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PREVENTING RESPIRATORY INFECTIONS – What we have learned and what we still need to study?

Business Finland Health Tuesday
7.12.2021

Pekka Nuorti, MD, PhD,
Professor of epidemiology
Tampere University

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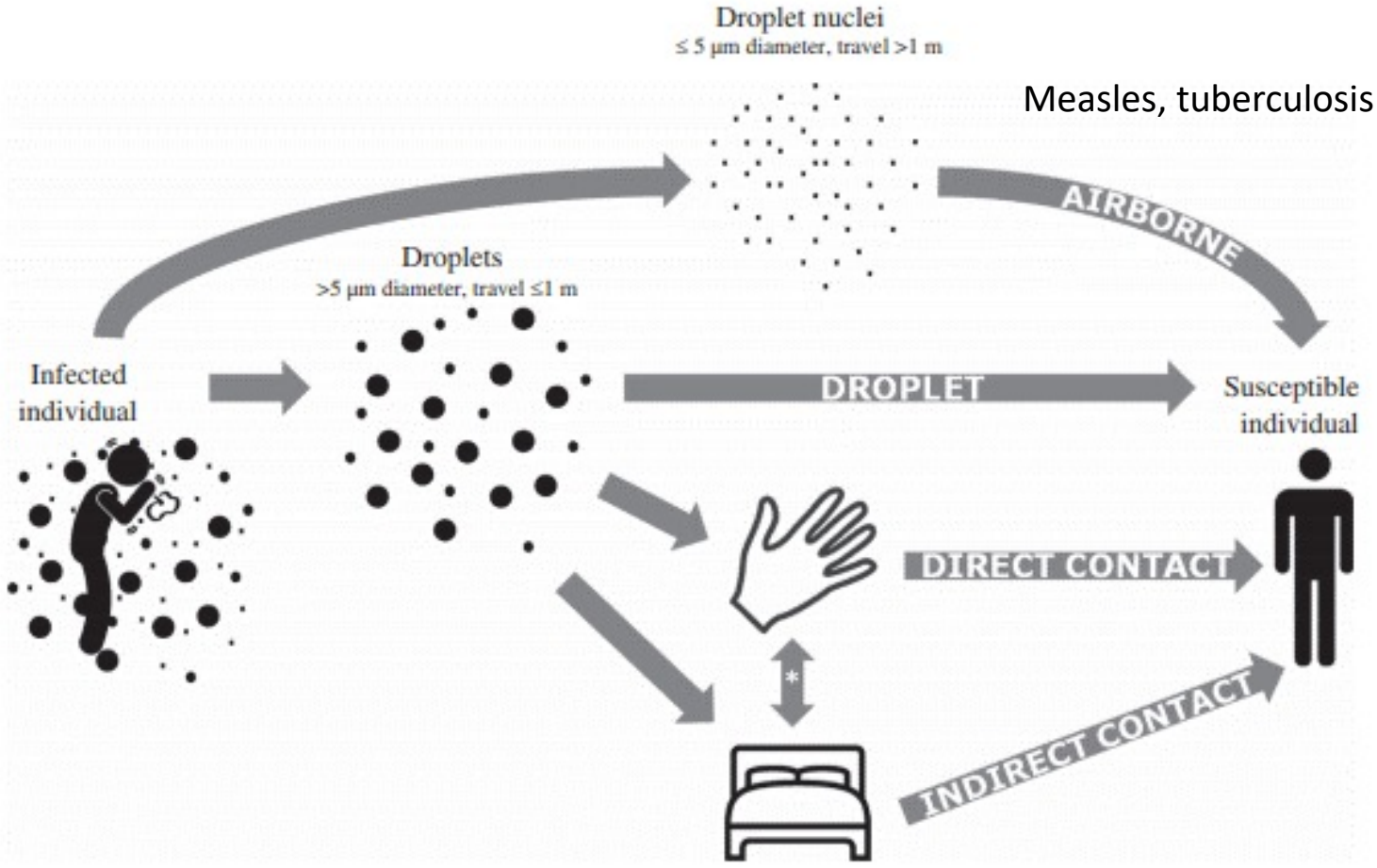
Transmission routes for respiratory infections – traditional view



Measles, tuberculosis

* Transmission routes involving a combination of hand & surface = indirect contact.

