

# From Aerosols to Populations

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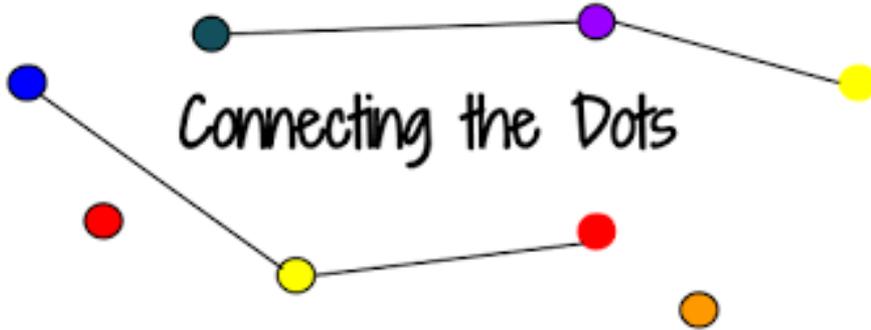
*EMHI Airborne Transmission of SARS-CoV-2  
Virtual Workshop*

August 26-27, 2020

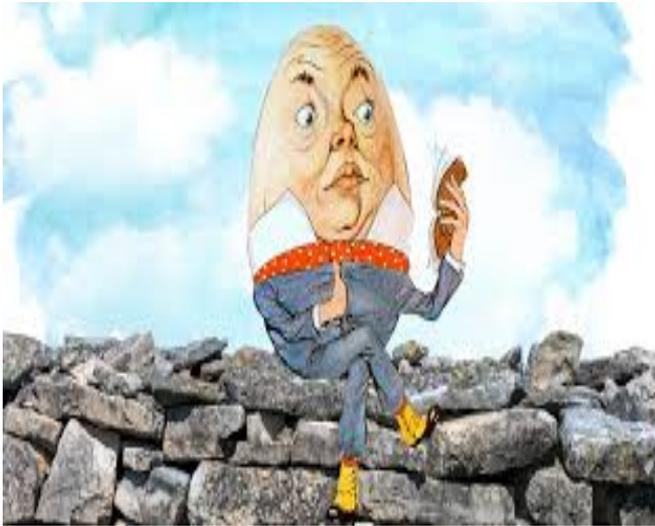
colorado school of  
public health

UNIVERSITY OF COLORADO  
COLORADO STATE UNIVERSITY  
UNIVERSITY OF NORTHERN COLORADO

# Bringing the story together



## Putting H-D together



## Population Measures

- Incidence (count)
- Test positive
- Hospitalization
  - ICU need
- Mortality
- $R_0$  and  $R_e$

