

Estimation of the Timing and Intensity of Re-emergence of Respiratory Syncytial Virus Following the COVID-19 Pandemic in the US

Presenter: Zhe Zheng

Epidemiology of Microbial Disease, Yale School of Public Health

zhe.zheng@yale.edu

Authors: Zhe Zheng^{1*}; Virginia E. Pitzer¹; Eugene D. Shapiro²; Louis J. Bont^{3,4}; Daniel M. Weinberger¹

¹ Department of Epidemiology of Microbial Diseases and the Public Health Modeling Unit, Yale School of Public Health, New Haven, CT, USA.

² Department of Pediatrics, Yale University School of Medicine, New Haven, CT, USA.

³ Department of Pediatrics and Department of Immunology, University Medical Center Utrecht, Utrecht University, University Medical Center Utrecht, Utrecht, the Netherlands.

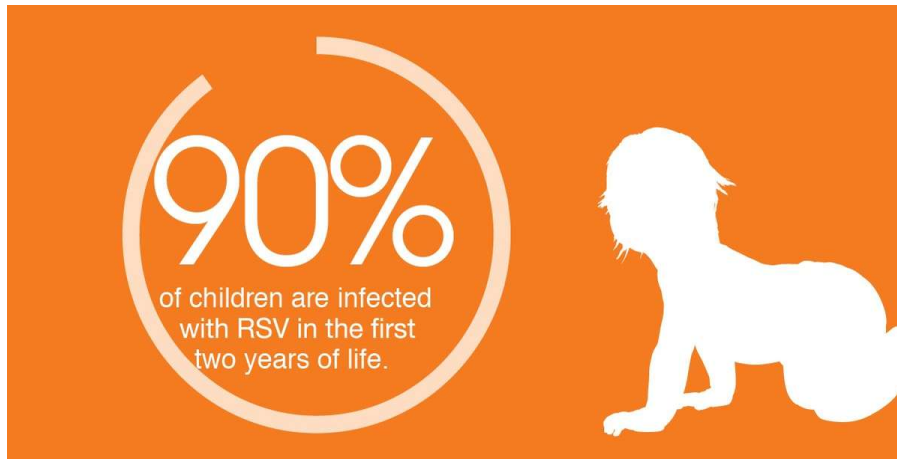
⁴ ReSViNET Foundation, Zeist, The Netherlands

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What is respiratory syncytial virus (RSV)?

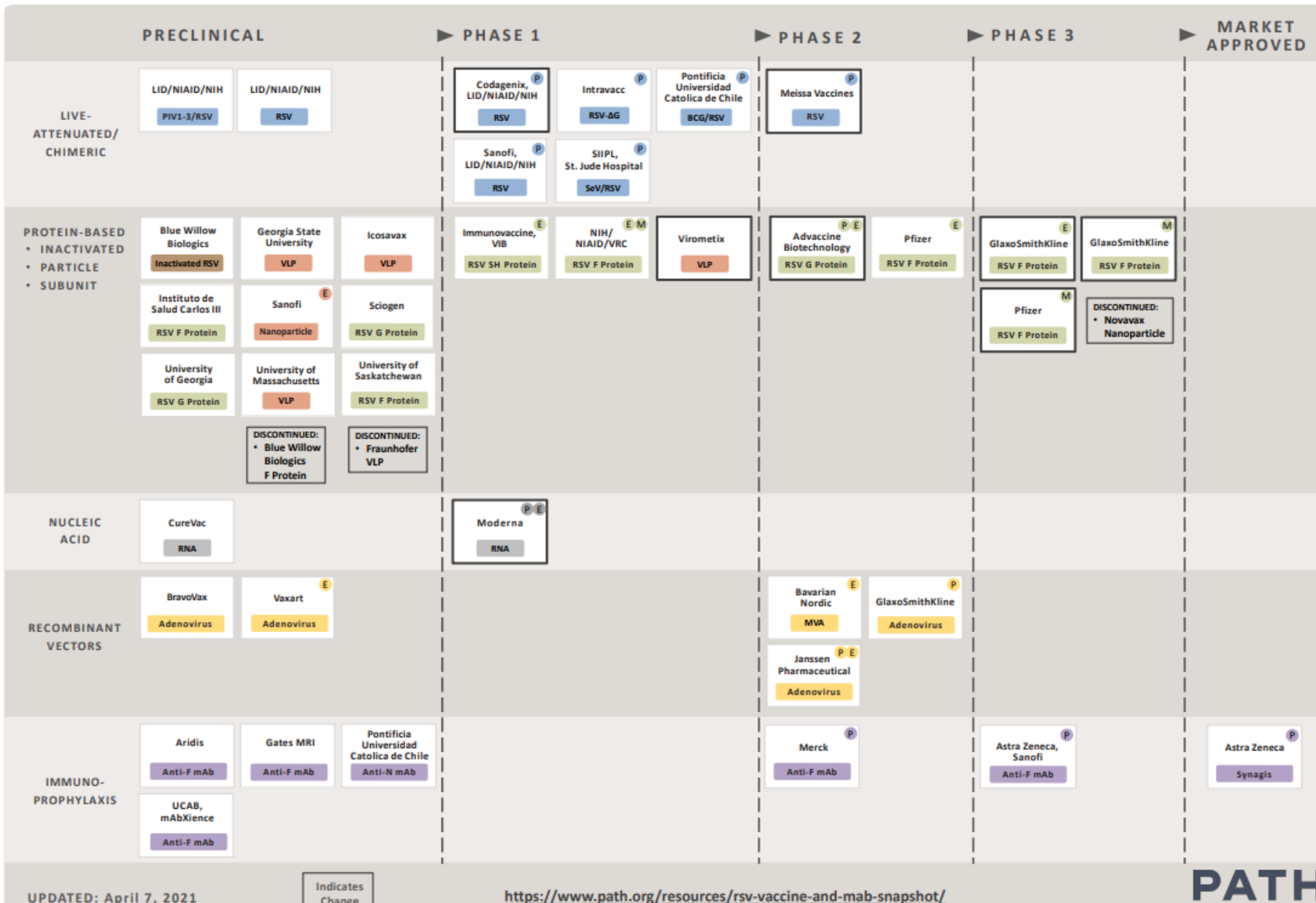


- The leading cause of acute respiratory hospitalizations in young children
- Few available anti-viral treatment or vaccines against RSV infections
- High-cost monoclonal antibodies can help protect infants at high risk for severe RSV disease