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Settings of SARS-CoV-2 transmission clusters- crowds, close contacts, closed spaces

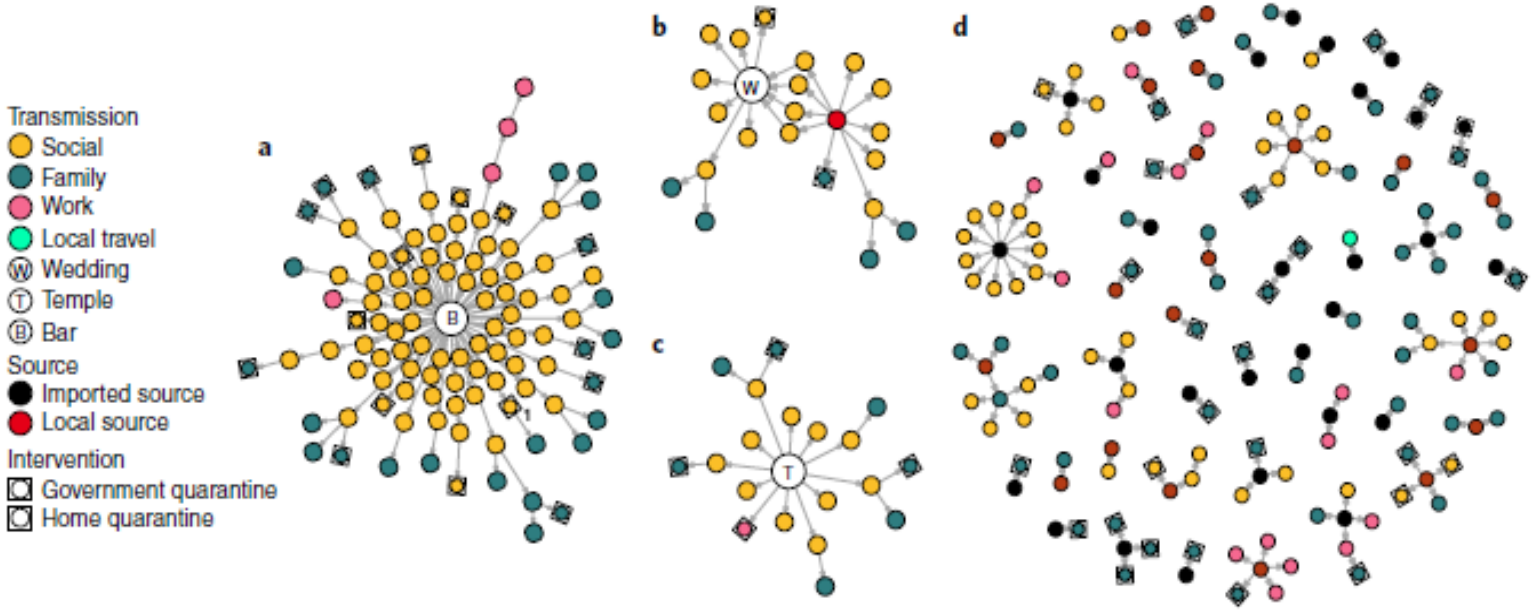

Fig. 2 | Chains of SARS-CoV-2 transmission in Hong Kong initiated by local or imported cases. a, Transmission network of the 'bar and band' cluster of undetermined source ($n = 106$). **b**, Transmission network associated with a wedding without clear infector–infectee pairs but linked back to a preceding social gathering and local source ($n = 22$). **c**, Transmission network associated with a temple cluster of undetermined source ($n = 19$). **d**, All other clusters of SARS-CoV-2 infections where the source and transmission chain could be determined.

