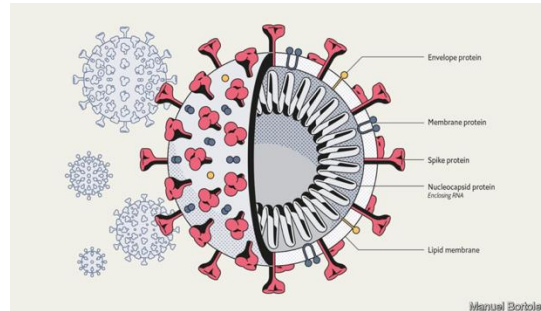


# *Using CO2 Monitors to Guide Ventilation Efforts*

Indoor Air Quality in Tribal Communities



Mansel A Nelson

Institute for Tribal Environmental Professionals



# Risk for Exposure to COVID

Highest

Crowded, poorly ventilated indoor spaces

Speaking, Singing, Exercising

Lower

Outdoor spaces

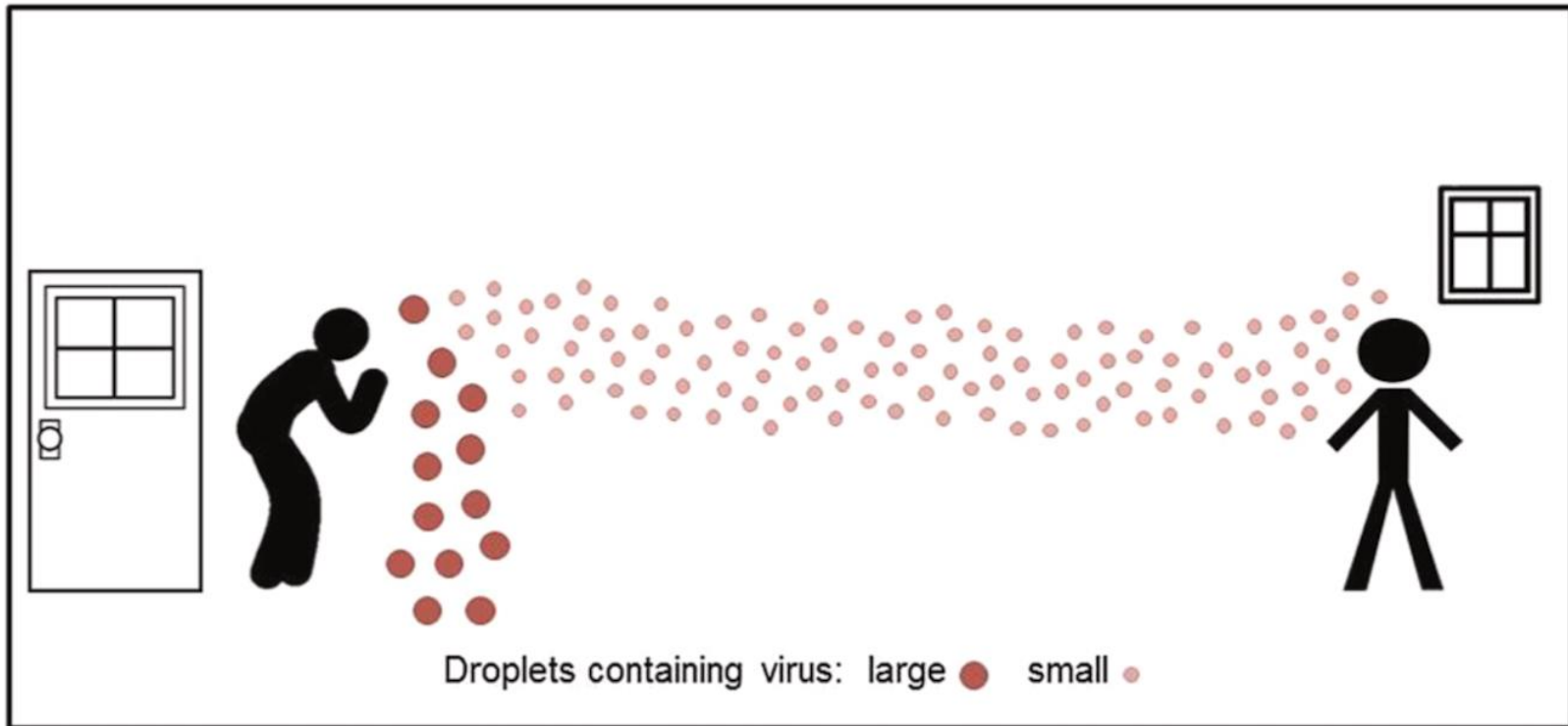


# Role of Vaccines

- Vaccines will not resolve pandemic issues immediately
- Need layered risk reduction for several more months...



# Aerosol Transmission



# Ventilation

- Providing “fresh” (Outside Air) to an indoor space
- Dilute pollutants, including SARS-CoV-2
- Concerns / Limits
  - Air Quality Outdoors
  - Temperature differences in/out
  - Mechanical or Natural



# Carbon Dioxide Measurements

## Benefits

- Quick estimate
- Occupied spaces
- Inexpensive
- Surrogate for body odors / pollutants

## Limitations

- Outside Air Only – does not measure filtration
- Unoccupied spaces will require additional steps
- Not a measurement of pollutants
- Snap-shot in time



# Carbon Dioxide Numbers

## ASHRARE (Pre-pandemic)

- Adequate - below 650 ppm above outside (400 ppm)
  - Below 1050 ppm (body odor only)

## Using Building for Health (Harvard T.H. Chan)

- Good 4-5 ACH = 800 ppm
- Excellent 5-6 ACH = 700 ppm
- Ideal 6 ACH = 650 ppm
- **Outdoors = 400 ppm**



Estimates



# Ventilation Assessment



Five-step guide to checking ventilation rates in classrooms

<https://schools.forhealth.org/wp-content/uploads/sites/19/2020/08/Harvard-Healthy-Buildings-program-How-to-assess-classroom-ventilation-08-28-2020.pdf>





# Consumer CO<sub>2</sub> Monitors

- <https://shop.hellowynd.com/products/wynd-halo-smart-air-monitor>
- \$149
- <https://www.airthings.com/wave-plus>
- \$230



Wind Halo



AirThing Wave-Plus



Not an endorsement or recommendation - Examples

# CO<sub>2</sub> Monitors - Mobile

- <https://www.microdaq.com/telaire-7001-carbon-dioxide-co2-monitor.php>

- \$499



Telaire 7001

- <https://tsi.com/products/indoor-air-quality-meters-instruments/>

- \$599



TSI 7515



Not an endorsement or recommendation - Examples

# CO<sub>2</sub> Monitors – Wall Mount

- <https://www.onsetcomp.com/products/data-loggers/>
- \$595
- <https://www.co2meter.com/collections/co2-wall-mount/products/csense-large-wall-co2-meter>



- \$429



**HOBO Carbon Dioxide - Temp - RH Data Logger**

**cSense Large Character Wall CO<sub>2</sub> Monitor**



Not an endorsement or recommendation - Examples

# Summary

Carbon dioxide measurements can help guide ventilation efforts

- Ensure adequate ventilation
- Minimize energy usage



# More Information...

<https://www.epa.gov/coronavirus>

<https://www.ashrae.org/technical-resources/resources>

<https://www.cdc.gov/coronavirus/2019-ncov/index.html>



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