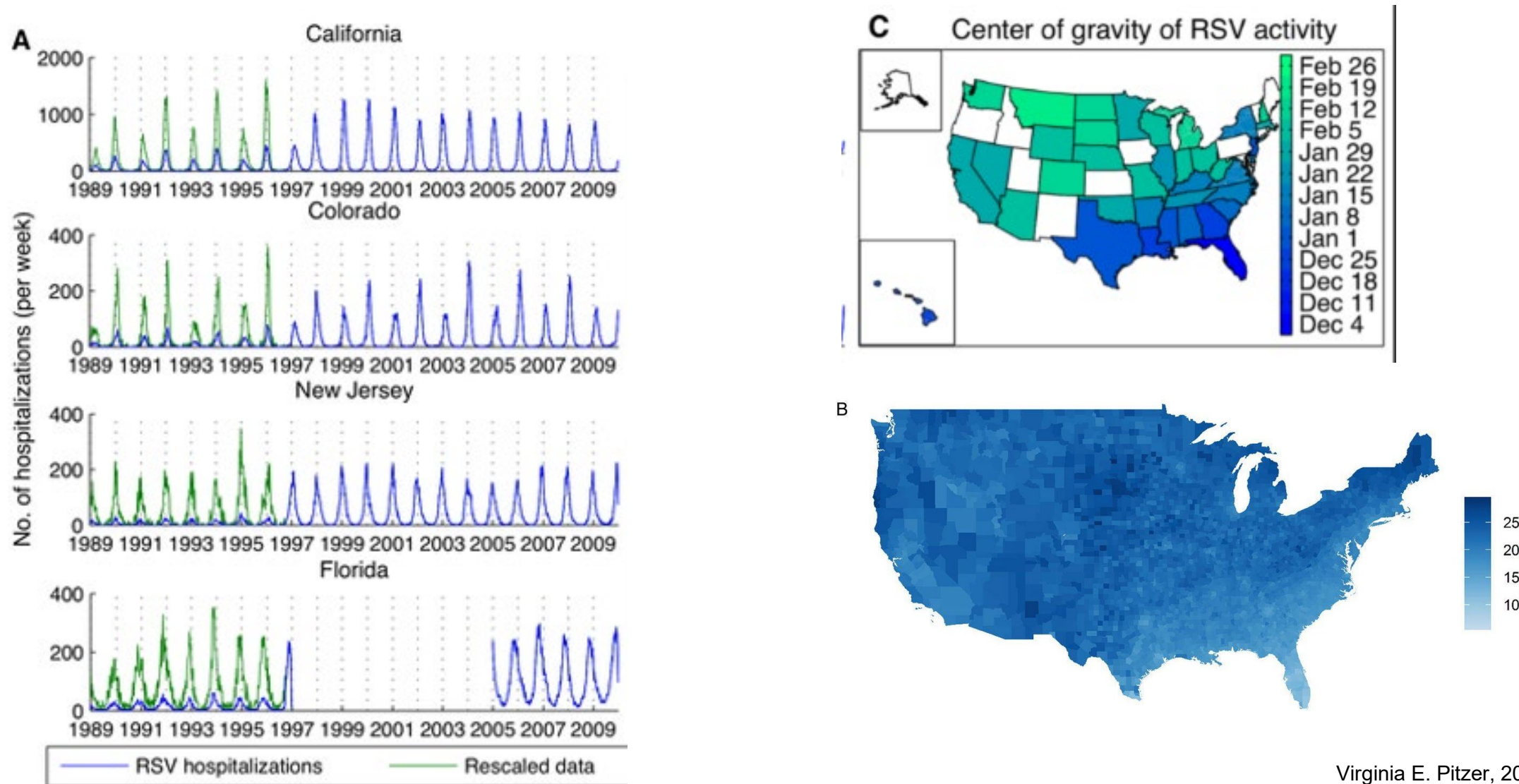


Several immunization products are in phase 2/3 clinical trials

- Understanding the timing of RSV epidemics is crucial for planning clinical trials and for administering prophylaxis

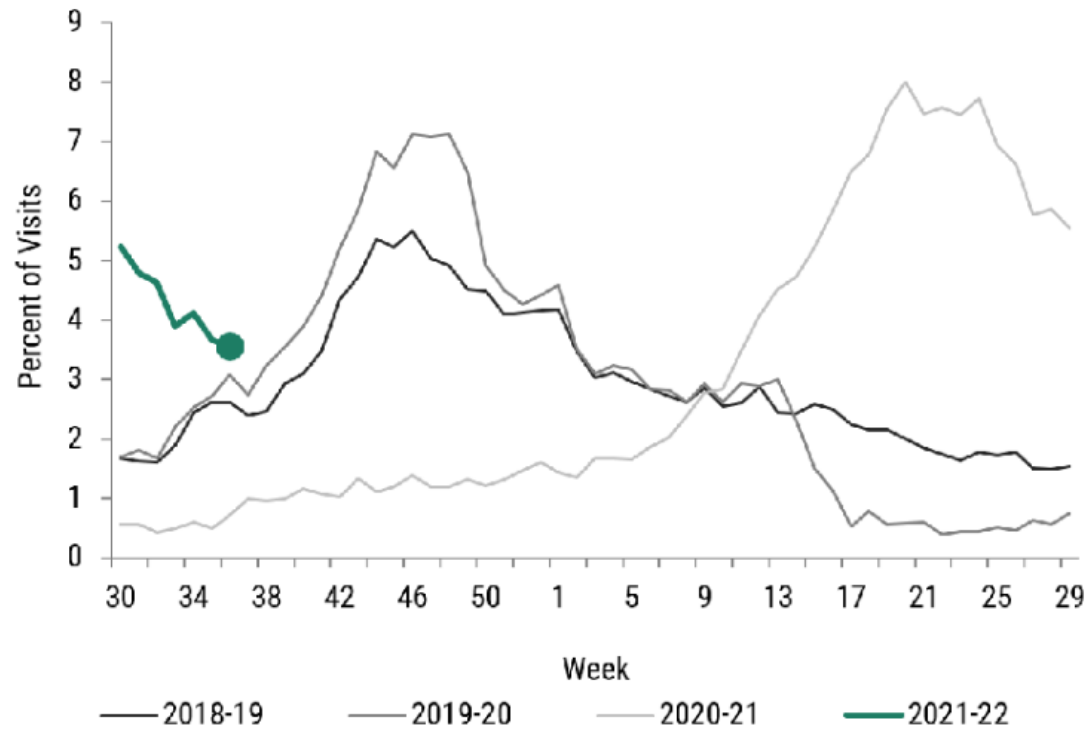


Before the COVID-19 pandemic, the timing of RSV seasonal epidemics exhibited notable spatial patterns

