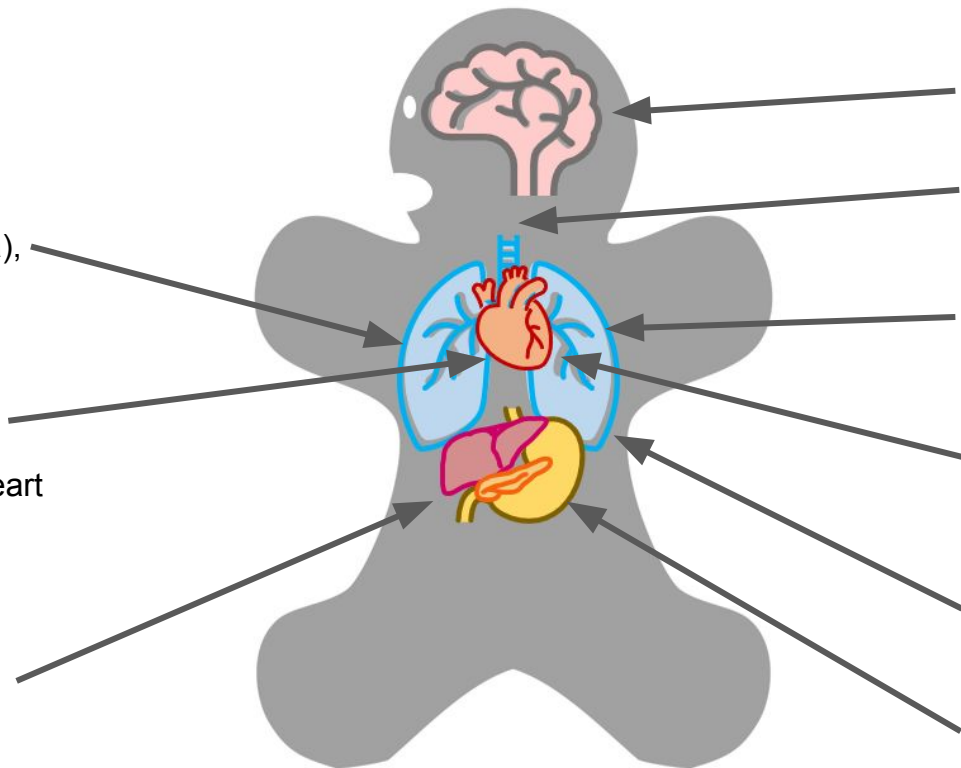
More respiratory infections, worsened respiratory conditions (such as asthma), respiratory-related death

PM_{2.5}, CO

Changes in heart rate, worsened heart disease, heart attack, heart-related death

Ozone

Increased blood sugar, increased insulin



Long-term

PM_{2.5}, UFP

Cognitive decline, dementia

HAPs

Nose and throat cancers, leukemia

PM_{2.5}, Ozone, NO_x

Asthma development, respiratory diseases, respiratory-related death

PM_{2.5}

Hypertension, heart disease, blood clots, stroke, heart attack, heart-related death

