



COVID-19 and Air Quality

Impact on public health

Board Meeting April 23, 2020

Outline

- Brief review of health (particularly respiratory) impacts of air pollution
- Brief review of studies linking air pollution to virus susceptibility
- Higher-risk populations
- Brief summary of recent air quality, media inquiries, and voluntary call to action

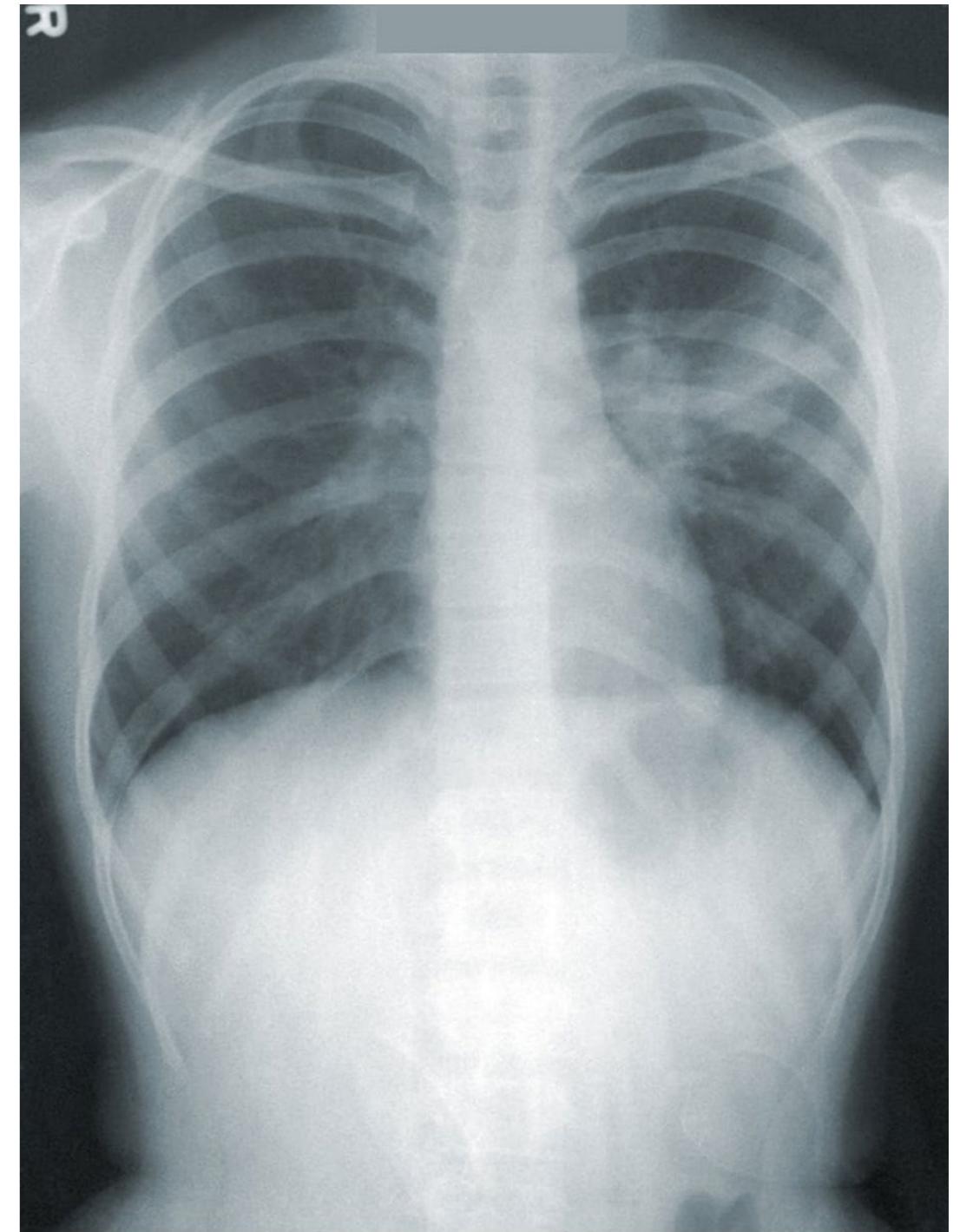
Established Health Effects of Air Pollution¹