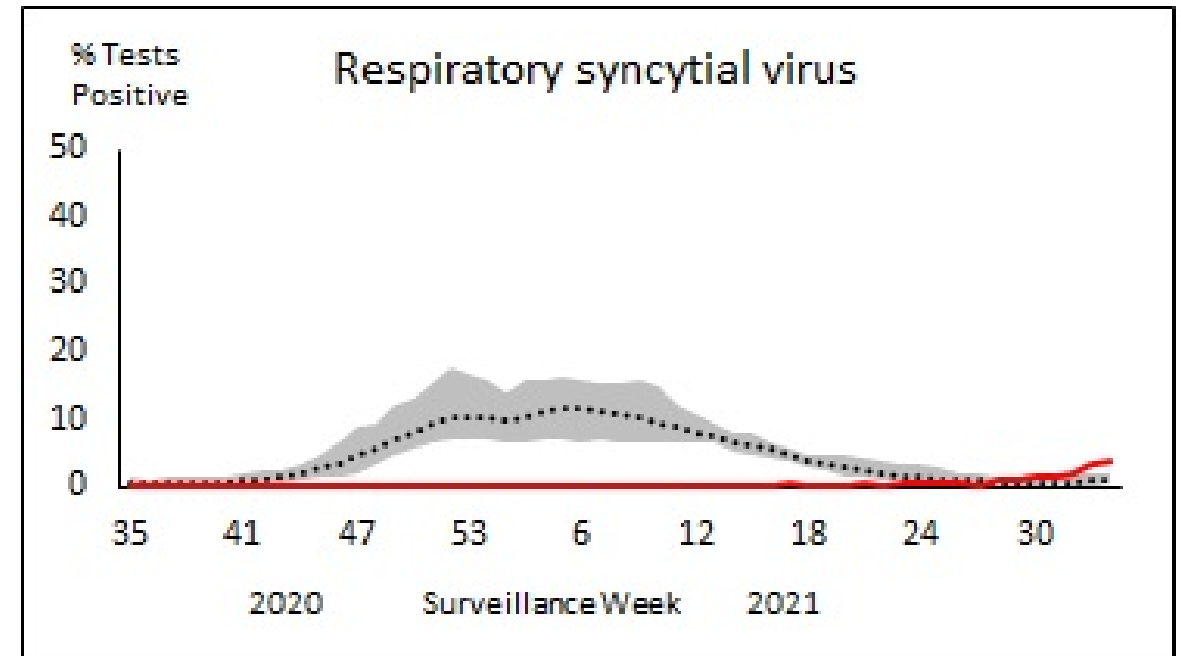


There are various patterns of re-emergent RSV epidemics in the US and around the world