**Relationship to airborne transmission?**

# $R_0$ : The basic reproductive number

**Definition:** the average number of secondary cases generated by a primary case in a 100% susceptible population.

$$R_0 = CPD$$

C=number of contacts per unit time

P=probability of infection when a contact occurs

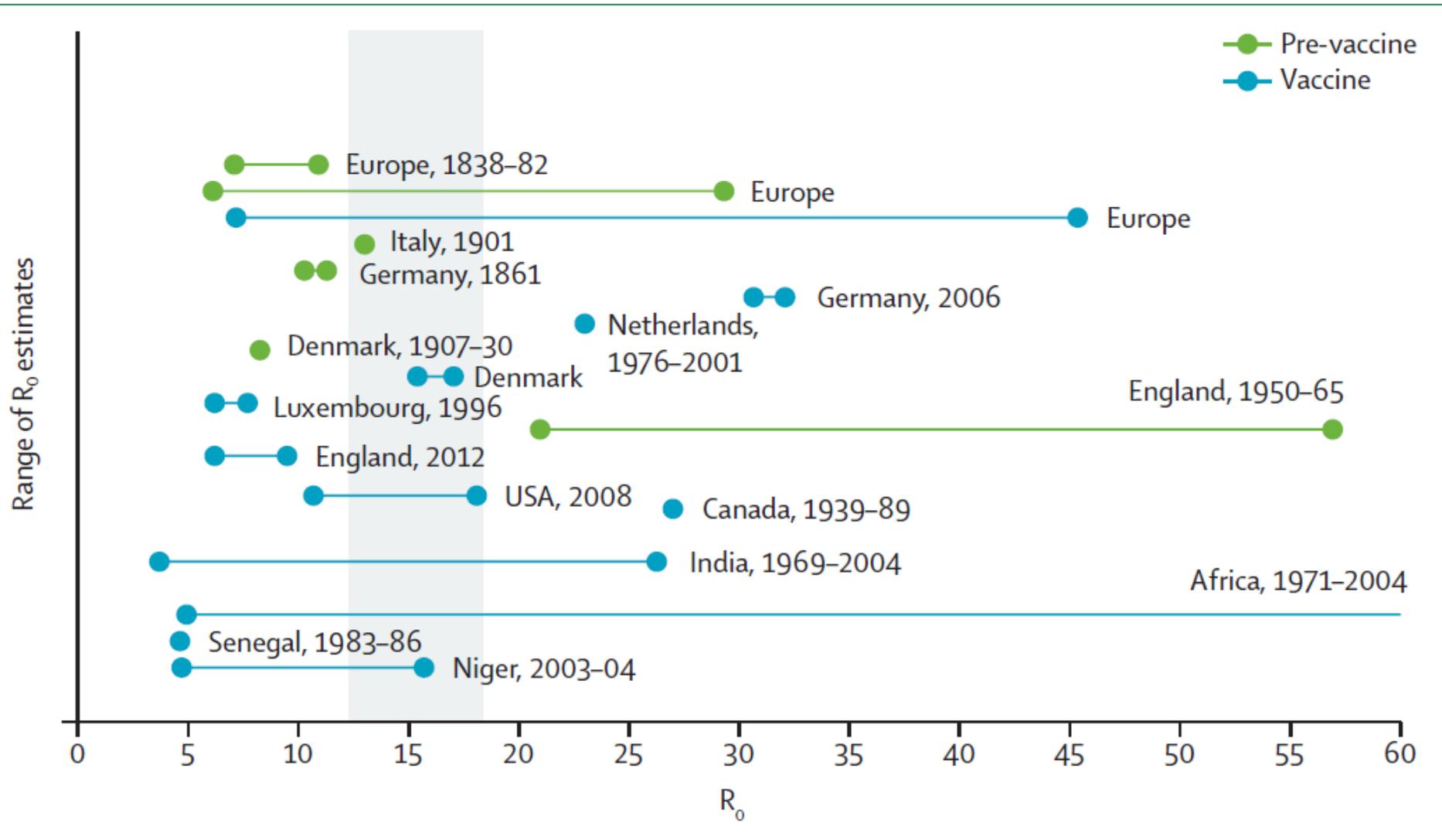
D=duration of infection

# Comparing SARS-CoV-2 with SARS-CoV and influenza pandemics

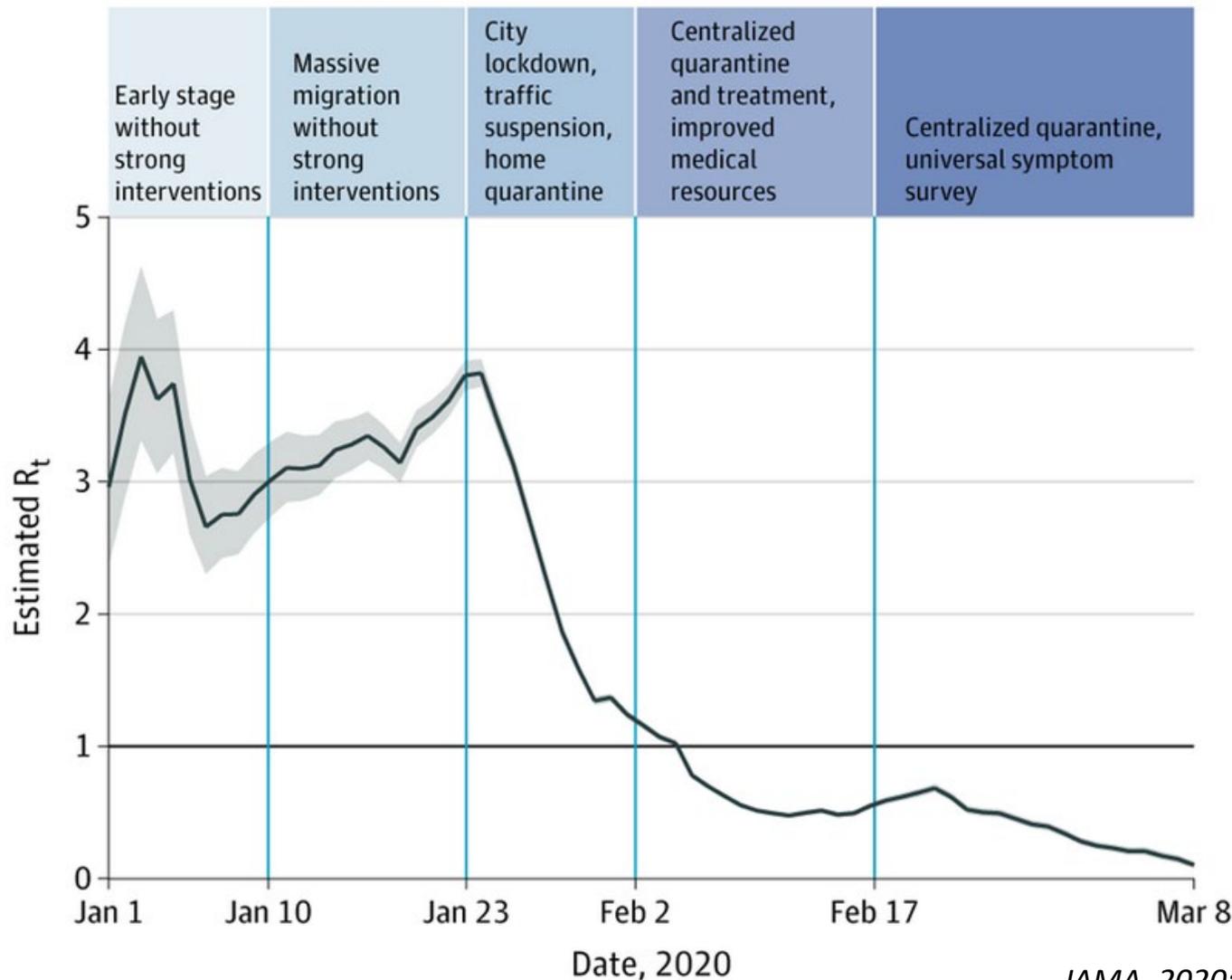
*Eskild Petersen, Marion Koopmans, Unyeong Go, Davidson H Hamer, Nicola Petrosillo, Francesco Castelli, Merete Storgaard, Sulien Al Khalili, Lone Simonsen*

	SARS-CoV-2	SARS-CoV	Pandemic influenza 1918	Pandemic influenza 2009	Interpretation
Transmissibility, $R_0$	2.5	2.4	2.0	1.7	SARS-CoV-2 has the highest average $R_0$
Incubation period, days	4-12	2-7	Unknown	2	Longer incubation period; SARS-CoV epidemics form slower