Adam et al. Nature Medicine Sept. 2020

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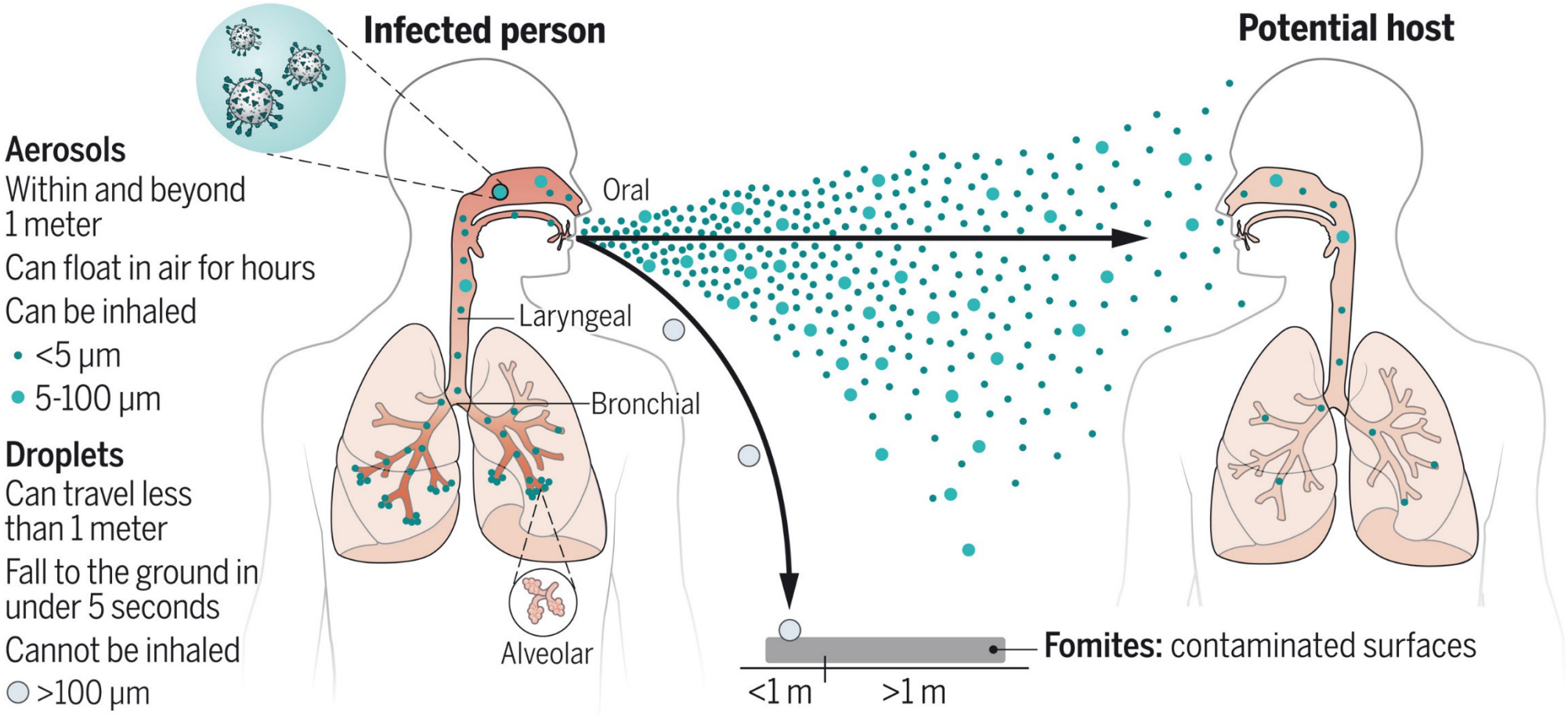
Airborne transmission of respiratory viruses



Wang CC et al Science 2021

In airborne transmission, personal protective measures are very important, but not alone sufficient

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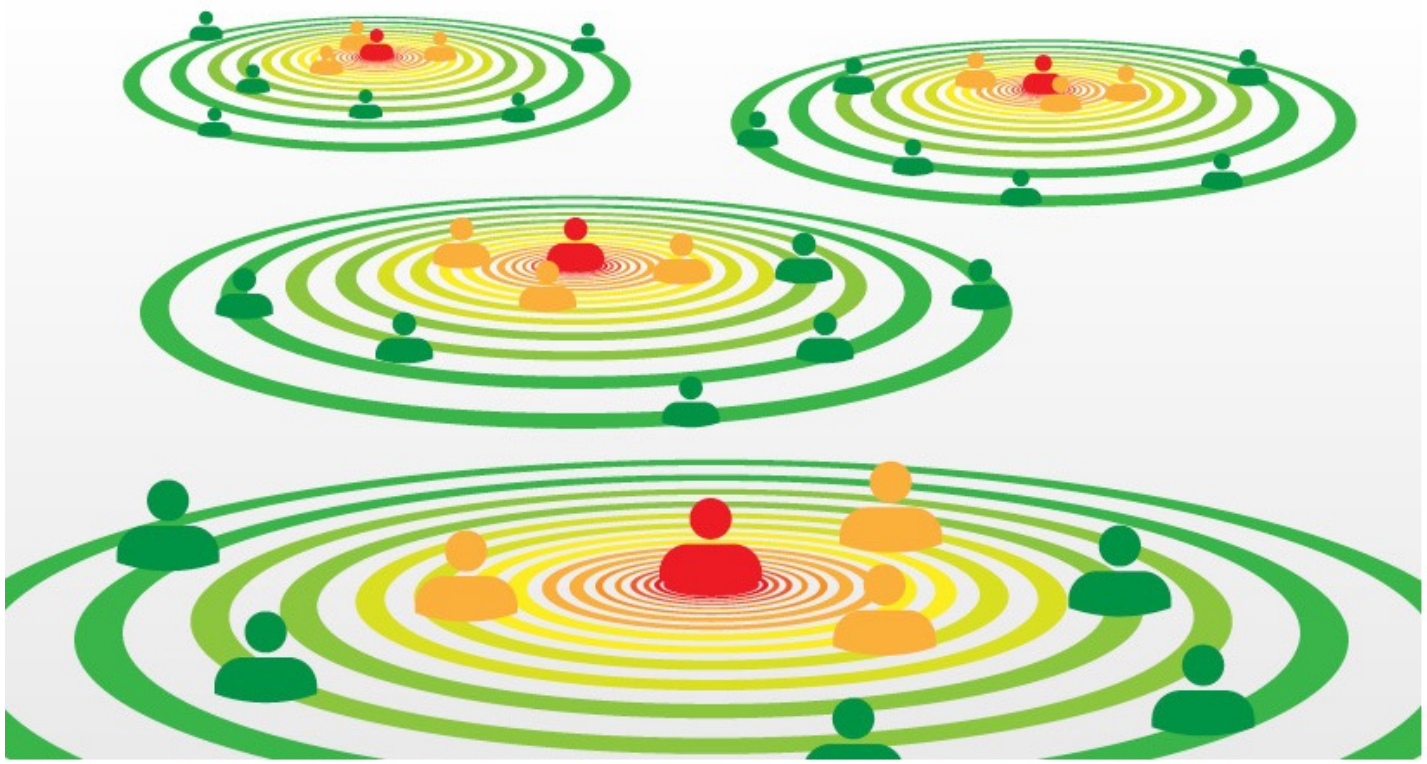
Human contact patterns are the driver of the epidemic