- Respiratory
 - Reduced lung function
 - Aggravation of lung disease
 - Increased lung infections
 - Asthma attacks
- Cardiovascular
 - Heart disease
 - Stroke
- Emerging studies showing other health links, but still early (worsen insulin sensitivity, neurological impacts)



Air Pollution and Respiratory Impacts

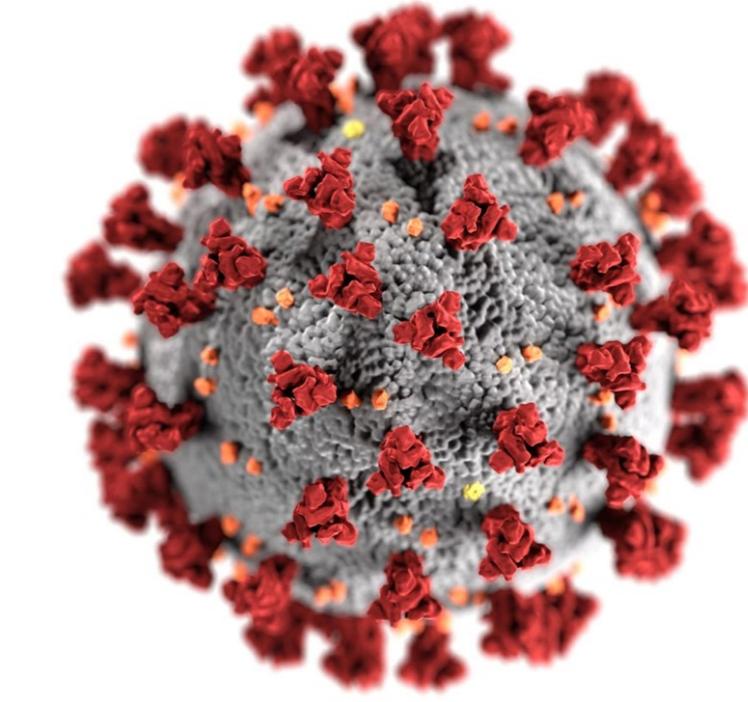
- Air pollution contributes to the health conditions that could increase risk from a virus or bacteria (like COVID-19)¹
- Particle pollution impairs the body's built-in protection mechanisms¹
- Linked to hospital admission for respiratory infection¹ and Acute Respiratory Distress Syndrome (ARDS)²
- Led to a higher viral load in-vitro³ and higher mortality from influenza in mice⁴



<https://unsplash.com/photos/NMZdj2Zu36M>

Pandemics and Air Quality

- Limited research—difficult to estimate effect because of many confounders
- 1918 flu⁵
 - Tens of thousands of excess deaths due to air pollution
 - A loss of \$45.9 billion; 6 percent of GDP
- SARS⁶
 - Somewhat limited study with five cities in China
 - Showed positive association between air pollution and SARS case fatality
- COVID-19⁷
 - A very recent study looking at 3,000 counties across the US
 - A small increase in long-term exposure to PM_{2.5} leads to a large increase in COVID-19 death rate
 - A “1 $\mu\text{g}/\text{m}^3$ in PM2.5 is associated with a 15% increase in the COVID-19 death rate”
 - Interesting result – will need to be more vetted with more analysis and duration



<https://unsplash.com/photos/k0KRNtqcjfw>

Populations at Increased Risk

- Elderly, people with pre-existing conditions
- Equity: People of color and low-income residents
 - More pre-existing conditions, under-insured, racial bias, higher pollution exposure^{8,9,10}
 - Ability to work from home¹¹
 - High-income (60%), low-income (9%)
 - Asian (37%), White (30%), Black (20%), Hispanic (16%)



Recent Air Quality

In our region:

- Traffic pollutants, such as black carbon and NOx, are down 20-30% (preliminary analysis)
- Fine particle pollution has been higher than expected
- Meteorology has a large effect, difficult to isolate the response to COVID-19

