

# **COMMUNITY HEALTH & AIRPORT OPERATIONS NOISE & AIR POLLUTION: THE KING COUNTY HEALTH STUDY**

**DRAFT**

**ATTORNEY WORK PRODUCT**

# AGENDA

## A. THE LEGISLATIVE CHARGE

## B. FINDINGS & RECOMMENDATIONS BY REPORT SECTION:

1. What is the health of airport communities compared to the rest of King County?
2. What pollutants result from airport operations and what are the likely health impacts?
3. What were findings from the UW public health study of ultrafine particulates?
4. Recommendations to address health issues

## C. CONCLUSIONS

## THE LEGISLATIVE CHARGE

**\$125,000 over 2 years provided to King County local health jurisdiction to conduct a study on the population health impact of the SeaTac airport communities**

An analysis of existing data sources and an oversample of the Best Start for Kids child health survey to produce airport community health profiles within a one-mile, five-mile, and ten-mile radius of the airport



A comprehensive literature review concerning the **community health effects of airport operations**, including a **strength-of-evidence analysis**



The findings of the University of Washington School of Public Health study on ultrafine particulate matter at the airport and surrounding areas



Any recommendations to address health issues **related to the impact of the airport on the community**



## WAS THE REPORT RESPONSIVE TO THE CHARGE?

Request	Requirements	Status	What KCDOH did
1	Analysis of existing data sources	<b>Completed</b>	Identified existing data sources and summarized aggregated data
	Oversample Best Starts for Kids Health Survey	<b>Did not complete</b>	Did not directly address this requirement.  <i>Issue: intention of the legislative requirement is unclear</i>
	Produce airport community health profiles within a one-, five-, and ten-mile radius	<b>Completed</b>	Compared percentages of demographic characteristics, prevalence rates for diseases between 3 zones and to the "balance of the county"  <i>Issue(s): Is "balance of county" an appropriate comparison given that demographics differ/ risk factors differ? Is "airport community" a surrogate for urban community? Urban and rural communities</i>
2	Comprehensive literature review of community health effects of airport operations	<b>Partially completed</b>	Identified pollutants associated with airport operations (generic and qualitative assessment) and summarized assessments of criteria pollutant ISAs  Identified papers related to exposures near airports but did not discuss results or health implications.
	Strength-of-evidence analysis of community health effects of airport operations	<b>Did not complete</b>	Relied upon US EPA weight of evidence analysis (evaluation of different lines of evidence) for causality determination (criteria air pollutants) and other authoritative bodies (WHO) for HAPs.  <i>Issue(s): While causality determinations could be used to identify possible health effects to consider in addressing the charge, there was no assessment of strength of evidence (e.g., strong, moderate, limited) that these health effects result from airport operations and not other factors affecting health</i>

## WAS THE REPORT RESPONSIVE TO THE CHARGE?

Request	Requirements	Status	What KCDOH did
3	Findings of UWSPH study of UFP at airport	<b>Completed</b>	<p>Very briefly summarized the study with few details provided. Did not critique or discuss implications of the study.</p> <p><i>Issue: intention of the legislative ask is unclear (what is the action?)</i></p>
4	Any recommendations to address health issues related to the impact of the airport on the community	<b>Did not complete</b>	<p>Offered generic recommendations that could be made without any underlying research (i.e., sensible recommendations that can be made even in absence of empirical data on health associations related to airport operations)</p> <p><i>Issue(s): Recommendations do not directly address what was learned from the scope of work</i></p>