Overdispersion of COVID-19

Why a Small Percentage of People May Be Responsible for a Large Share of the Disease's Spread

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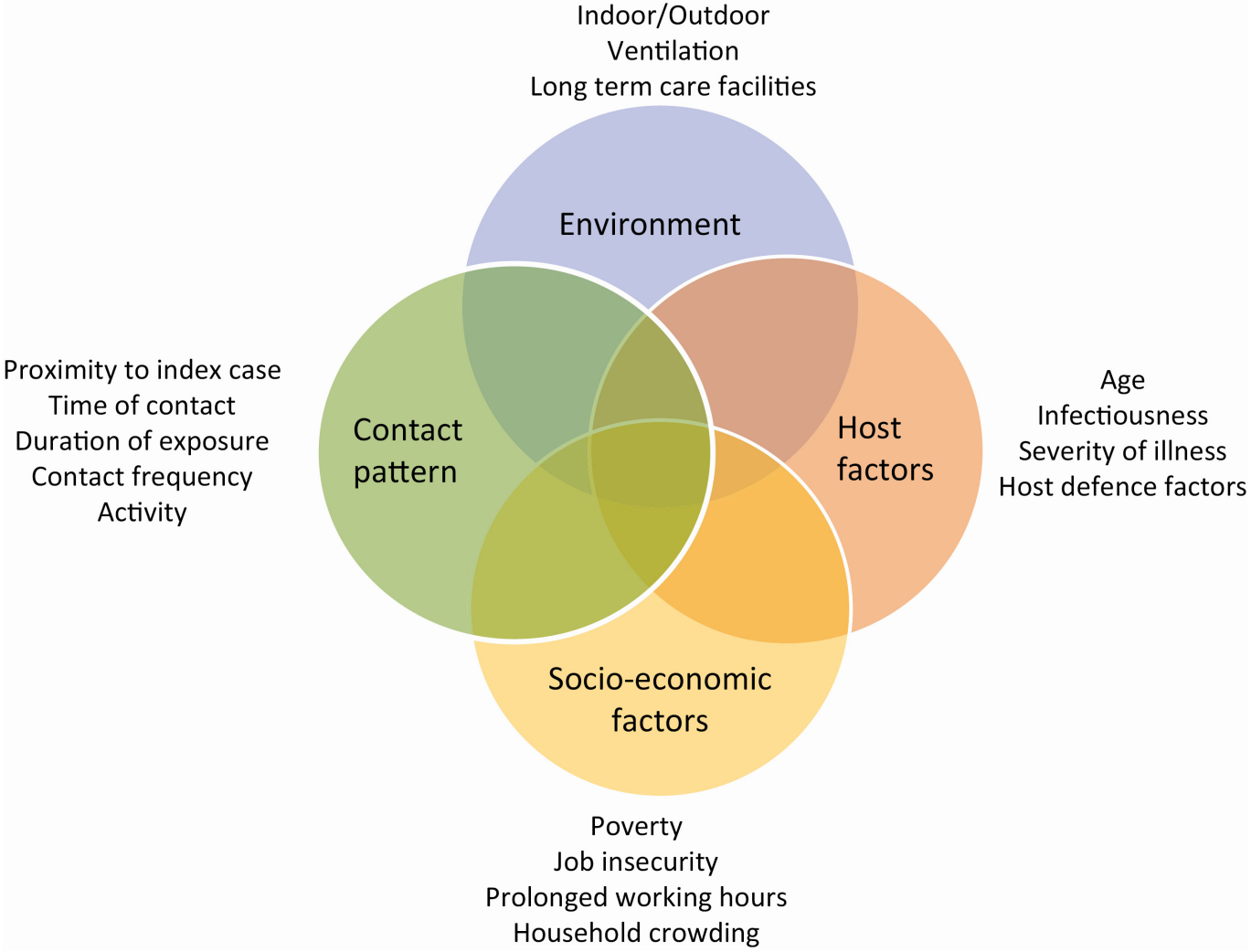
Transmission dynamics are influenced by several factors