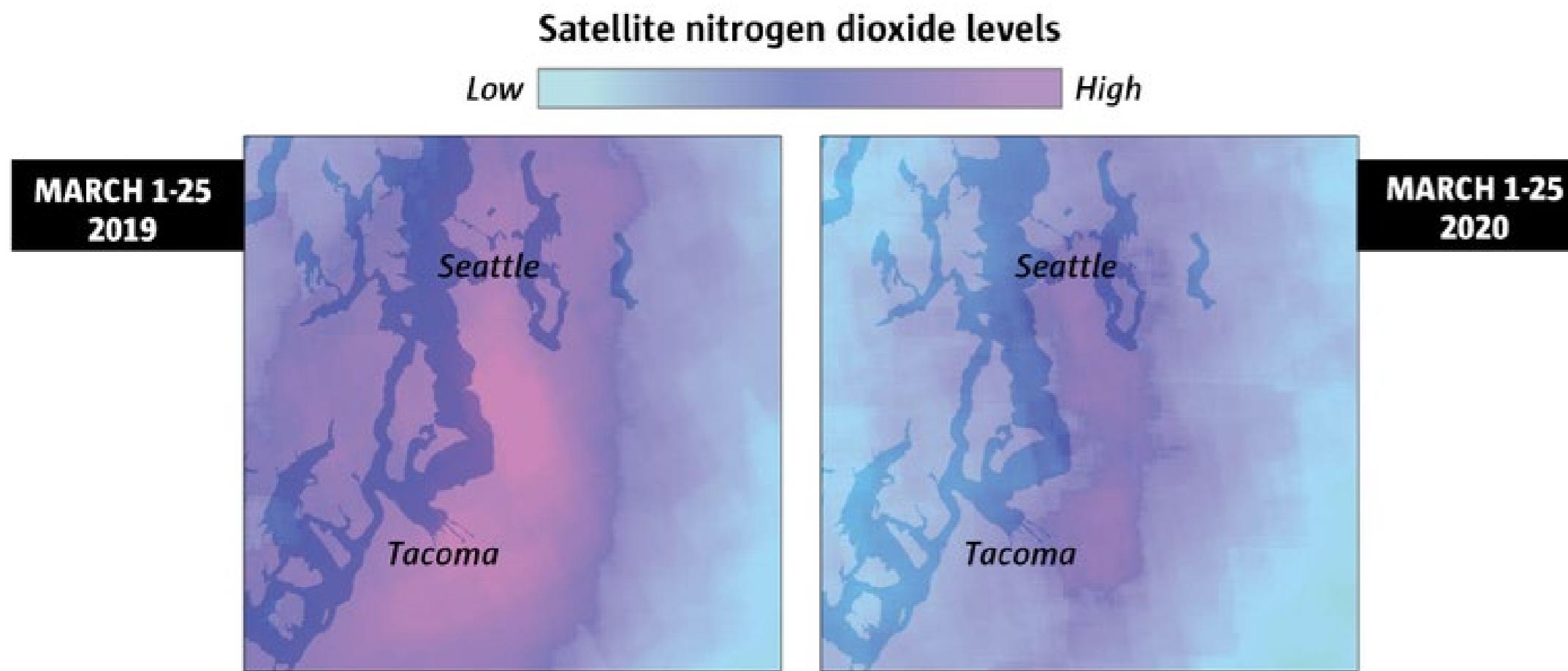
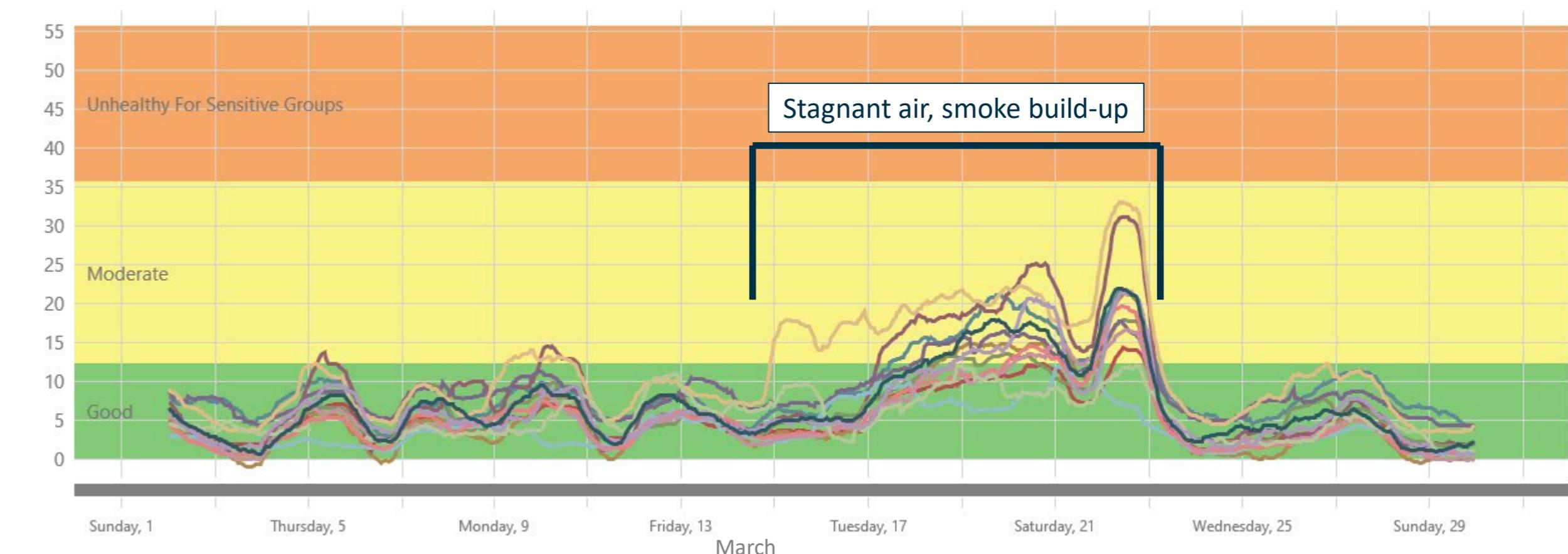