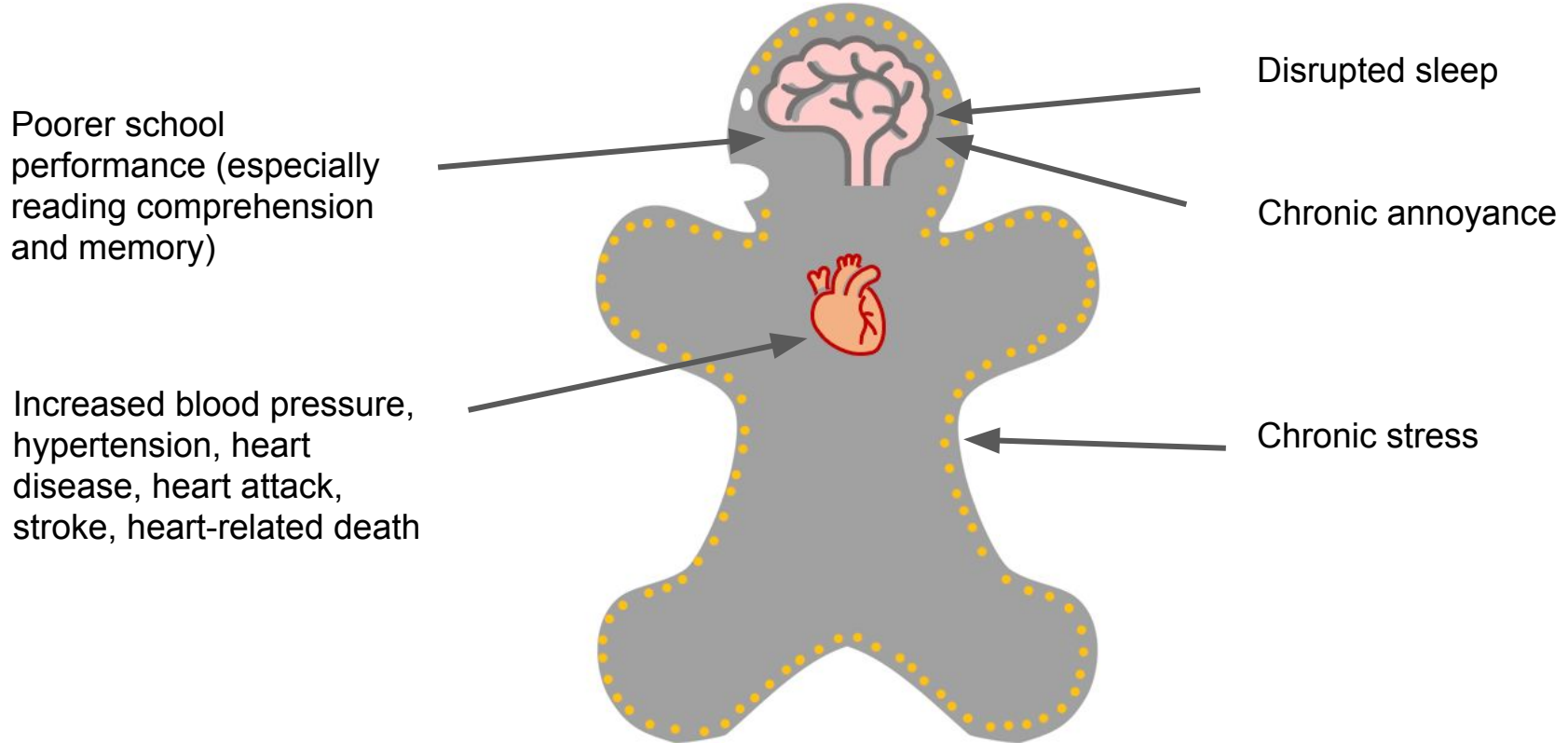
PM_{2.5}

Lung cancer, lung cancer death

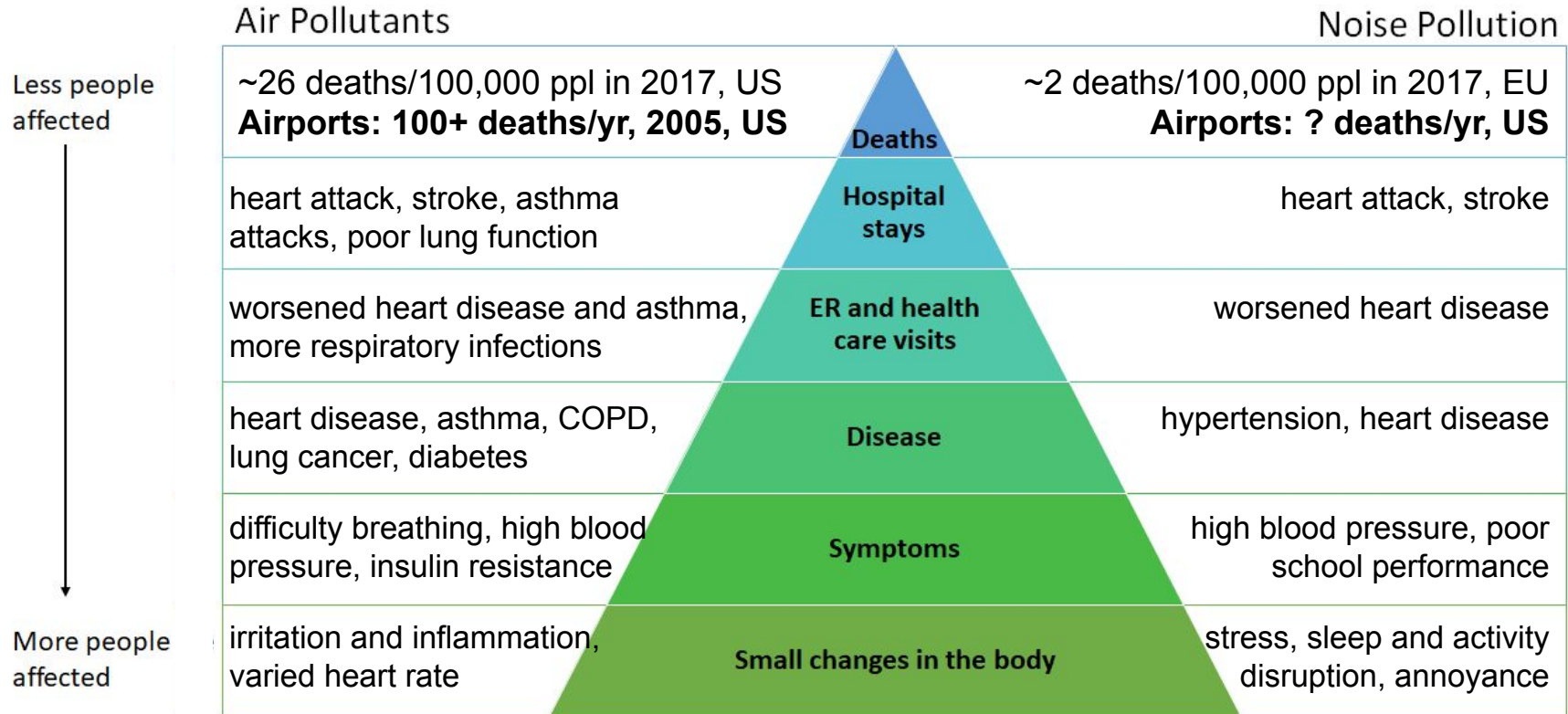
Ozone

Insulin resistance, metabolic syndrome, type II diabetes, metabolic-related death

How does noise pollution impact health?



Scale of Health Impacts



Which populations are most impacted?

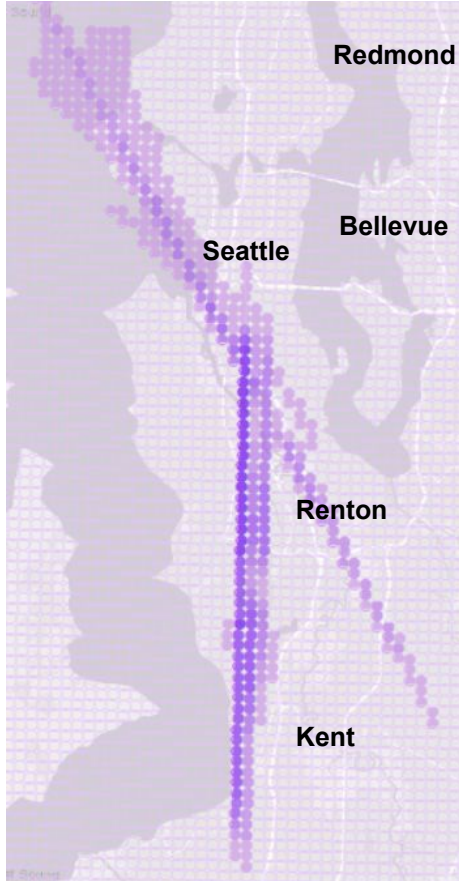
- Children, older adults, and people with underlying disease are more likely to experience worse health effects from air and noise pollution.
- People of Color and people of lower socioeconomic status are exposed to higher levels of air pollution and noise pollution.
- Nationally, Black and Hispanic/Latinx populations are exposed to much more PM_{2.5} than they produce, while non-Hispanic White populations contribute much more PM_{2.5} emissions than they are exposed to.

