

Urban Ultrafine Particles Advisory Group Meeting

Fri, 3 October 2025, 9 am – 12 pm

4225 Roosevelt Way NE, Room 229 & Zoom Hybrid

Attendees

In person: Elena Austin (UW), Maria Batayola (Jump Start), Jan Capps (Public Health – Seattle & King County), Liliana Cardenas (Tukwila School District), Yeon Cheong (UW), Tim Gould (UW), JC Harris (Des Moines City Council), Lisa Hayward (UW), Ningrui Liu (UW), Cecilia Martindale (UW), Clément (Clem) Miège (PSCAA), Erik Saganić (PSCAA), Edmund Seto (UW), Laura Schladetzky (Congressman Adam Smith's (WA, 9th) office), Jeff Shirai (UW) & Maria Tchong-French (UW)

On Zoom: Magali Blanco (UW), Graeme Carvlin (PSCAA), Jennifer Farmer (Renton School District), Julie Fox (WA State Department of Health), Beth Friedman (WA State Department of Ecology), Peter Kwon (SeaTac City Council), Tim Larson (UW), Nate May (WA State Department of Ecology), Stephanie Meyn (Port of Seattle), Edwin Obras (WA State Representative, 33rd), Tina Orwall (WA State Senator, 33rd) Joseph Santana (DRCC), Shirlee Tan (Public Health – Seattle & King County) & Debi Wagner (Burien-based community leader)

Summary notes disclaimers

- These summary notes focus primarily on the discussions that took place during the hybrid meeting. For the presentation content, please see the slide deck or listen to the meeting recording.
- These summary notes were taken by the UW team and have not been reviewed or vetted by other UFP Advisory Group members. If comments were captured incorrectly or inaccurately, please reach out to Jeff Shirai (jshirai@uw.edu) so the UW team can make corrections.
- These notes are meant to be used by the UFP Advisory Group members and are not meant for external distribution.

Overall Summary

Introduction: The UFP advisory group meeting focused on updating members on current air quality initiatives at UW, discussing emerging needs, and jointly prioritizing research directions on UFP exposures, health effects, and mitigation strategies. Emphasis was placed on balancing scientific content with input and questions, and on building partnerships that connect research, policy, and agency priorities to promote healthy living in aviation-impacted communities.

Questions posed to the Advisory Group during Discussion portion (top three responses)

Feedback on research priorities and next steps was collected through a structured discussion designed to balance ranking with discussion. Advisory Group members engaged in an interactive polling session using Mentimeter, which allowed non-UW participants (both in-person and remote) to vote on key questions related to (1) health study design priorities, (2) mitigation and exposure reduction strategies, and (3) future UFP exposure research directions. Each question was followed by a discussion to contextualize and capture the reasoning. Members were encouraged to share examples from their agency, policy, or community work that could inform research. Here are some highlights of this process.

- ***Which Health Effects Study Designs Should UW Prioritize?***
 1. Short-term human health study (*e.g.*, daily asthma symptoms & UFP exposure)
 2. Cumulative impacts (*e.g.*, combined effects of UFP + noise + housing quality)
 3. Long-term human health study (*e.g.*, dementia risk with chronic UFP exposure, pre-term labor)

Discussion focused on how best to research and communicate the health impacts of transportation related sources on local communities. There was strong interest in short-term health studies that could demonstrate week-to-week improvements such as reduced asthma symptoms or fewer missed school days when indoor air is cleaner. Participants also expressed strong interest in cumulative exposure studies that link air, noise, and housing conditions. Long-term human studies were seen as especially meaningful for outcomes such as dementia and adverse birth outcomes. There was strong emphasis that a mix of local, reproducible studies and broader regional analyses would make results more compelling.