# THE KING COUNTY HEALTH REPORT

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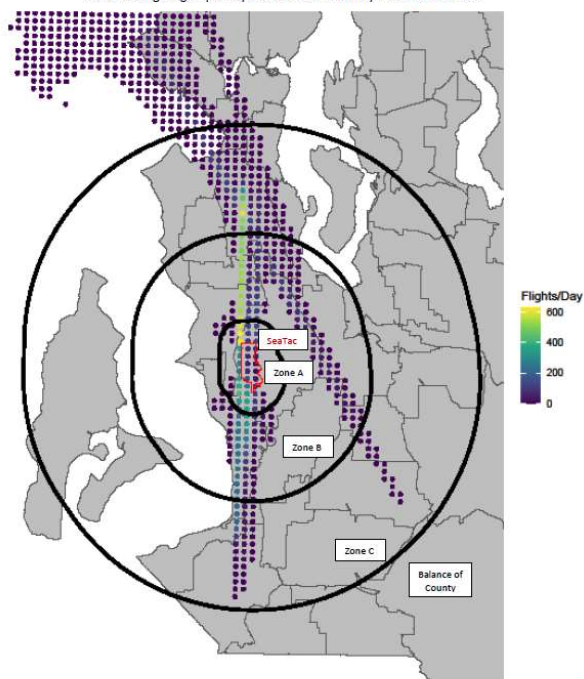
# DISTANCE FROM AIRPORT

## 1-, 5-, AND 10-MILES (ZONES A, B, C, RESPECTIVELY)

Figure 1  
Community Health Profile Zones



Figure A1  
SeaTac Average Flights per Day in 2018 and Community Health Profile Zones



Although mandated by the Legislative charge, Zones A, B, and C are each heterogeneous with respect to **airport impact** (flight paths) and **wind direction** (not uniform)

- Prevailing winds are from the southwest (occasional severe winter storms will produce strong northerly winds). In summer, occasional land-sea breeze effects creating afternoon northerly winds.

Legislature's charge did not allow for meaningful design of study groups

# 01 WHAT IS THE HEALTH OF AIRPORT COMMUNITIES COMPARED TO THE REST OF KING COUNTY?



Greater level of poverty/  
lower income compared to  
other areas in County



Greater frequency of smoking



Greater obesity



Greater depression



Greater frequency of  
inadequate sleep



Lower life expectancy  
(1.7-5.0 years)



Death rates higher for heart  
disease, unintentional injury  
(poisoning, falls, traffic  
crashes), chronic lower  
respiratory disease, diabetes,  
chronic liver disease, homicide



Higher hospitalization rates  
for asthma, stroke, diabetes,  
heart disease



Greater cancer incidence

**How do we distinguish between health impacts related to social determinants of health and health impacts related to airport operations?**





# WHAT KCDOH COULD HAVE DONE: USE SOCIAL DETERMINANTS OF HEALTH TO PROVIDE CONTEXT

## Neighborhood and Built Environment

- Many sources of **air pollution** and **noise**
  - Several Interstates (I-5, I-405) run through the Airport Community
  - Other major roadways (SR-518, SR-509, SR-99) run through the Airport Community
  - Many industrial facilities to the North
- **Densely populated area**

*Missing: housing characteristics*

01

## Economic Stability

- Higher percentage of people live in poverty or near poverty

*Missing: information on employment status*

02

## Health Care Access and Quality

- Adults more likely to be underinsured
- Children more likely to lack routine dental checkups
- Pregnant women less likely to receive early and adequate prenatal care

03

# WHAT KCDOH COULD HAVE DONE: USE SOCIAL DETERMINANTS OF HEALTH (SDH) TO PROVIDE CONTEXT

## Education Access and Quality

- Children less likely to have met third grade reading standard
- Lower high school graduation rates
- Fewer adults with associate degrees and higher
- Language and literacy, foreign born

04

## Social and Community Context

- Access to nutritious food
- Physical activity
- BIPOC / discrimination / structural racism

05

## SDH factors affect:

- Chronic conditions
- Mental health
- Life expectancy
- Birth outcomes

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## NOISE POLLUTION & HEALTH EFFECTS

- Noise pollution causes:
  - Cardiovascular disease
  - Sleep disturbances
  - Annoyance
- Noise pollution is likely to cause:
  - Decreased school performance

Minor part of Report, yet noise pollution may be significantly greater than background in the closer airport communities