Cevik et al. Clin Infect Dis, 2021
Parkkila S ym. Duodecim 2021

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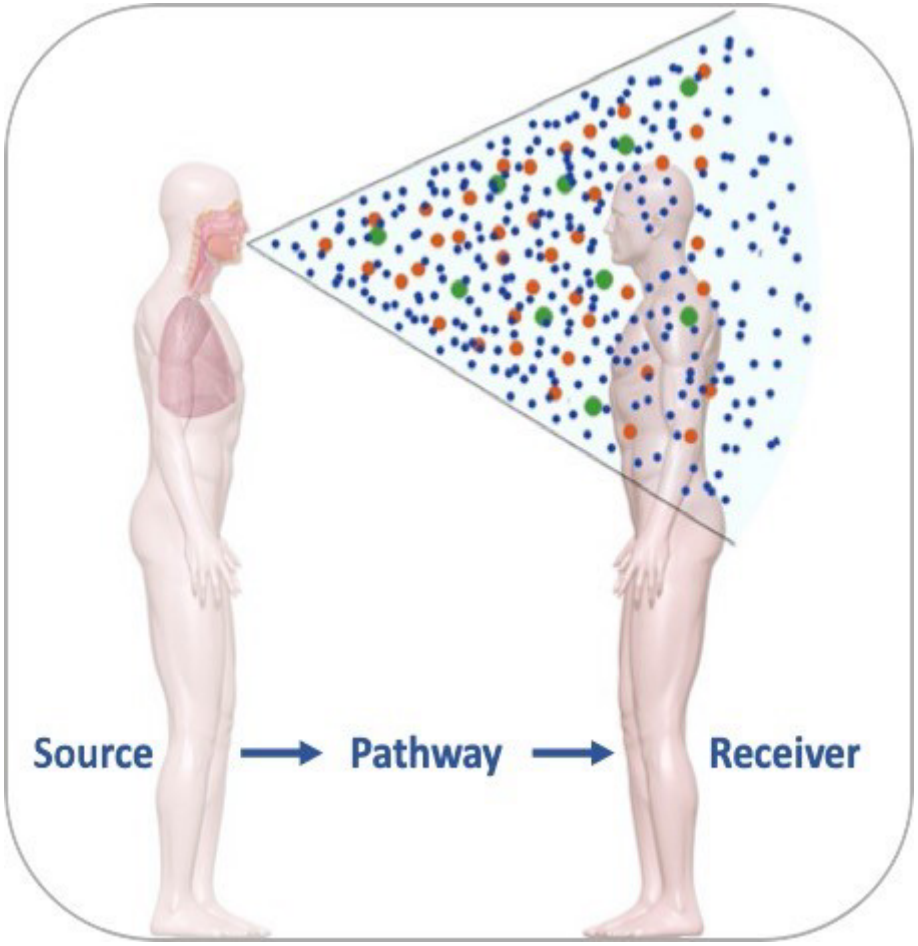
Prevention should address all parts of the transmission chain



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A combination of control measures are required

Table 2. Source, Pathway, and Receiver Controls for the Public to Prevent Infectious Aerosol Inhalation