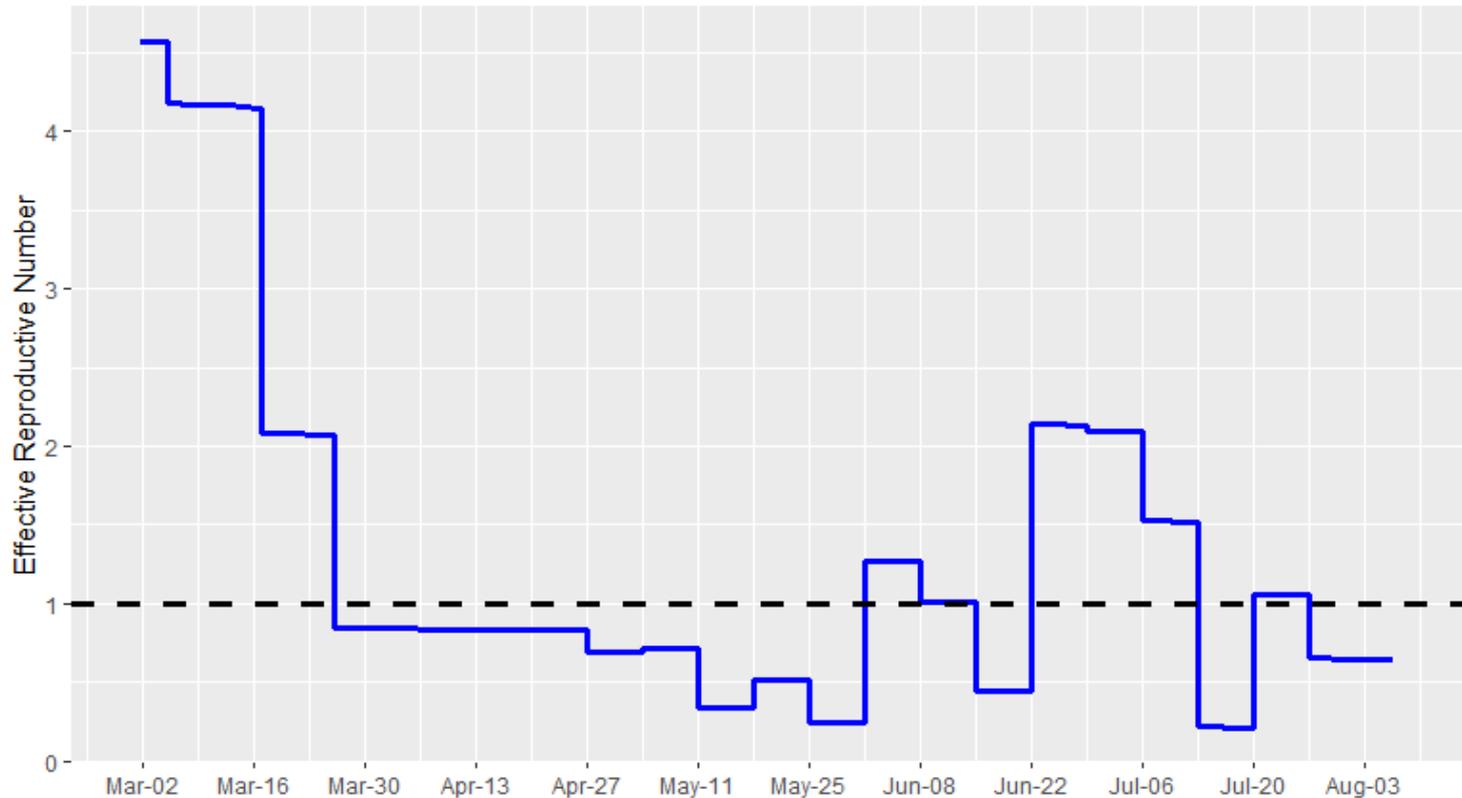
# Systematic Review: Measles $R_0$ Estimates by Geographical Location and Time