## AIR POLLUTION HEALTH EFFECTS: SHORT-TERM EXPOSURE\*

Health Outcome	PM <sub>2.5</sub>	UFP	O <sub>3</sub>	CO	NO <sub>2</sub>	SO <sub>x</sub>
Cardiovascular	Causal	Suggestive	Suggestive	Likely causal	Suggestive	Inadequate evidence
Respiratory	Causal	Suggestive	Causal	Suggestive	Causal	Causal
Nervous system	Suggestive	Suggestive	--	Suggestive	Inadequate evidence	Inadequate evidence
Metabolic	--	--	Likely causal	--	--	--
Reproductive / Birth outcomes	Suggestive	Suggestive	Suggestive	Suggestive	Suggestive	Inadequate evidence

\*These assessments of short-term exposure came from US EPA, where short term exposure duration is considered "hours up to approximately one month"

## AIR POLLUTION HEALTH EFFECTS: LONG-TERM EXPOSURE\*

Health Outcome	PM <sub>2.5</sub>	UFP	O <sub>3</sub>	CO	NO <sub>2</sub>	SO <sub>x</sub>
Cardiovascular	Causal	Inadequate evidence	Suggestive	Likely causal	Suggestive	Inadequate evidence
Respiratory	Causal	Inadequate evidence	Likely to be causal	Inadequate evidence	Likely to be causal	Suggestive
Nervous system	Likely to be causal	Likely to be causal	--	Suggestive	Suggestive	Inadequate evidence
Metabolic	--	--	Likely to be causal	--	--	--
Reproductive / Birth outcomes	Likely to be causal	Suggestive	Suggestive	Suggestive	Inadequate evidence	Inadequate evidence

\* These assessments of long-term exposure came from US EPA, where long-term exposure duration is considered "from one month to years"

## COMMENTS: POLLUTANTS & HEALTH IMPACTS FROM AIRPORT OPERATIONS

Airport-related pollutants are identified but not quantified

All are common pollutants, associated with other sources in Airport Community (especially mobile sources – cars and trucks)

Charge calls for “strength of evidence” concerning community health impacts of airport operations. Instead, authors repeated the US EPA “weight-of-evidence analysis” for causal determination of health hazards of criterial air pollutants (regardless of exposure or source)

Report has repeated vague and unjustified generalizations of causation

- e.g., “various health outcomes are caused by air and noise pollution related to airport operations”

## POLLUTANTS & HEALTH IMPACTS FROM AIRPORT OPERATIONS

Report does not answer the question "***Are communities near airports exposed to pollution resulting from airport operations, and if so, how much?***"

- Report states:

“Not enough is known about people’s exposure to airport-related noise and air pollution, likely because it can be difficult to assess and requires understanding the concentration of pollutants, duration of exposure, and in some cases infiltration of pollutants into biological system. At an individual level, determining exposure requires either testing biologically to determine the level of pollutants in systems, or using personally, portable pollutant monitors to measure exposure as well as people’s location when exposure occurred. Such studies are infrequent and time consuming; the more common approach is to use available information from existing ambient noise and air pollutant monitors and estimate people’s exposure using residential addresses or similar data.”

! This should be addressed in State Environmental Policy Act (SEPA) Health study.



## WHAT KCDOH COULD HAVE DONE

Report identifies papers reviewing exposure + health effects in populations near airports but does not discuss findings

**Further review and synthesis of this literature would add value to study**



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## WHAT KCDOH REPORTED

Provides excerpt of Executive Summary from MOV-UP report

“The study primarily found that UFPs derive from both roadway and aircraft sources, with the highest UFP counts found nearest major roadways (Interstate 5). Total concentrations of UFP alone (10-1,000 nm) did not distinguish roadway and aircraft features”