Source (infected person)	Pathway (infectious particles in air)	Receiver (uninfected person)
Do these first and use as many as possible	**Do these second in combination with source controls**	**Do these last after using all possible source and pathway controls**
Limit the number of sources or time spent in shared spaces	Limit the movement of infectious particles from source to receiver	Limit receiver's inhalation of infectious particles
• Vaccination • Consider immediate testing and isolation for 5-10 days when in contact with sources who are infected or whose infectious status is unknown • Masks or non–fit-tested respirators to limit outward emission of particles* • Limit number of people inside • Limit time spent with people indoors	• Move activities outdoors • Increase distance between source and receiver (will work for only a short time) • Remove, replace, and clean the air to lower particle concentrations (e.g., portable air cleaners)	• Masks or respirators to limit inhalation of particles*

*Refer to Table 1 for information on how long it will take for an uninfected person to receive an infectious dose when the source and the receiver are wearing a cloth face covering, surgical mask, or respirator.

Brosseau LM, et al. Center for Infectious Disease Research and Policy (CIDRAP), University of Minnesota, 2021

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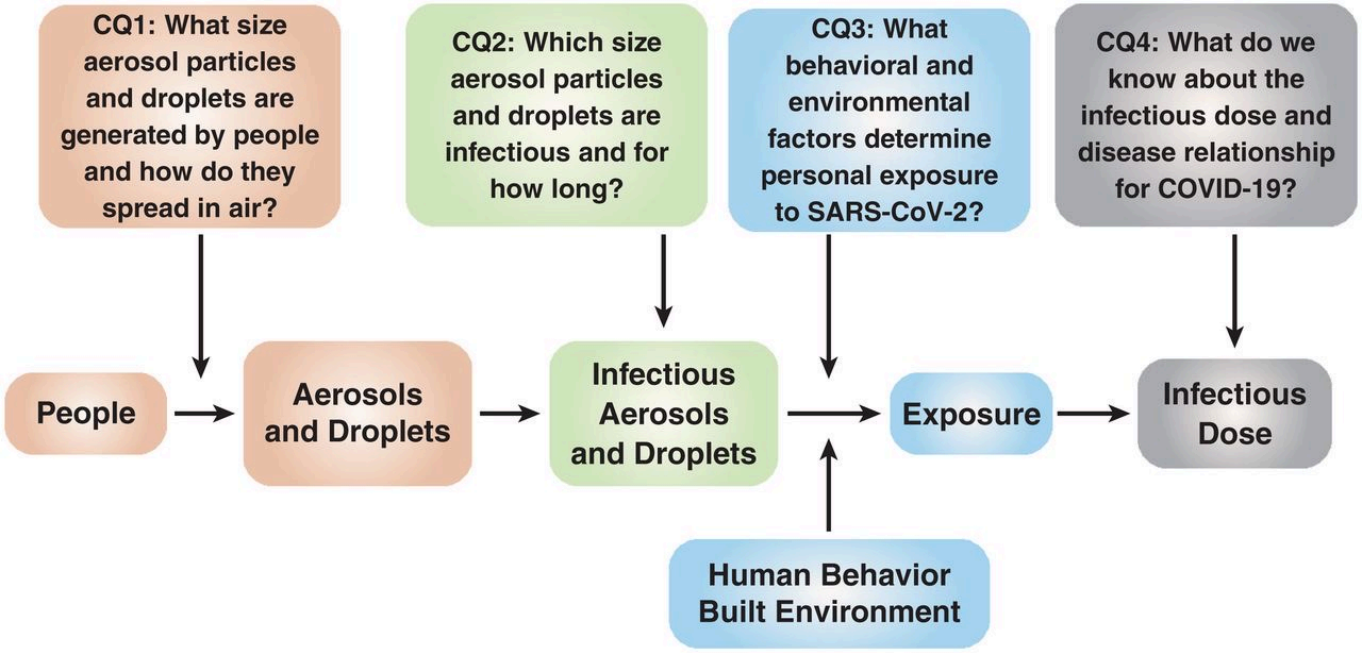
Preventing airborne transmission requires collaborative, multidisciplinary research approaches



Samet JM et al. PNAS 2021

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Healthy indoor environments are essential for public health in the same way as clean water and sanitation

POLICY FORUM

INFECTIOUS DISEASE

A paradigm shift to combat indoor respiratory infection

Building ventilation systems must get much better

https://www.nature.com/articles/d41586-021-00460-x

The risk of airborne respiratory transmission recognized globally

The Sydney Morning Herald

Ventilation 'revolution' needed to speed up Australia's path out of lockdown

By Paul Sakkal and Aisha Dow
August 22, 2021 — 5.00am

Save Share A A A 2

Australia's building standards would be overhauled to stem the spread of COVID-19 and employers could be sued if poorly ventilated workplaces led to outbreaks, under changes some say could be as important as vaccination in the battle against the virus.