# The Effective Reproduction Number Estimates Based on Laboratory-Confirmed Coronavirus Disease...



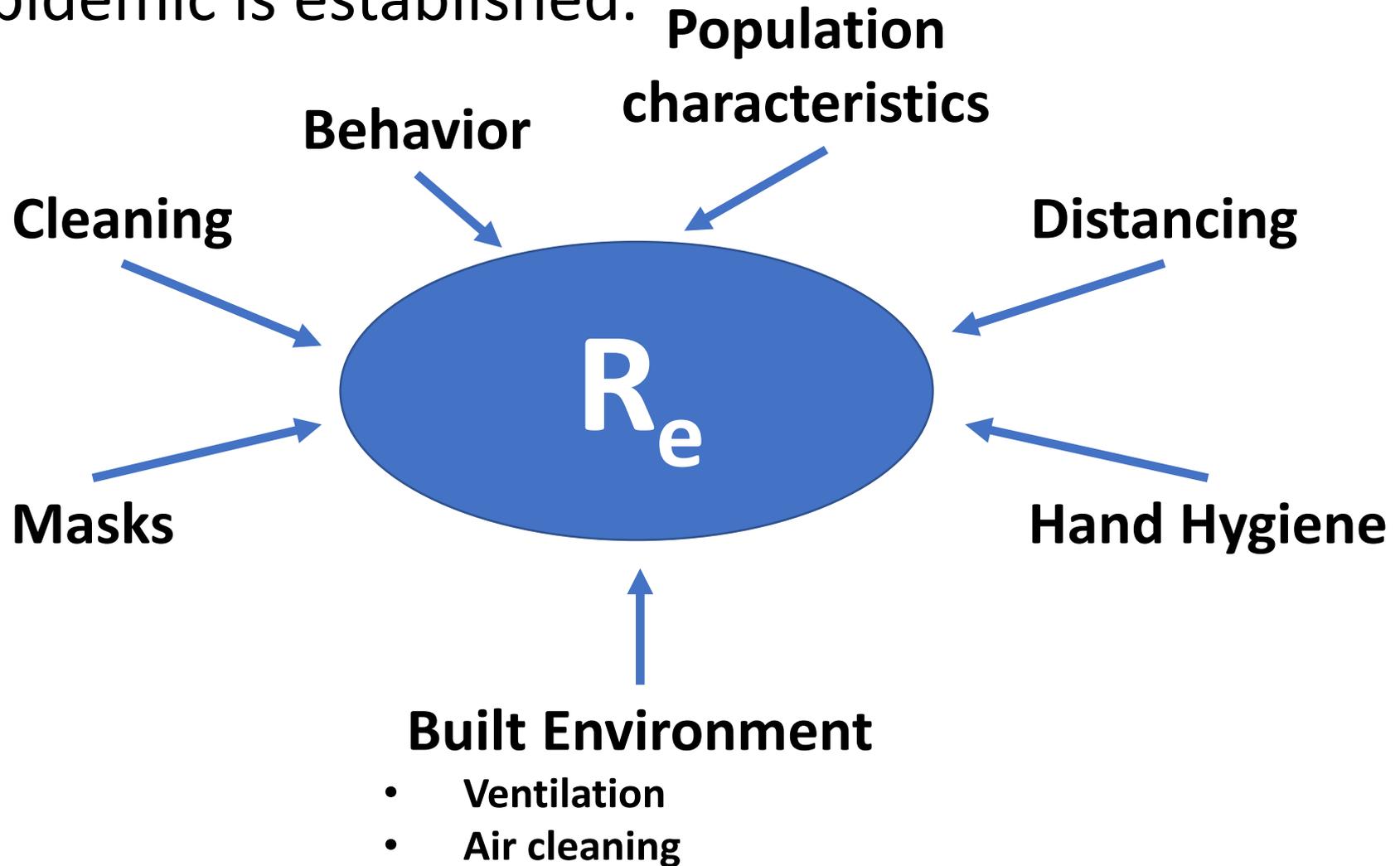
# Colorado: the estimated reproductive number from March to now