Local Airport-Related Exposures

Flights:

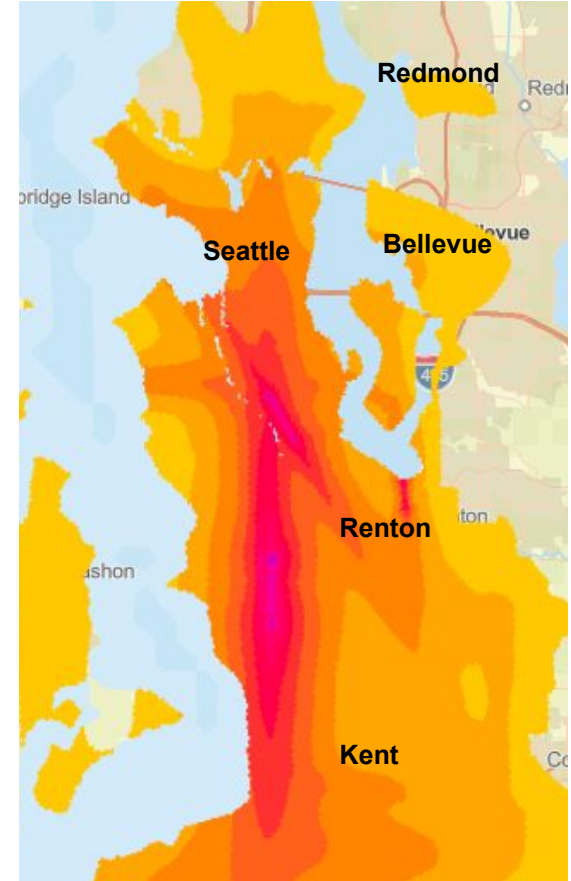
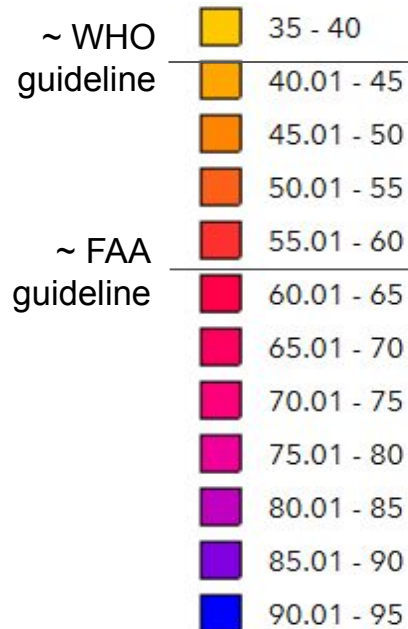
2018 annual flight counts below 750m altitude

- 1
- 1,300
- 7,500
- 20,000
- 39,000
- 72,000
- 138,000
- 229,000



Noise:

Modelled Aviation Noise - (L_{Aeq}, dB)



Which communities are most impacted locally?

