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 Pollution

- 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 mechanisms^1
- Linked to hospital admission for respiratory infection^1 and Acute Respiratory Distress Syndrome (ARDS)^2
- Led to a higher viral load in-vitro^3 and higher mortality from influenza in mice^4

https://unsplash.com/photos/NMZdj2zu36M
Pandemics and Air Quality

- Limited research—difficult to estimate effect because of many confounders

  - 1918 flu\textsuperscript{5}
    - Tens of thousands of excess deaths due to air pollution
    - A loss of $45.9 billion; 6 percent of GDP

  - SARS\textsuperscript{6}
    - Somewhat limited study with five cities in China
    - Showed positive association between air pollution and SARS case fatality

  - COVID-19\textsuperscript{7}
    - A very recent study looking at 3,000 counties across the US
    - A small increase in long-term exposure to PM\textsubscript{2.5} leads to a large increase in COVID-19 death rate
    - A “1 \mu g/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

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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\textsuperscript{8,9,10}
  - Ability to work from home\textsuperscript{11}
    - 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

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

7. https://projects.iq.harvard.edu/covid-pm
References