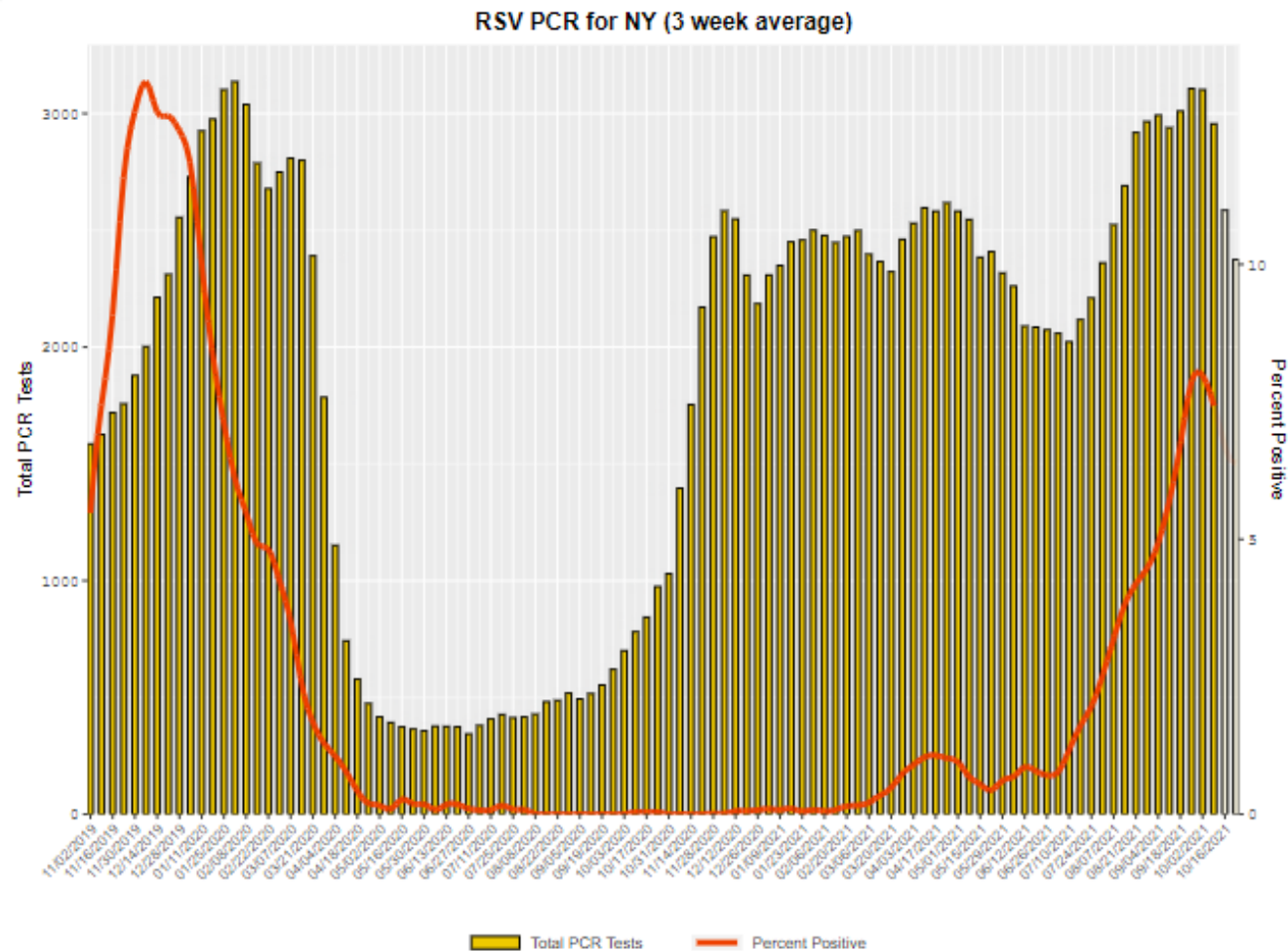
Florida



Canada

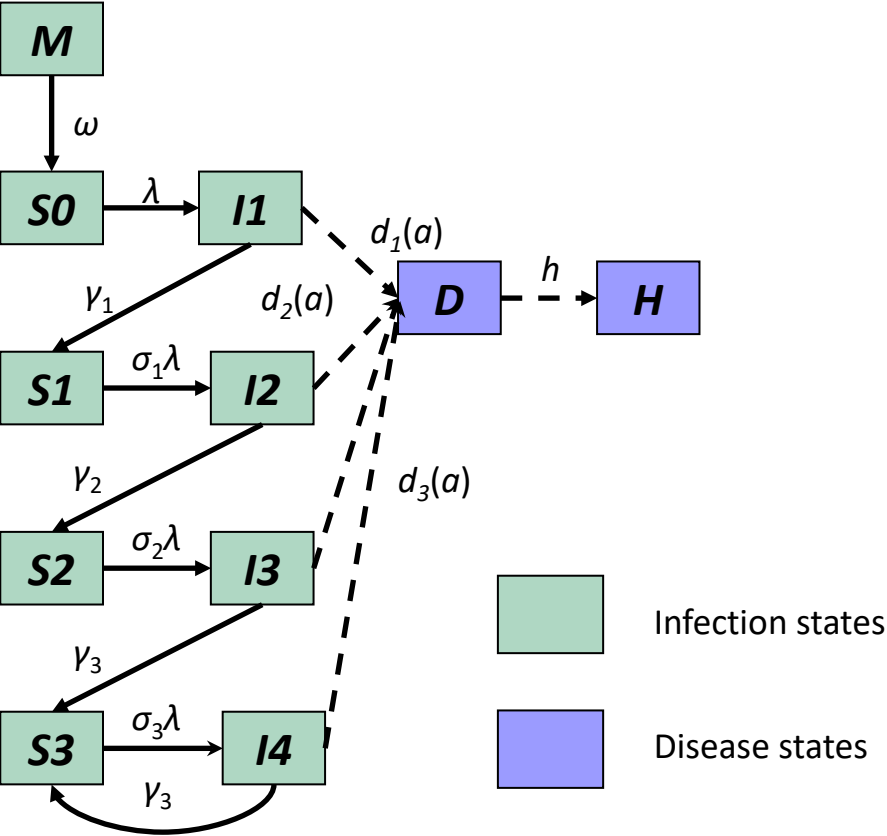


There are various patterns of re-emergent RSV epidemics in the US and around the world



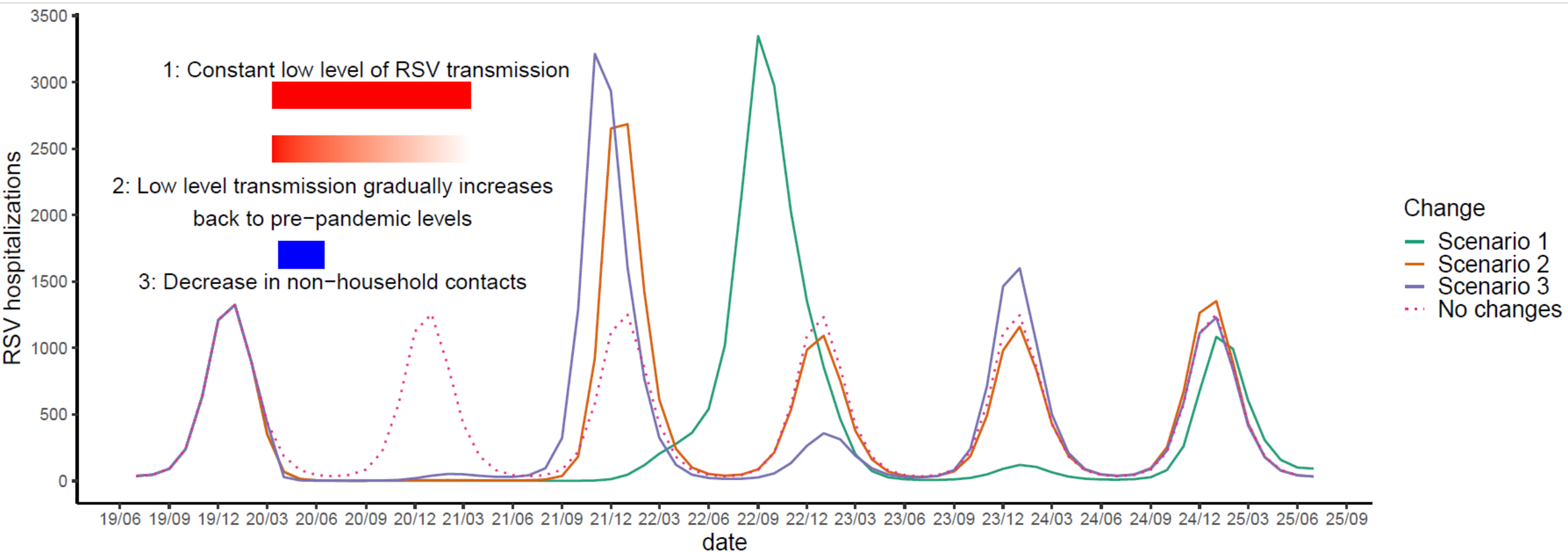
- What are the factors associated with the timing and intensity of re-emergent RSV epidemics following the COVID-19 pandemic?

Simulations evaluated factors likely to impact the re-emergence of RSV epidemics

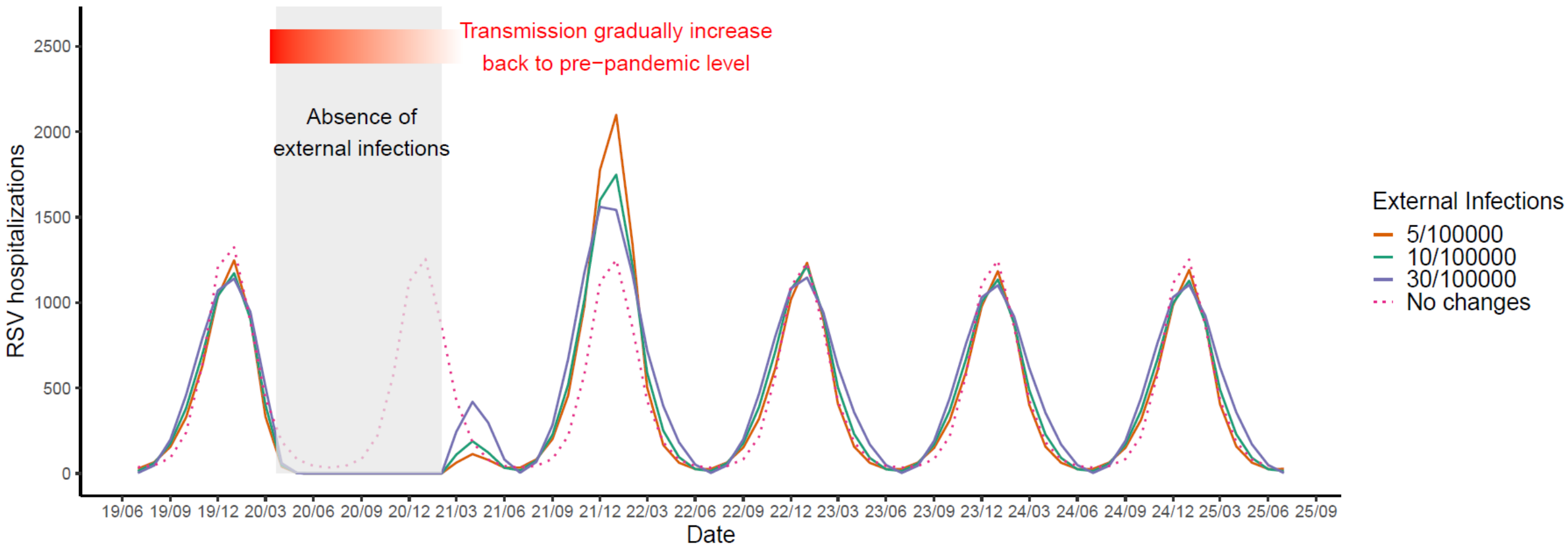


Scenarios	
Stringency of mitigation measures	
1. Constant low level of transmission	Individuals obey social distancing strictly and have constant low contact rate from March 2020 to March 2021
2. Sudden decrease + gradual increase in transmission	Mitigation measures are most strict at the beginning and are gradually relaxed between March 2020 and March 2021
3. Decrease in non-household contacts	Stay-at-home orders from late March 2020 to late June 2020 reduced contact opportunities in non-household settings by 82% and increased household contacts by 10%.
Factors impacting the reemergence of RSV epidemics	
1. Importation of external infections	Introduction of the virus from other regions may ignite RSV epidemics
2. Decrease in the duration of protective maternal immunity	Absence of RSV epidemics leads to lack of boosting of maternal immunity