- ***How should we prioritize UW future research to mitigate and reduce human exposures to UFP?***
 1. Infrastructure changes → building ventilation upgrades, noise/air barriers, vegetation buffers
 2. HEPA filter interventions → effectiveness of portable air cleaners in schools, homes, clinics
 3. Mitigation of cumulative impacts → pairing strategies for air + noise exposures

Discussion around mitigation centered on the need to match community needs with scalable solutions. Infrastructure improvements were ranked as an important approach because they address emissions and infiltration directly. Portable HEPA air cleaners were viewed as the next best intervention strategy to research, especially for classrooms and clinics. Some suggested that long-term success depends on ease of use and consistent messaging. Several participants raised concerns that energy-efficiency mandates may unintentionally reduce indoor air quality and encouraged strategies that balance energy and health goals. Education and communication were seen as equally important to mitigation research. For

example, when teachers, families, or facility managers understand the benefits of these mitigation tools, they are more likely to keep them running.

- ***How should we prioritize UW future research on exposures to UFP?***

1. Distinguishing sources → separating roadway, Jet A, SAF and regional contributions
2. Communication of exposure → public dashboards, community-friendly reports
3. Trends over time → long-term UFP changes linked to flight operations

The group agreed that understanding where UFPs come from and how they change across time and space is essential to guide both research and policy. Participants supported linking PSCAA's high-resolution monitoring data with UW's spatial models to create a regional view, including how concentrations vary by wind, flight operations, and time of day. There was strong interest in expanding monitoring to schoolyards and community sites to make data more visible and relevant. Pairing fixed-site measurements with personal monitoring was viewed as a promising way to better capture exposure differences, although cost was raised as a challenge. Members also emphasized that research improving the communication and dissemination of exposure data should be prioritized with the goal of developing simple summaries that make complex findings accessible to residents and decision-makers.

Detailed Summary

UFP updates shared by attendees

- Erik Saganić: PSCAA, partnering with UW & many communities, is using air monitoring trailers to house instruments to monitor various air pollutants, including UFPs. Trailers placed in different communities, work with UW on data analysis to figure out pollutant sources for each neighborhood. Outreach to take place in Feb 2026. Community groups also used handheld sensors to help get a spatial view and better sense of sources of UFPs (e.g., ground transportation sources). Good community science activity. Also, thanks to Senator Orwall's efforts, PSCAA have two high-resolution, high-frequency UFP monitors that can be used for these sorts of activities (e.g., to detect nearby roadway & airport UFPs).
- Senator Orwall: with former Senator Keiser, \$6 million Climate Action funds, one-time funding for air quality work in the 2023-25 biennium; \$330K for asthma intervention funding in the 2025-27 biennium.
- Julie Fox: received \$5.3 million funds in the 2023-25 biennium earmarked for HVAC upgrades in schools across WA state to address wildfire smoke and extreme heat (e.g., adding air conditioning or cooling mechanisms like window shades or increasing indoor filtration). Five schools selected based on need (in terms of vulnerability) and historical heat & wildfire smoke levels. Each received ~\$1 million each. Mitigation strategies varied. Evaluation component involved UW team. Report pending. Great experience working with the five schools that were excited to receive these funds. Five schools not a lot, but good demonstration on the difference that these efforts can make.
- Maria Batayola: community efforts have focused on King County's 2025 Strategic Climate Action Plan. Activities included (1) King County communities under the SeaTac International airport flight path added to definition of aviation-impacted communities, (2) working with Chair of TREE (Transportation Economy & Environment) committee to embed language in SCAP, (3) encouraging task force creation to focus on greenhouse gas reduction in aviation by considering full cycle methodology, (4) King County smaller airports moving away from lead, (5) adoption of sustainable aviation fuels, (6) pushed for tree canopies that are science- and community-informed, and (6) Aviation Community Health Environment & Climate Advocates community report back Zoom meeting on **Tuesday 10/21**.
- Peter Kwon: recognizes importance of understanding exposures to UFP or UFP composition through research, but understanding health effects and instituting mitigation strategies are also very important. While studies are valued, from a policy perspective, it's important for the public/communities to see action, so mitigation activities need to be done. Example of HEPA air cleaner distribution in south Seattle communities is a good example.
- Elena Austin: encourages reading Particles of Truth: A Story of Discovery, Controversy, and the Fight for Healthy Air (C. Arden Pope III and Douglas W. Dockery).