The Belgian authorities recently made it mandatory for people who manage hotels, restaurants, bars, banquet halls and fitness centres to monitor carbon dioxide levels at their venue

President Biden Announces American Rescue Plan

JANUARY 20, 2021 • LEGISLATION

President Joe Biden's $130 billion schools package includes funding to ventilate schools and keep them open.

BBC NEWS

Covid: CO2 monitors pledged to aid school ventilation

Around 300,000 carbon dioxide monitors are to be made available to schools in England next term to help improve ventilation and lessen Covid outbreaks.

Conclusions

- Epidemiological principles of SARS-CoV-2 transmission and spread form the scientific basis for developing effective prevention and control measures
- Respiratory protection needs to begin at systems level
- Multidisciplinary, collaborative research is needed to help societies live with COVID-19
- Control measures will also reduce the burden of other, seasonal respiratory infections and make us better prepared for future pandemics.

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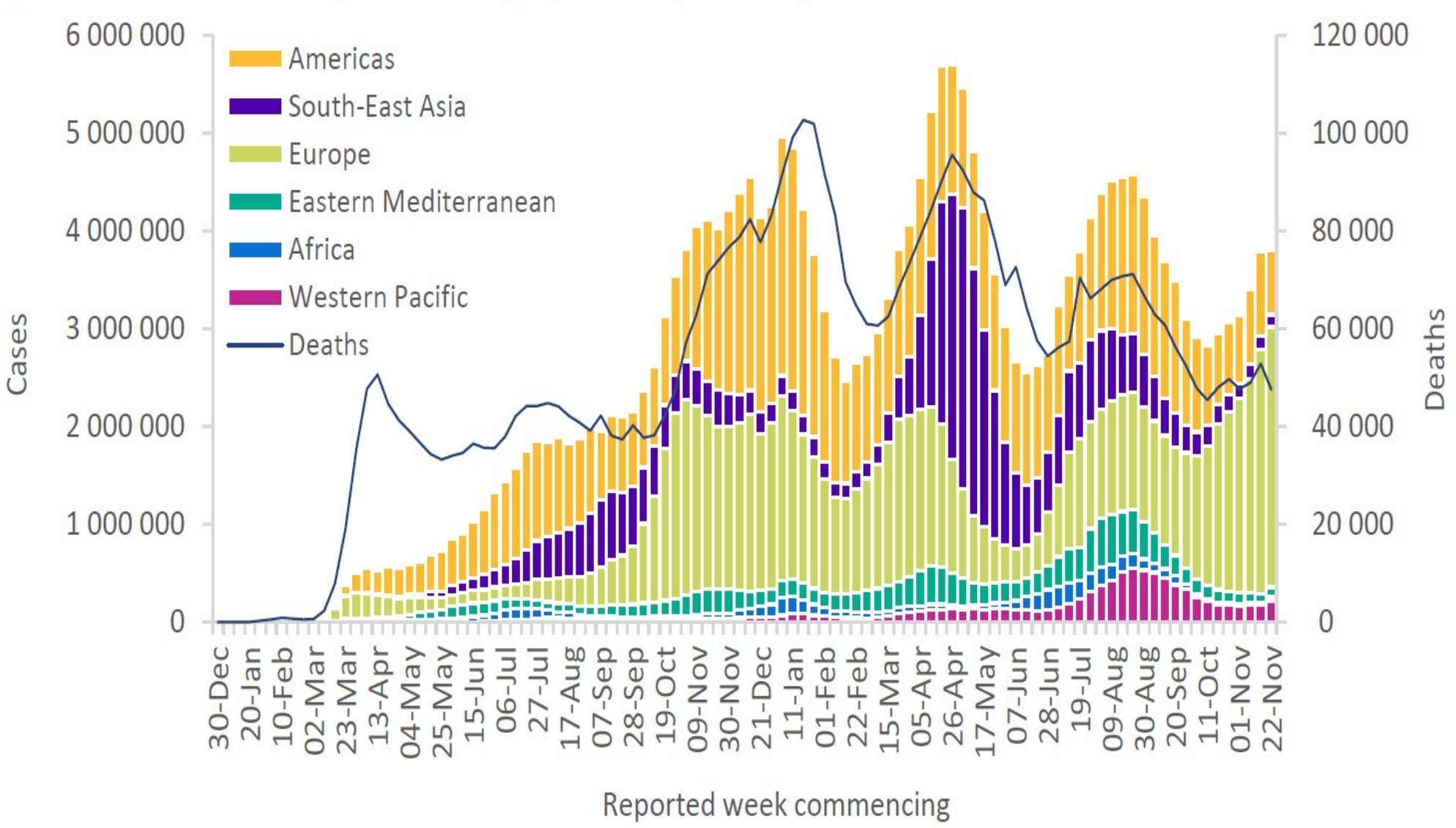
The pandemic will not be over any time soon…

