COVID-19 Seasonality

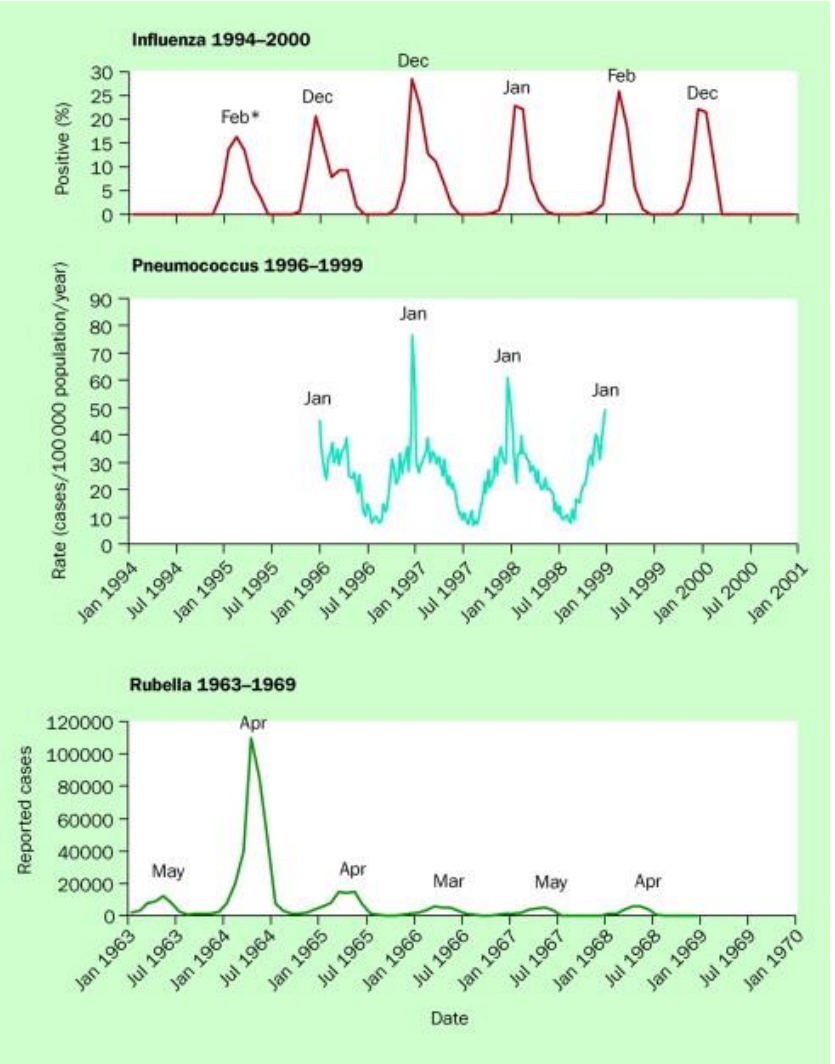
What we know about COVID-19 seasonality

- **Virtually nothing**

- This all started in late 2019, the pandemic is still expanding, and our knowledge of # of infected people is uneven at best

Why might COVID-19 be seasonal?