HEPA Air Cleaner Use in Schools

- Need for more teacher feedback on HEPA air cleaner usage, but difficult to collect as teachers are very busy
- Based on (limited) Healthy Air, Healthy Schools study findings though, it appears:
 - When air cleaners are on, they stay on for long periods of time

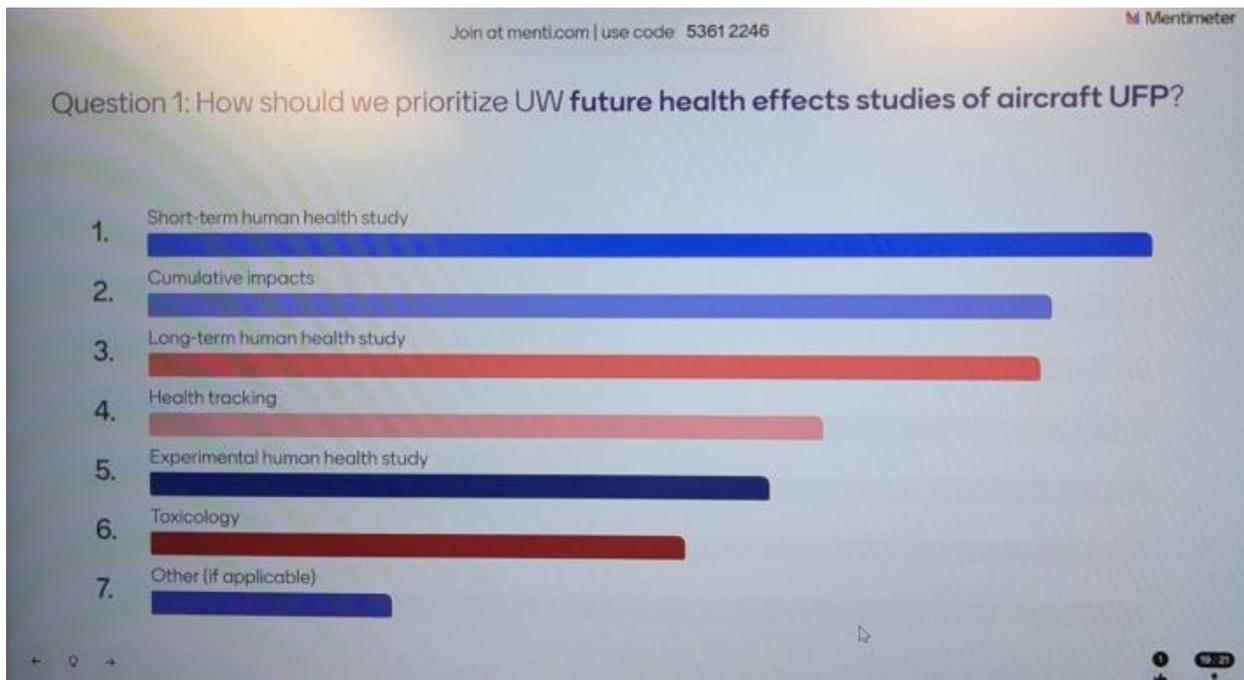
- When air cleaners are off, they stay off for long periods of time
- When a HEPA air cleaner is in a classroom, they become part of the existing furniture and as there are no local or centralized cues for teachers to turn them on or off, they can be forgotten.
- Audience suggestion (Liliana Cardenas):
 - Track what classrooms in each school have air cleaners and which ones need them
 - Integrate HVAC system management with room-based air cleaner usage

Group Discussion/Mentimeter Section

Question 1: Which Health Effects Study Designs Should UW Prioritize?