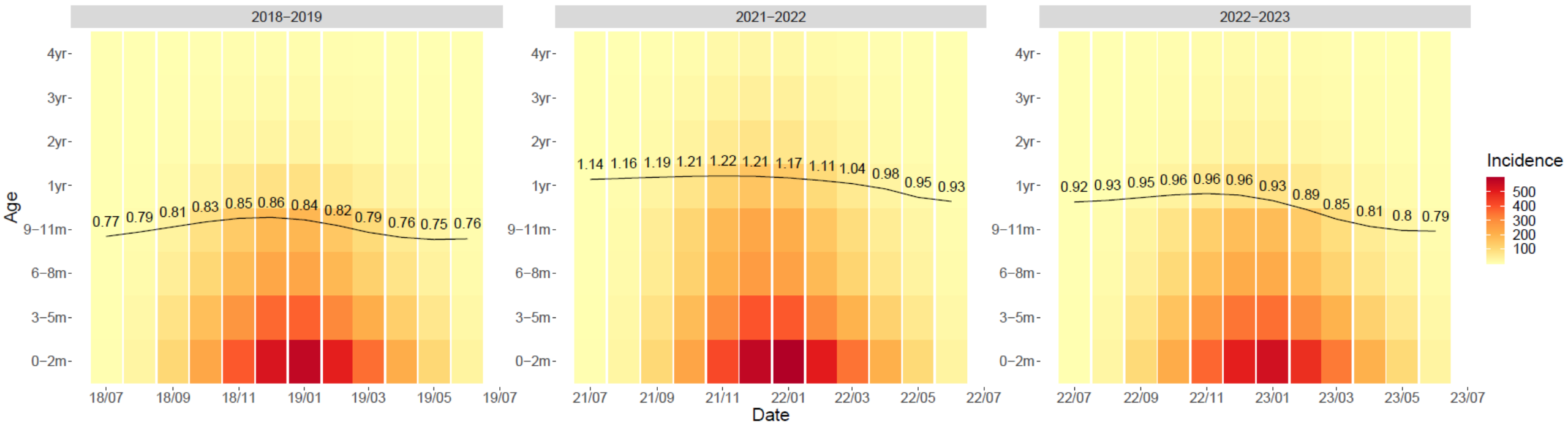
The impacts of mitigation measures on RSV hospitalizations without external infections, New York, 2019–2025



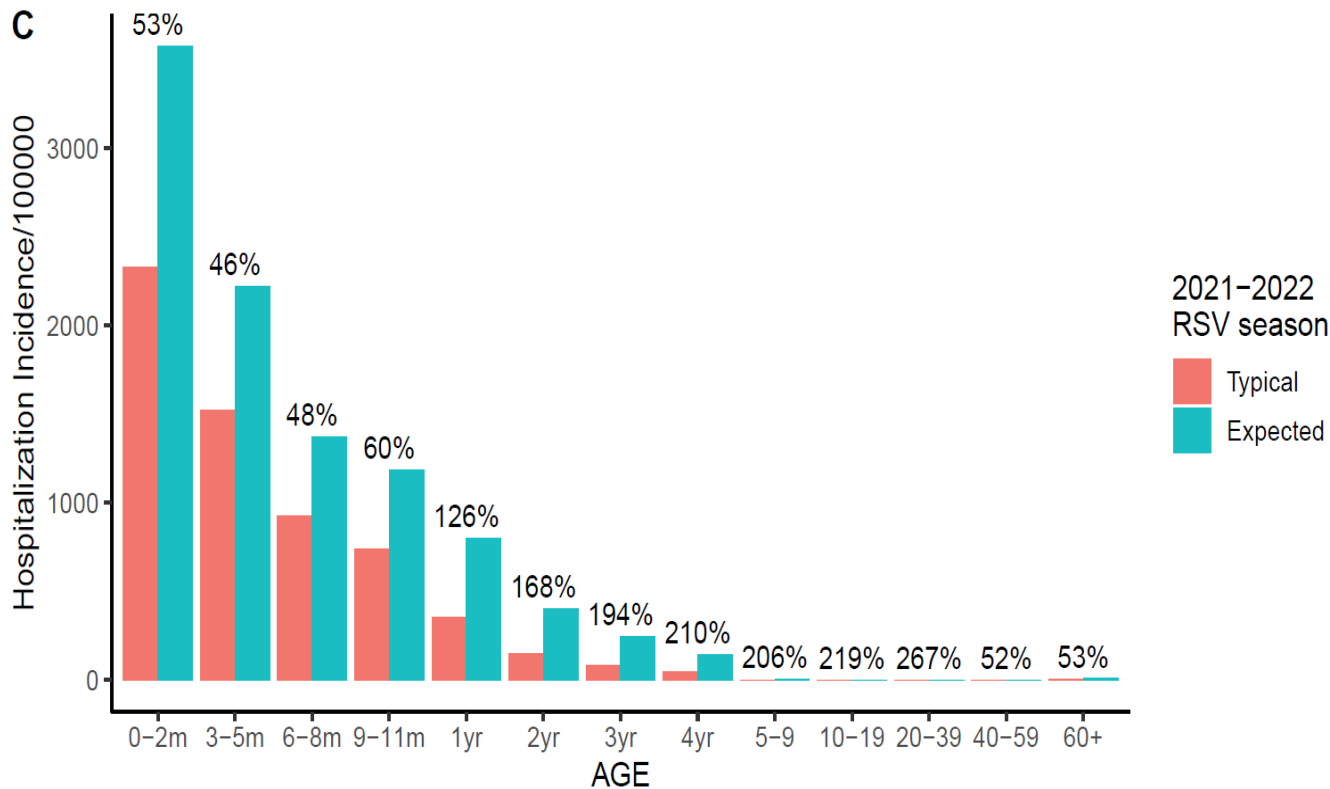
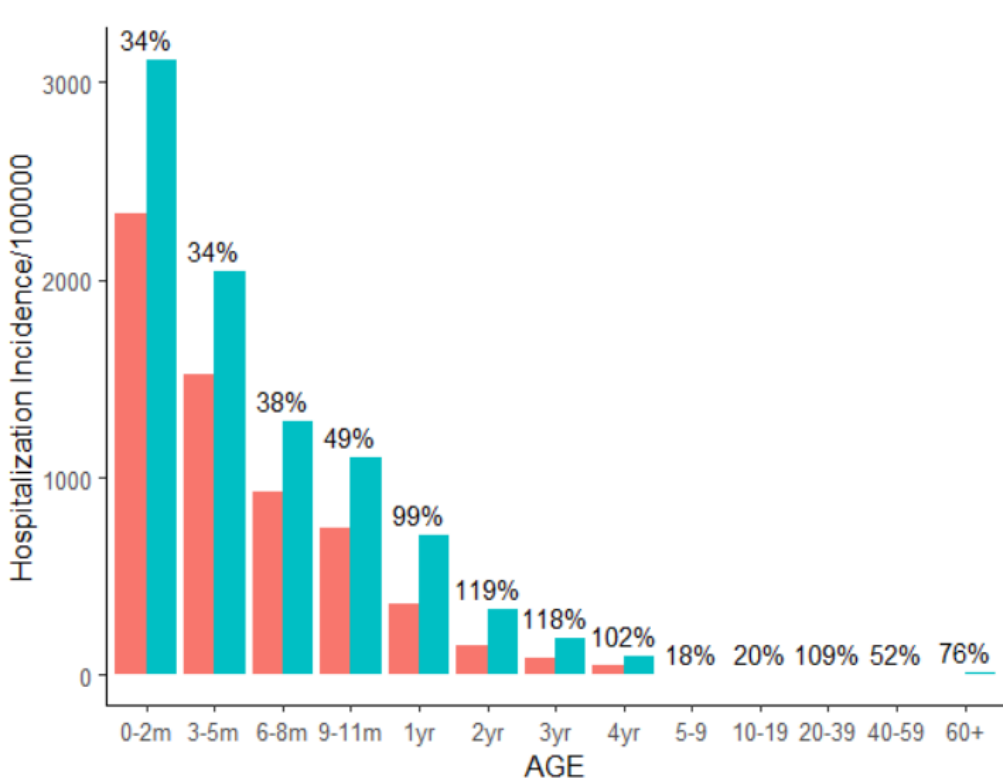
The impact of importation of external infections on RSV hospitalizations in New York, 2019–2025