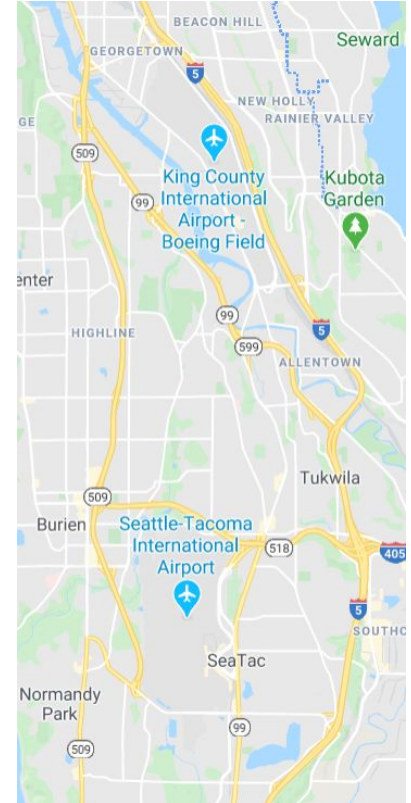
A handful of studies between 2007 and 2010 found higher burden of air pollution from road traffic among lower income neighborhoods and communities of color in the Seattle-metro area.

Preliminary analysis of 2018 census tract data:

- Black, Native Hawaiian and Pacific Islander, Hispanic/Latinx, and American Indian and Alaska Native populations are disproportionately exposed to higher levels of noise pollution and overhead flights than the King County population as a whole.
- Non-Hispanic White populations are much less exposed than the county averages for both noise pollution and overhead flights.

What do we know about these pollutants locally?

- How much pollutants spread and impact communities around airports varies based on geography, climate, weather, land use near the airport, and airport operations.
- Sea-Tac Airport sits at relatively high elevation compared to surrounding areas, so pollutants can usually disperse instead of getting trapped and accumulating.
- Both Sea-Tac and Boeing Field are near several major roadways, each other, and a busy port - these are a lot of sources of air and noise pollution in close proximity.



What we know from local studies

- Beacon Hill Noise Study:
 - Noise levels were monitored at 52 locations in Beacon Hill, over half of the sites had average noise levels above FAA standards (2018).
 - Some sites average noise level were more than double the FAA standard for maximum average noise level.
- MOV-UP Study:
 - Measured UFP around Sea-Tac airport and distinguished between aircraft-emitted UFP and road vehicle UFP.
 - Found high concentrations of UFP underneath and downwind of landing aircrafts.
 - Also roadway UFP was higher concentrated but dissipated over shorter distances, while aircraft UFP was less concentrated but persisted over longer distances, potentially affecting more people.

What we know from local studies

- Aircraft emissions during takeoff and landing were less than 1% of all PM_{2.5} emissions from transportation sources in the Seattle-Tacoma region (2005 data).
 - Around 2% of all deaths in King and Pierce counties were due to mobile PM_{2.5} emissions over the same time period.
- Estimated 0.7 deaths annually (or 2 deaths every 3 years) due to Sea-Tac aircraft emissions and 0.1 deaths annually (or 1 every 10 years) related to Boeing Field aircraft emissions (2005 data).

Note, these estimates are from data that is 15 years old.

Key Takeaways

Pollutants:

The air pollutants we are most concerned with are PM_{2.5} & ozone.

We have more to learn about UFP, but we expect it will be very important as well.

The FAA says average noise levels below 65dB are compatible with schools & residences. The WHO sets a much lower standard.

Health Effects:

PM_{2.5} has the largest effects on health, affecting the lungs, heart, brain, and contributing to 3% of all deaths nationally.

“Small” numbers of deaths due to airport exposures, but deaths are just the tip of the health effects pyramid.

Noise levels impact heart health, annoyance, sleep, and school performance.

Local Exposures:

Locally, communities under and downwind of aircraft landing paths and very near major roadways face higher UFP exposure.

Locally, many communities are chronically exposed to noise levels that impact health. Aircraft noise is a major contributor to these noise levels.

Inequity:

Communities of color and lower socioeconomic status neighborhoods are disproportionately impacted by noise and air pollution and are less responsible for emissions.

Knowledge Gaps

Broadly:

- Much is still unknown about the health impacts of ultrafine particulate matter.

Locally:

- We don't have measurements of PM_{2.5} and HAPs in areas closest to Sea-Tac Airport so we don't know how exposed communities may be.
- Need for an updated evaluation of local health effects.
- Clearer identification of communities that are disproportionately burdened.

All of this will help inform effective interventions



Thank you!

What questions/comments do you have?