Mentimeter results:

1. Short-term human health study (e.g., daily asthma symptoms & UFP exposure)
2. Cumulative impacts (e.g., combined effects of UFP + noise + housing quality)
3. Long-term human health study (e.g., dementia risk with chronic UFP exposure, pre-term labor)
4. Health tracking (e.g., linking UFP to trends in health and vulnerability)
5. Experimental human health study (e.g., respiratory health while exercising under a flight path with and without filtration)
6. Toxicology (e.g., animal or lab studies on brain & cardiovascular impacts)
7. Other → suggested by you (e.g., multiple pollutants)



Group comments:

- Senator Orwall: How we paired asthma study with real impacts via mitigation strategies was very informative & supportive to communities; link intervention with short-term (week-to-week) outcome

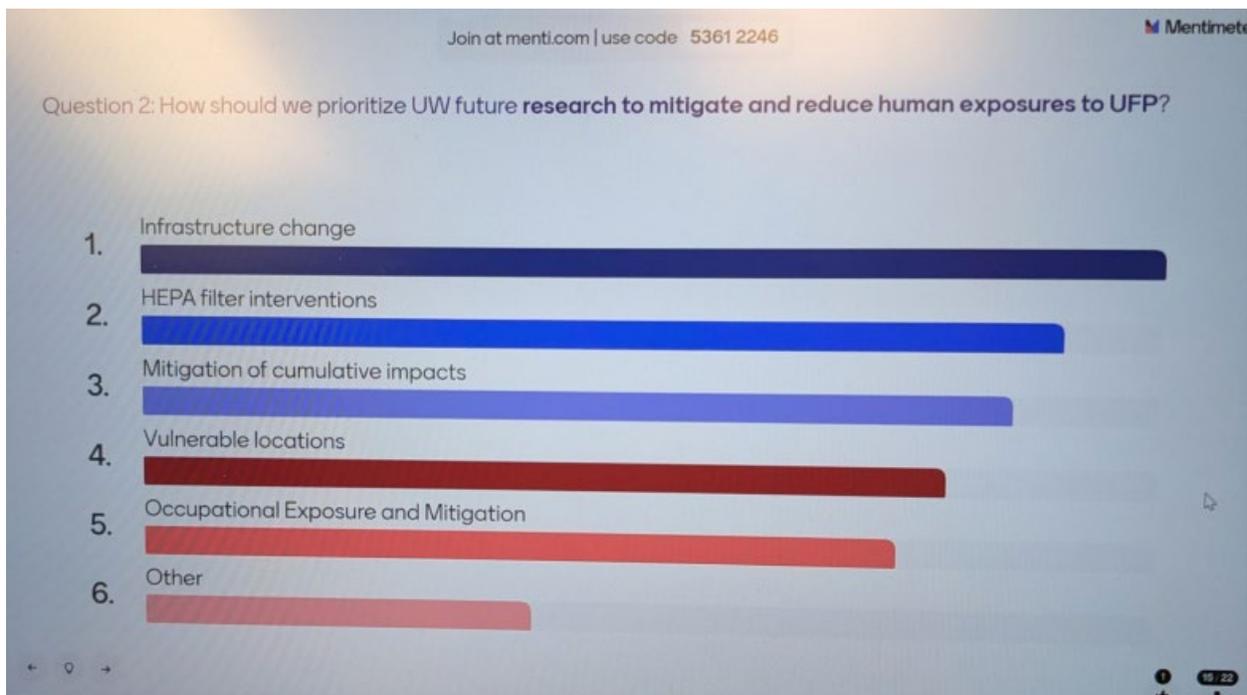
- Joseph Santana: What type of PM2.5 research and studies were available to the EPA when PM2.5 was introduced to the NAAQS?
- Elena Austin: referenced Particles of Truth: A Story of Discovery, Controversy, and the Fight for Healthy Air; for the incorporation of PM2.5 into the NAAQS, the most impact was the variety and types of study designs that demonstrated the impact of PM2.5 exposures. There was lots of pushback on the PM2.5 causal relationship with health outcomes, but the most impactful evidence was the reproducibility of short- and long-term, and multi region efforts, and locally driven research (*e.g.*, Utah where strong inversion is experienced in valley regions, lots of PM2.5 variability daily, looked at children respiratory function vs day-to-day changes in PM2.5).
- Debi Wagner: asked about if UFP masses were measurable. Also interested in PM2.5 & PM10 near-airpot mass data.
- Erik Saganić & Elena Austin: counts are used as UFP masses are basically not measurable. Erik to work with Debi to share PSCAA PM2.5 & PM10 data.