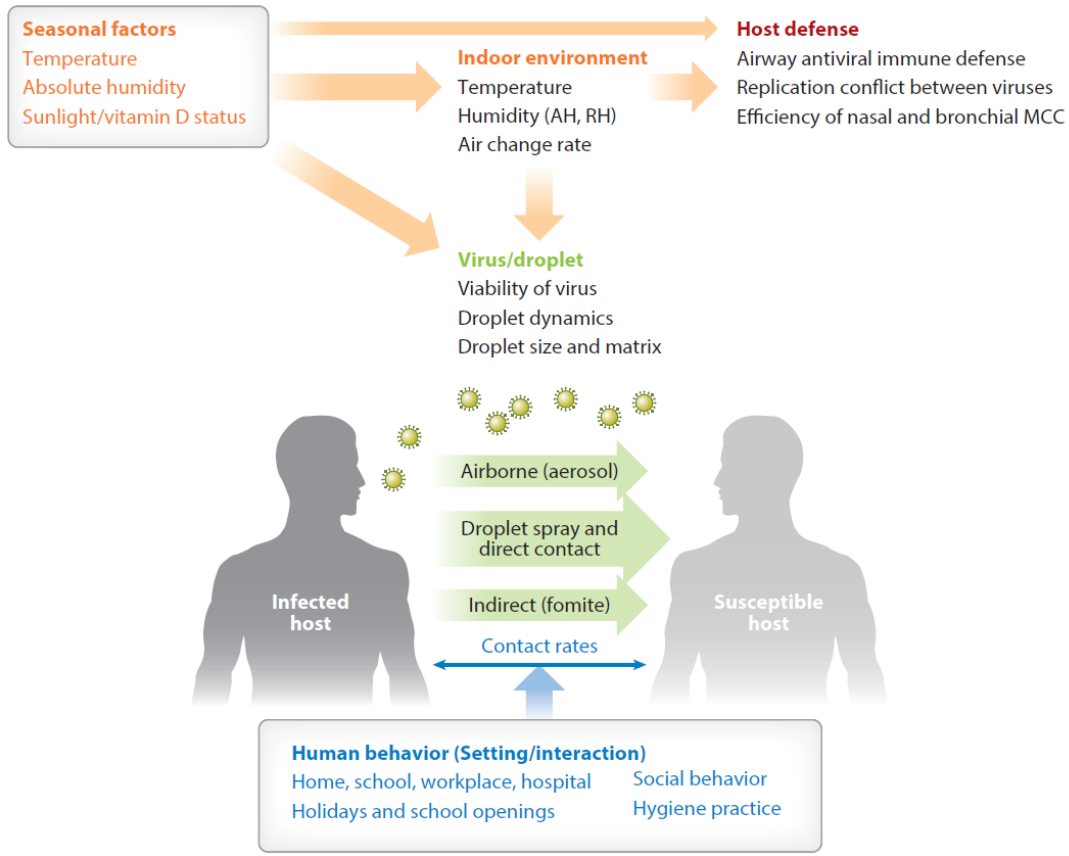
- Most, though not all, **human respiratory pathogens exhibit seasonality in temperate regions**, with a winter peak.
- This includes several established coronaviruses and influenza, such that we might expect SARS-CoV-2 to be the same.



Dowell & Ho (2004)

What causes seasonality in human respiratory pathogens?

- Classically, this has been attributed to some unknown combination of behavioral and direct environmental sensitivity.
- Recent research indicates that **direct environmental sensitivity plays the dominant role**, as best demonstrated for influenza.
- Pathways include virus survival and dispersion (as demonstrated in the lab for influenza) and host defense response



Moriyama et al. (2020)

Which environmental factors matter?

- Again, our best information is for influenza.
- Both temperature and humidity have been explored, but **absolute humidity** appears to be the best predictor
  - This has been demonstrated in lab and epidemiological studies, many led by Jeff Shaman's group
- Why?
  - Lab studies show that vapor pressure is a better predictor of transmission than is relative humidity or temperature
  - Meteorological measurements of absolute humidity are a useful proxy for indoor conditions: AH is ~conserved between indoor and outdoor settings

State of knowledge for COVID-19

- Several rapidly released, non peer reviewed studies have claimed to find COVID-19 sensitivity to AH or to Temperature
- The state of case data and lack of confirmatory lab studies **lead most experts to conclude that these studies are speculative**
- Anthony Fauci has suggested that evidence of seasonality is emerging in the geographic patterns of COVID-19 expansion

Importantly: the answer is unlikely to be black and white—i.e., it's unlikely that COVID-19 will "go away" or will never make it in tropical environments. But

From the GEO-Health perspective:

- The seasonality question would seem to hinge on the potential for **direct environmental sensitivities**
- The leading candidate predictor is **not well-monitored** beyond synoptic weather stations, and the range of tested predictors is limited
- There are **critical open questions** about both temperate zone seasonality and tropical/subtropical hydrometeorological sensitivities

But, but, but:

- There is no lab evidence for SARS-CoV-2 environmental sensitivity
- Case count data are not yet reliable or consistent indicators of transmission rates. This is likely to change in coming months, but it will always be messy