The average age of RSV hospitalizations among children under 5

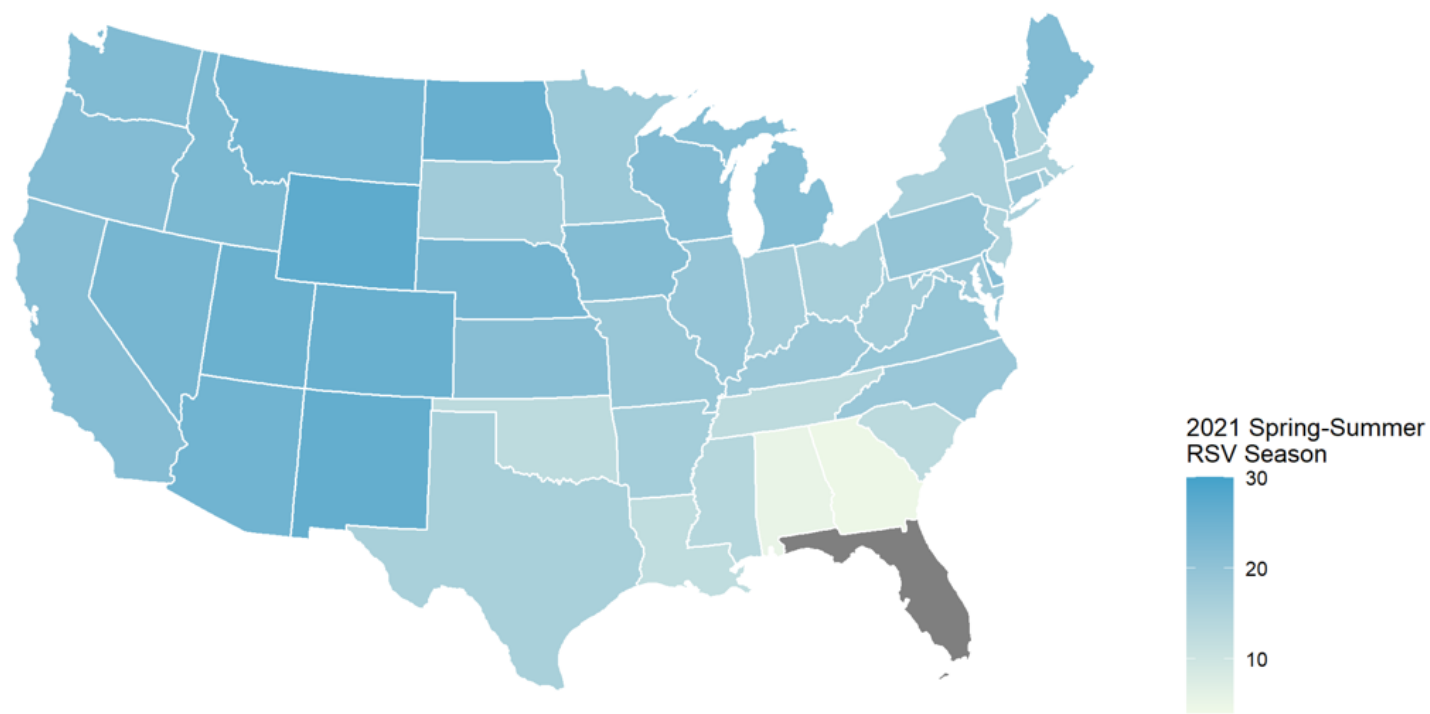


Age distribution of RSV hospitalizations with vs without virus importation, 2021-2022 RSV season