- JC Harris: how would a long-term health study be designed, near enough to schools, senior centers or fields? What equipment is needed and what is the appropriate distance to these sites? Possible to do something like this?
- Elena Austin: Mobile monitoring results have suggested we can do a better job with spatial distribution vs fixed site data, but mobile monitoring data doesn't have long-term trends. Hopefully, by comparing information we are getting on Puget Sound-wide spatial differences with long-term trend data we're starting to collect at SeaTac (and soon at Des Moines), we'll be able to see how things are changing over time and space.
- Edmund Seto: mentioned Magali Blanco who has a spatial model for our region that utilizes the 300+ sites mentioned in the Source Apportionment portion of the slide deck. If we update this model by integrating PSCAA's continuous monitoring data, that may yield the best spatial model of UFPs in the country. This can be used to link to long-term health effects (*e.g.*, mortality, birth outcomes, asthma incidence).
- Debi Wagner: selected Cumulative impacts. Referenced earlier mention of noise & UFP emissions, but pointed out cardiovascular effects and birth outcomes associated with both as well. Drill down on these impacts, including metabolic effects. Factor in hospitalizations, correlations of measuring & monitoring of noise & emissions Risk assessment in this area could be very interesting.
- Tim Larson: There were some studies done in the LA area (around LAX) that combined UFPs and noise measurements. The authors found an interaction with pre-term birth and low birth weight. Longer term study data are still needed though.
- Maria Batayola: Not sure if this is considered a short-term health study, but it is important to identify different sources. Could there be a meta analysis on what interventions best mitigate different sources so communities can better plan & prioritize ways to reduce their exposures? Concerns surround exposures that kids get while playing outdoors.