This is based on estimation method 2 in the table on the next page

# $R_e$ : Effective reproductive number

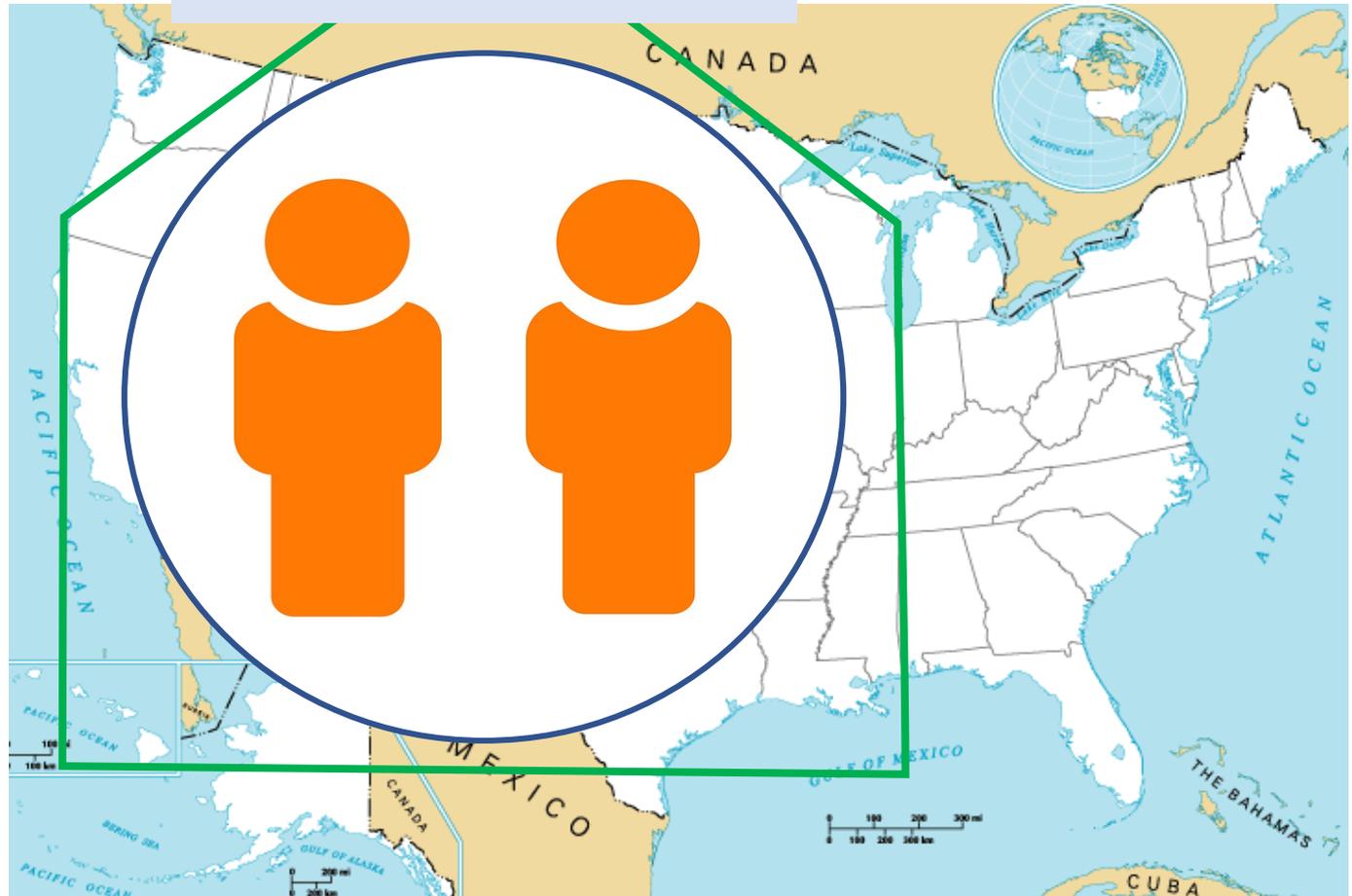
**Definition:** Describes transmission once the epidemic is established.