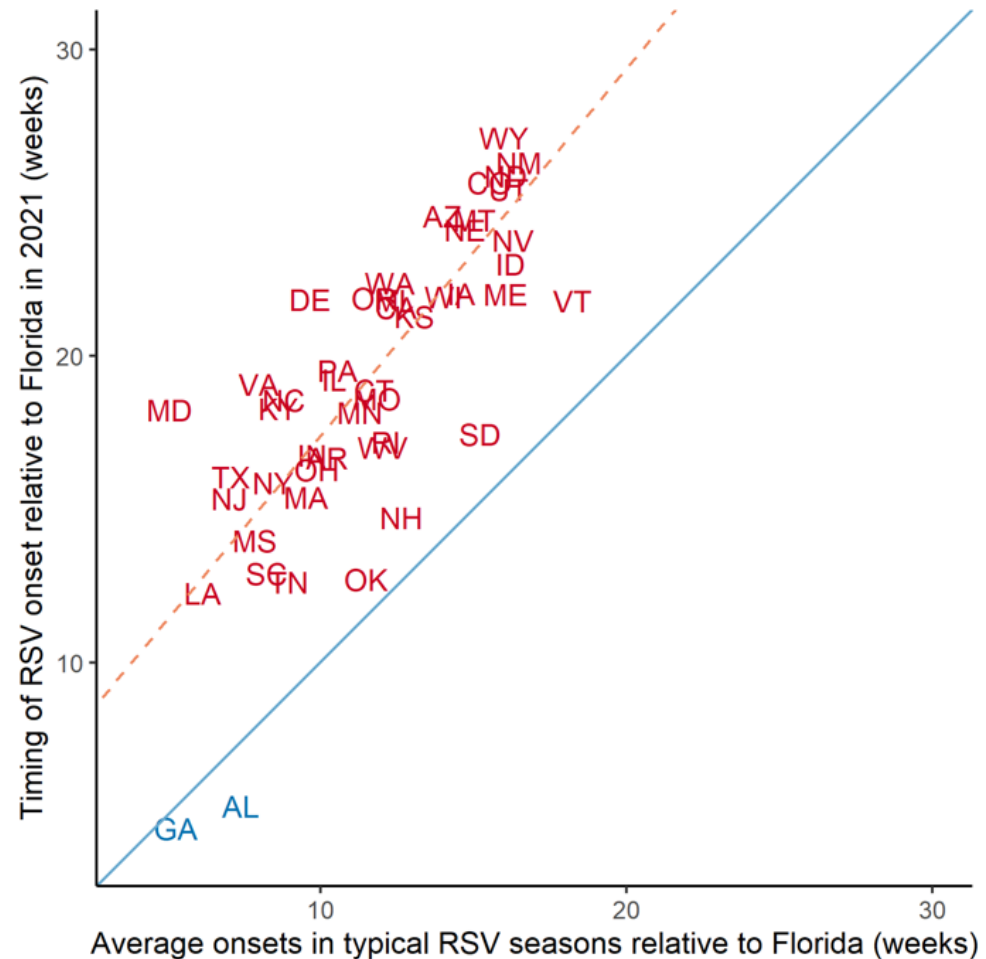


Related study: Relative timing of RSV epidemics in summer 2021 across the US was similar to a typical season

A



B



Implication

- Re-emergent RSV epidemics in 2021-2022 were expected to be more intense and to affect patients in a broader age range than in typical RSV seasons
- The timing of re-emergent RSV epidemics might be different from the usual RSV season, depending on the duration of mitigation measures and the extent of virus introduction from other regions.

Acknowledgement

Co-authors

- Virginia E. Pitzer, ScD
- Eugene D. Shapiro, MD
- Louis J. Bont, MD, PhD
- Daniel M. Weinberger, PhD

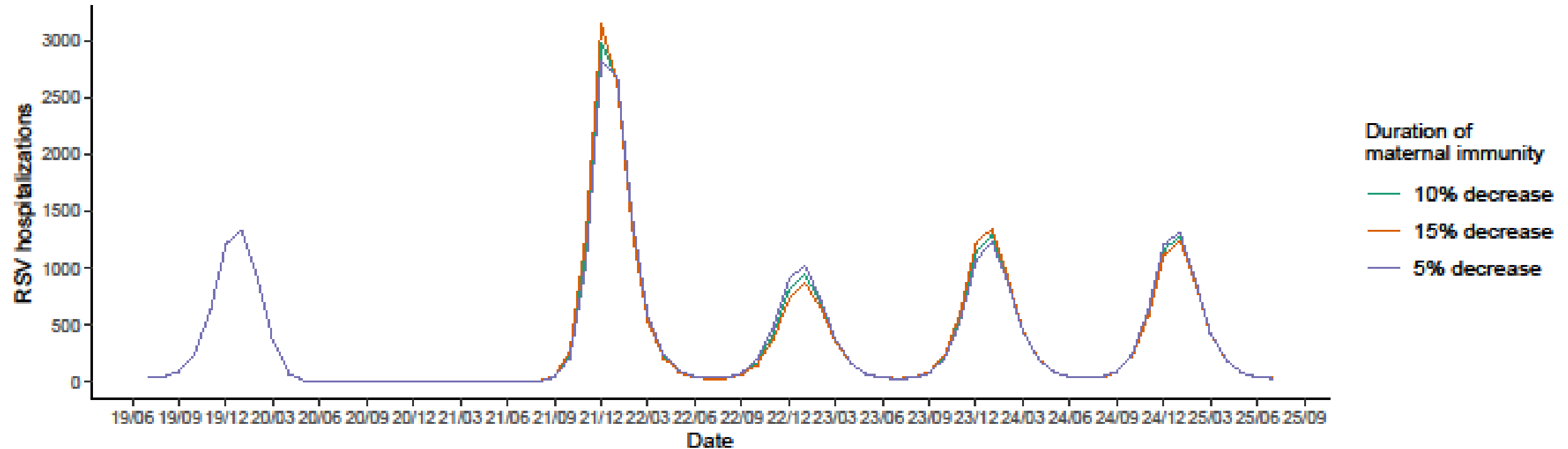
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- MIDAS

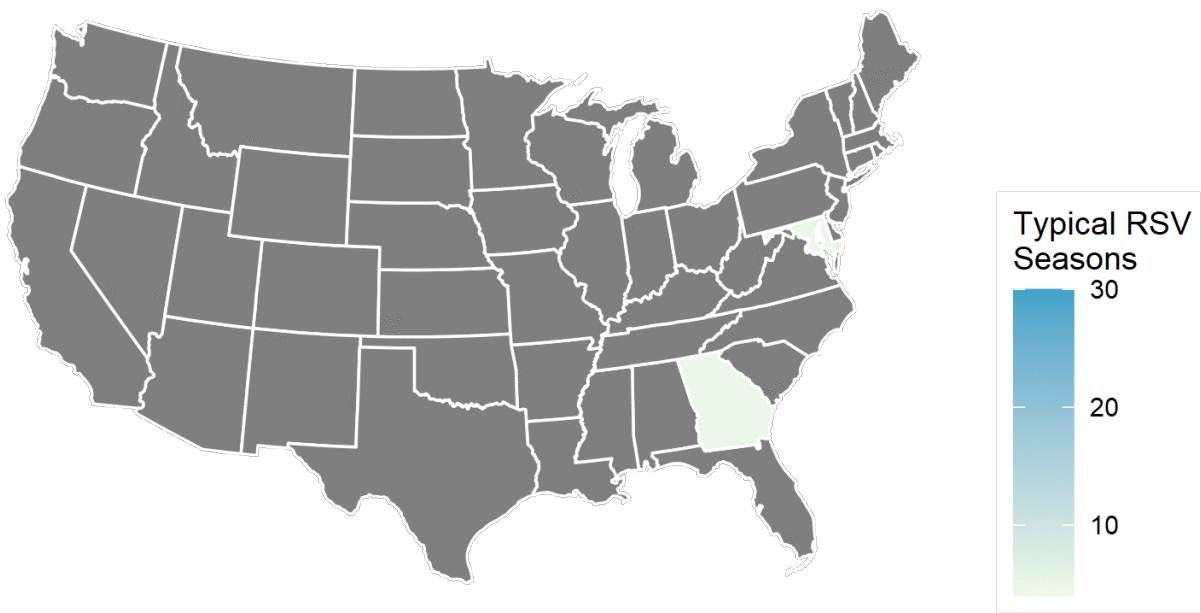
Institutes

- Department of Epidemiology of Microbial Diseases and the Public Health Modeling Unit, Yale School of Public Health.
- Department of Pediatrics, Yale University School of Medicine
- Department of Pediatrics and Department of Immunology, University Medical Center Utrecht, Utrecht University, University Medical Center Utrecht
- ReSViNET Foundation