**Could have brought in more relevant detail (see next slide)**



## UNIVERSITY OF WASHINGTON STUDY FINDINGS

	Aircraft-related	Roadway-related
<b>Ultrafine particles</b> (UFP; measured as particle number concentration)	<p>UFP mostly released during landing activities (vs. during take-off)</p> <p>The size distribution of these UFP are mainly in the 10-20nm aerodynamic diameter fraction</p> <p>Downward transport of UFPs result in plumes reaching ground level below and up to 15km downwind from airport</p>	<p>UFP are also found adjacent and downwind from major roadways</p> <p>The size distribution of these UFP are mainly in the 50-60nm aerodynamic diameter fraction, but range up to 1000 nm</p> <p>UFP decrease 50% within 150m of roadway. Background concentration by 500m</p>
<b>Black carbon</b> (BC; part of PM <sub>2.5</sub> ; measured as mass concentration)	<p>BC also associated with aircraft activities. BC concentrations adjacent to the airport on the north and south ends: 1.0-1.5 µg/m<sup>3</sup></p>	<p>BC also found near major roadways. BC concentrations near roadways: 5.0 µg/m<sup>3</sup></p>



**King County DOH could have highlighted these important findings and commented about their health implications**

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# KCDOH MADE RECOMMENDATIONS TO ADDRESS HEALTH DISPARITIES OF AIRPORT COMMUNITIES

Issue	Recommendations
<b>Mitigate health impacts of airport operations</b>	<ul style="list-style-type: none"><li>• Ensure participatory community engagement</li><li>• Increase culturally and linguistically appropriate prevention and disease management<ul style="list-style-type: none"><li>• Prevent and treat chronic disease and intentional injuries</li><li>• Ensure healthy births and pre/postnatal care</li></ul></li><li>• Quality education and equitable learning opportunities</li><li>• Increase awareness of risks to health from airport noise and air pollutants<ul style="list-style-type: none"><li>• Seal and vent buildings</li></ul></li></ul>
<b>Mitigate airport pollution and noise</b>	<ul style="list-style-type: none"><li>• Healthy housing conditions: adequate ventilation and effective sealing of residences</li><li>• Ensure safe physical environment of childcare, schools, community centers, long-term care facilities<ul style="list-style-type: none"><li>• Seal and vent buildings</li></ul></li><li>• Reduce noise and emissions from airports</li><li>• Create green space and add trees to help capture particulate matter</li></ul>
<b>Expand monitoring indoors and outdoors</b>	<ul style="list-style-type: none"><li>• Measure peak noise levels</li><li>• Create monitoring network</li><li>• Measure noise levels and pollutant concentrations in airport communities</li></ul>
<b>Support further research</b>	<ul style="list-style-type: none"><li>• The extent outdoor pollution infiltrates buildings</li><li>• The impact of sound exposures on human health and quality of life</li><li>• Mechanisms and nature of UPF effects on human health</li></ul>

## WHAT KCDOH COULD HAVE RECOMMENDED

- Recommendations are reasonable given existing health disparities in the airport communities. However, most of these issues are **not directly related to airport noise and air pollution.**
- More specific recommendations could possibly have been made if analysis had considered benefits of programming (where to maximize the benefit for improving health in communities).



### **KCDOH could have explained:**

- The built environment (and accompanying exposures) is one factor (of many) that impacts health
- Air pollution effects on health are likely to be subtle (in the absence of high levels of pollution, e.g., wildfires) when compared to other determinants of health (behavioral factors, socioeconomic factors)

# CONCLUSIONS



## MAJOR SHORTCOMINGS OF THE REPORT



Attributes all potential or assumed exposures and health impacts to the airport, rather than providing broader context (social determinants of health as co-factors)



No exposure data at all



Report does not address the actions that will improve health the most

- Those that are most important, are not directly related to the airport

## HOW MIGHT THE REPORT BE TRANSLATED BY STAKEHOLDERS?

Airport contributes minor amount compared to other sources (see statistics in the report) and yet they did not put this in perspective; communities may suggest airport is major source



Although the Report has no quantitative health impact data, people may use this report to attribute a variety of observed and potential health impacts to SeaTac-related sources



Influence changes in airport flight paths to improve AQ



Limit increases in air and road traffic



# THANK YOU QUESTIONS?

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