- Jan Capps: chose long-term health study, citing Alzheimer's & social determinants of health. Factored in potential sources of funding and that Alzheimer's is likely not a partisan topic.

Question 2: How should we prioritize UW future research to mitigate and reduce human exposures to UFP?

Mentimeter results:

1. Infrastructure changes → building ventilation upgrades, noise/air barriers, vegetation buffers
2. HEPA filter interventions → effectiveness of portable air cleaners in schools, homes, clinics
3. Mitigation of cumulative impacts → pairing strategies for air + noise exposures
4. Vulnerable locations → targeted protection for schools (kids outdoor play, play fields), health centers, parks etc.
5. Occupational Exposure and mitigation (e.g., workers at airports or adjacent locations who are exposed to diesel exhaust or truck traffic)
6. Other (e.g., Emission reduction → impact of sustainable aviation fuel (SAF) blends on UFP emissions)



Group comments:

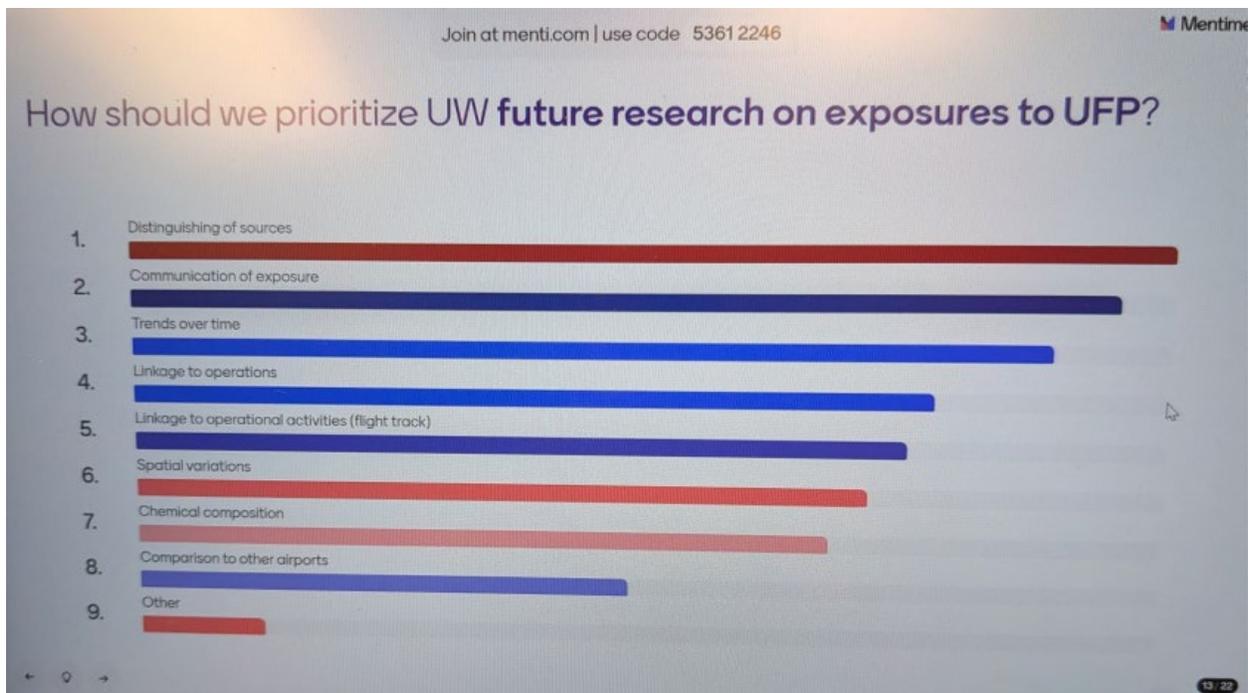
- Erik Saganić: selected Infrastructure change as that will get straight to the source. Address the primary source(s) and that can impact what mitigation factors we might still need. Potential solutions like sustainable aviation fuels.
- Shirlee Tan: focus on work that can inform code change to create better indoor & outdoor air which in turn can reduce pollutants folks are exposed to.
- Joseph Santana: agrees with Erik; go straight to the source.

- JC Harris: interventions can dramatically improve worker safety, but we have to eventually find ways to change hearts & minds. Can we think of a study that can figure out what it will take to convince everyone (e.g., elected officials, superintendents, teachers) to utilize the interventions that are already available? Figure out an effective marketing campaign.
- Elena Austin: our research has included some direct feedback that suggests that the indoor air quality (IAQ) in rooms are a great motivator for people to understand the connection between the use & maintenance of HEPA air cleaners & improvement of IAQ.
- Liliana Cardenas: a lot of education has to happen. A plan needs to be put into place (e.g., seat belt education). Has to be mandated and put into place until the behavior becomes automatic. Messaging from state can be better as it is currently difficult to follow. Right now, there is a lot of effort/focus on the clean building & energy requirements. This means people are trying to reduce energy usage, but not factoring how that might impact IAQ. There is a requirement to reduce energy usage irrespective of other considerations like IAQ. We need to implement strategies that balance energy reduction and IAQ needs; need to be on the same page.
- Senator Orwall: it was so clear from previous HEPA air cleaner interventions efforts that we barely touched the need. How do we take that to scale? How do we support families of different needs? Is there a way to message this need for balancing energy reduction and IAQ needs when homeowners are purchasing heat pumps or insulation packages? Interest in HEPA air cleaners at public meetings is evident. Messaging about the importance of IAQ and mitigation strategies is important.
- Joseph Santana: agrees with the importance of education of HEPA air cleaners & filters, but he selected infrastructure changes like infrastructure improvements & greenspace barriers. He likes the idea of “building things in” so we don’t have to rely on educational efforts as much as people won’t have to think about these issues as the solutions are already built in.