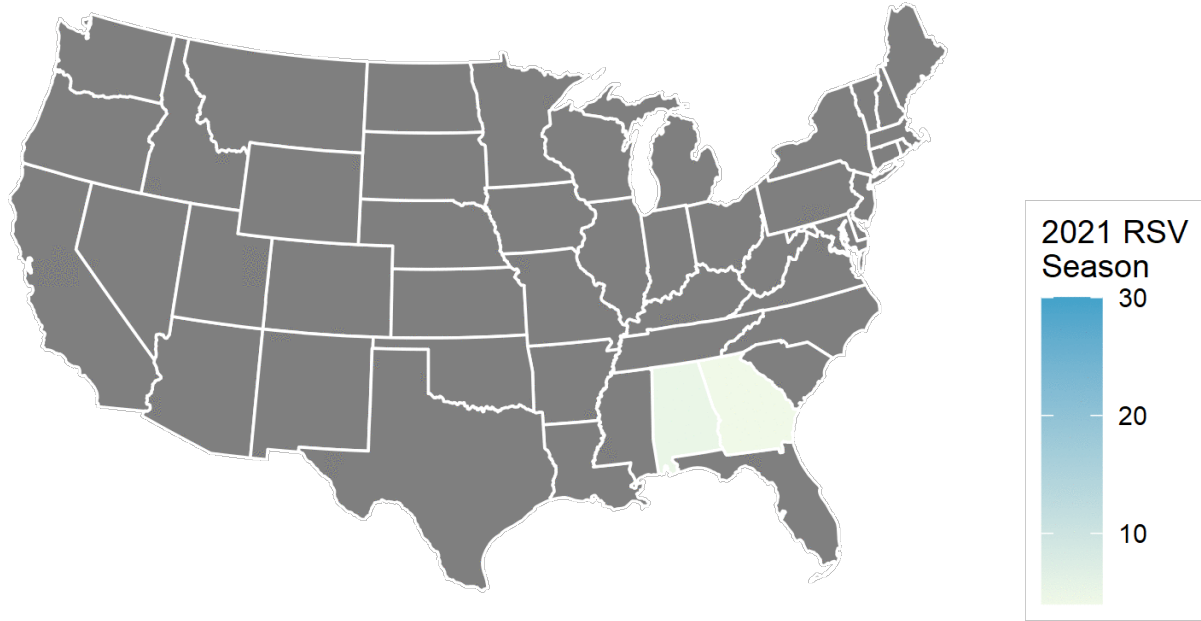
The impact of changes to the duration of transplacentally acquired immunity in infants on RSV epidemics



The average onsets in typical RSV seasons relative to Florida
Week 5

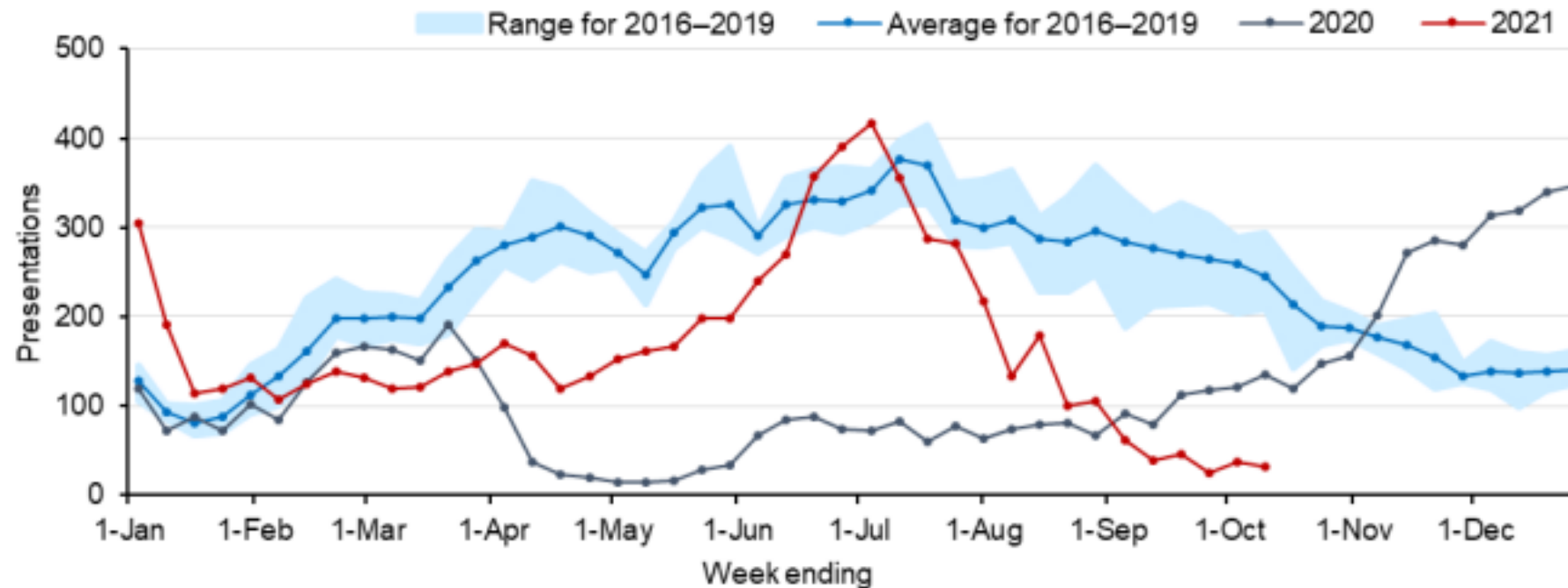


The timing of RSV epidemic onsets relative to Florida in 2021
Week 5



There are various patterns of re-emergent RSV epidemics in the US and around the world

Figure 13. Emergency Department bronchiolitis presentations, NSW, 1 January 2016 to 10 October 2021



Interpretation: Bronchiolitis is a common disease of infants often caused by respiratory syncytial virus (RSV). Public health measures introduced last year around social distancing and improved hygiene practices coincided with a large decrease in bronchiolitis presentations for the majority of 2020. A rise in bronchiolitis presentations in the later part of 2020 corresponds to an increase in RSV detections. Since the beginning of the current outbreak from 16 June 2021, there has again been a steady decrease in bronchiolitis presentations, with the number of presentations in the week ending 10 October remaining well below the seasonal range for this time of year.