Figure 1. COVID-19 cases reported weekly by WHO Region, and global deaths, as of 28 November 2021**



https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19---30-november-2021

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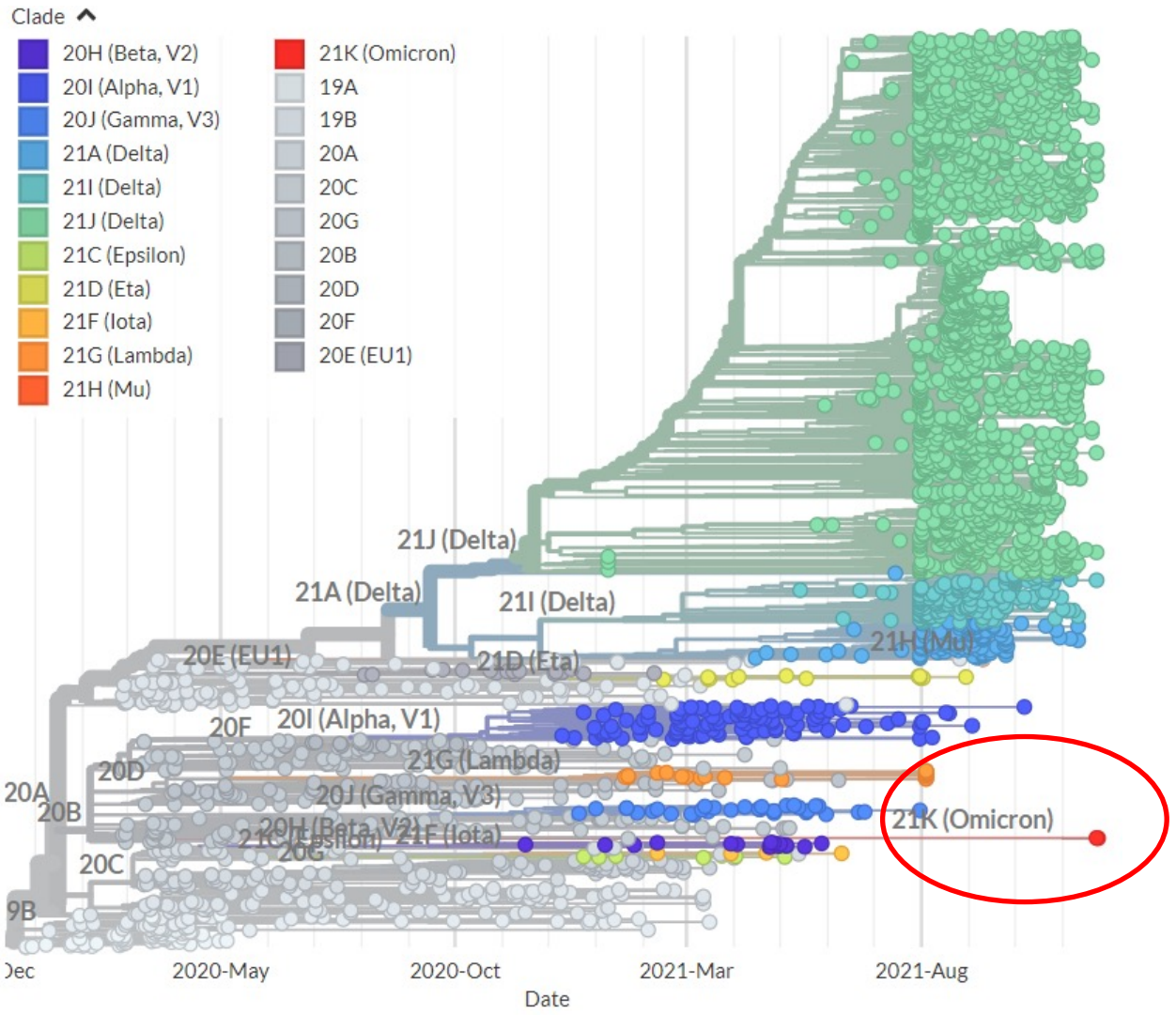
From COVID-19 to COVID-21…



https://nextstrain.org/ncov/open/global

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Thank you!

Pekka.Nuorti@tuni.fi