Image source: Satellite Sentinel-5P NRTI NO₂ - near real time nitrogen dioxide as imaged from space by satellite.
Provided by the European Union/ESA/Copernicus, Scripps Institution of Oceanography

<https://www.seattletimes.com/seattle-news/environment/coronavirus-closures-reduce-seattle-area-air-pollution-but-not-global-warming/>



COVID-19 and Air Quality

April 16, 2020

Media Inquiries

- “One good thing about the stay-at-home order – better air quality. With fewer cars on the road, there’s **less tailpipe pollution**. While roadway pollution is down, the Puget Sound Clean Air Agency (CAA) has noticed an **increase in very small particle pollution**, the type of pollution created by burning things.”¹² KOMO, 4/7, author and Phil Swartzendruber
- “the amount of very small particular pollution is actually up, probably because so **many people are home burning** fireplaces and wood stoves.”¹³ Seattle Times, 3/31, Craig Kenworthy
- “having a viral pandemic isn’t the way we want to see air pollution improve.”¹⁴ Crosscut, 4/6, Erik Saganić
- “more extensive research is necessary to understand how polluted air could impact the outcomes of coronavirus patients.”¹⁵ KOMO, 4/8, Erik Saganić

Actions

- Media inquiries and social media
- Voluntary burn ban
 - Our message: *To reduce local pollution and help our most at-risk friends and neighbors during the COVID-19 pandemic, please burn wood only for heating purposes and avoid any outdoor fires.*
 - Coordination with other local air quality agencies and state



References

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3. <https://www.ncbi.nlm.nih.gov/pubmed/15772371>
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References

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13. <https://www.seattletimes.com/seattle-news/environment/coronavirus-closures-reduce-seattle-area-air-pollution-but-not-global-warming/>
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15. <https://komonews.com/news/coronavirus/study-air-pollution-may-increase-risk-of-dying-from-covid-19>