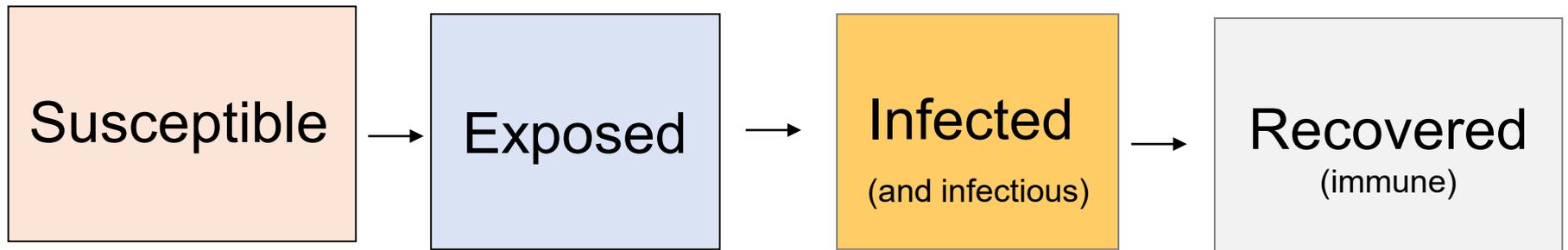
# $R_e$ is a Multi-Level Parameter

Macro-environment

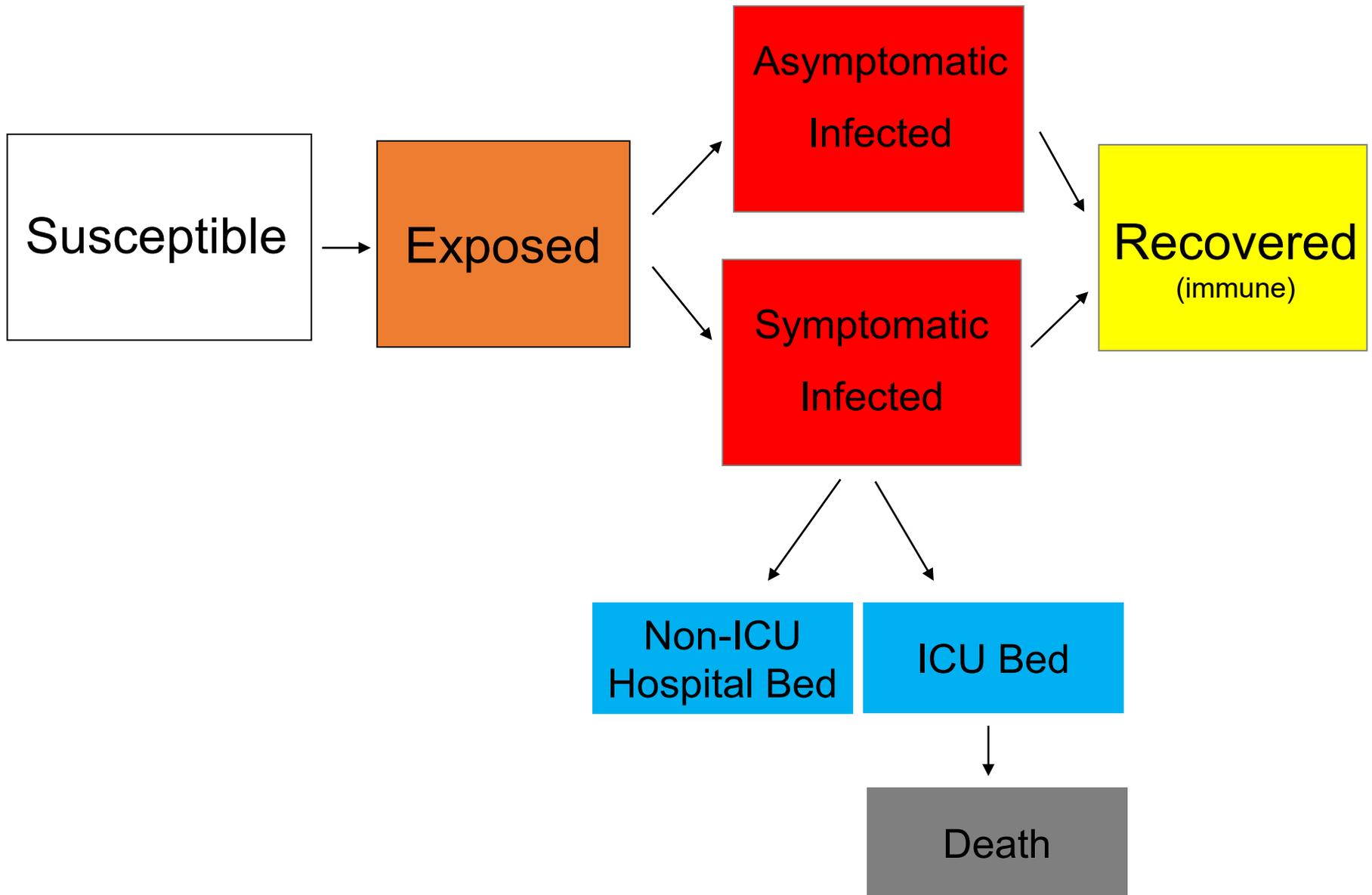
Microenvironment  
Personal



# The SEIR Model



# The SEIR Model Elaborated



# The SEIR Model and CQ1-4