Question 3: How should we prioritize UW future research on exposures to UFP?

Mentimeter results:

1. Distinguishing sources → separating roadway, Jet A, SAF and regional contributions
2. Communication of exposure → public dashboards, community-friendly reports
3. Trends over time → long-term UFP changes linked to flight operations
4. Linkage to operations → matching UFP patterns with flight tracks and schedules
5. Linkages to operational activities (flight track)
6. Spatial variations
7. Chemical composition → lead, bromine, 6-PPD-quinone in airport-related UFP
8. Comparison to other airports → benchmarking Sea-Tac against other airports
9. Other



Group comments:

- Debi Wagner: can we do a blood test or some other biological testing to detect UFPs? Referenced the King County health effects report. Where is it safe to live around the airport & for how long? Do things improve if they spend time away?
- Edmund Seto: this goes back to the health studies discussed in Question 1. They can look at individual biological samples (e.g., blood, etc) and use Toxicology mechanisms studies to figure out if higher exposure leads to upregulations of immune function genes or inflammation which in turn can help figure out the health consequences.
- Elena Austin: UW DEOHS EDGE Center researchers have ways to collect blood samples from individuals and evaluate the change in immune response or regulation of various pathways linked to immune systems. While we may not have the science to get a clear picture of what is going on, we do know which immune pathways are active which may help us gain a more detailed understanding of these responses.

Post-meeting group comments

- Erik Saganić: Personal exposure monitoring could also be interesting.
- Elena Austin: Agreed this could be interesting around the new Des Moines site currently being set up. A new TSI UFP counter that can be used as a personal monitor is under consideration about could be offered as a lending tool.
- Multiple individuals: agreed on interest in getting personal monitoring in vulnerable populations/locations, perhaps linking fixed sites with personal monitoring (e.g., kids), but a major hurdle is the cost of the instruments (~\$10+K) which would mean a study of a very limited size or would need a huge budget.

- Edmund Seto: described his previous personal exposure study where volunteers walked around the SeaTac Community Center with and without PAPRs (powered air-purifying respirators), breathing filtered or non-filtered air. Different from personal monitoring that others may be considering in this discussion.
- Liliana Cardenas: can we do air quality monitoring in school yards?
- Elena Austin: we are very interested in this and would be very happy to partner with schools or school districts to do this.
- Edmund Seto: there are also reasonably cost-effective (~\$10K) networks available to do this (*e.g.*, QuantAQ).
- JC Harris: would a PO of \$50K get us such a network for \$7.5K (don't know). Can we quantify partial day interventions? The public tends to interpret aviation impacts as all or nothing (binary terms). For example, would they turn down sound insulation or air quality mitigation instruments if they think they are being exposed to noise or smoke (*e.g.*, BBQs) anyways? Can we show that if a child is placed in a clean and quiet environment for 8-10 hrs, will there be a health benefit? Can we show that something is better than nothing? This would help show that these situations are not binary.
- Tim Larson: emphasized yesteryear regulation of PM where EPA was actually regulating total suspended particles. It took them a while to get to PM10 (10 years) to eventually get to PM2.5. It may be the same to get to UFPs. More monitoring data would help move this along.
- Julie Fox: great strength of UW work is their focus on real world evaluations vs lab scenarios. Evaluating variations & combinations of mitigation strategies can help provide more information on what we need for IAQ & energy reduction requirements.
- Debi Wagner: suggested a study looking at UFP exposures & interventions & pregnancy outcomes.
- Elena Austin: work is in progress to develop a PHSKC-like asthma map for pre-natal outcomes.

Chat question not captured above

- Senator Orwall: HVAC doesn't necessarily reduce ultrafine particles, is that correct?
- Elena Austin: HVAC does not necessarily reduce UFPs, although in some designs we do see significant improvements. But the design standard of the existing HVAC do not necessarily indicate performance relative to UFPs, and low energy goals likely interact with this efficiency.