Monitoring Local Acute Respiratory Disease Trends Using an Interactive Data Dashboard and Custom Alert Thresholds in Marion County

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MPH Data Day

April 30, 2026

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Outline

- Threshold Estimation
  - Background
  - Data and Methods Used
  - Estimation Examples
  - Stakeholder Input
- Data Dashboard
  - Data and Methods Used
  - Comparison - Dashboard vs. Weekly Report
  - Demonstration
- Next Steps
- Key Takeaways

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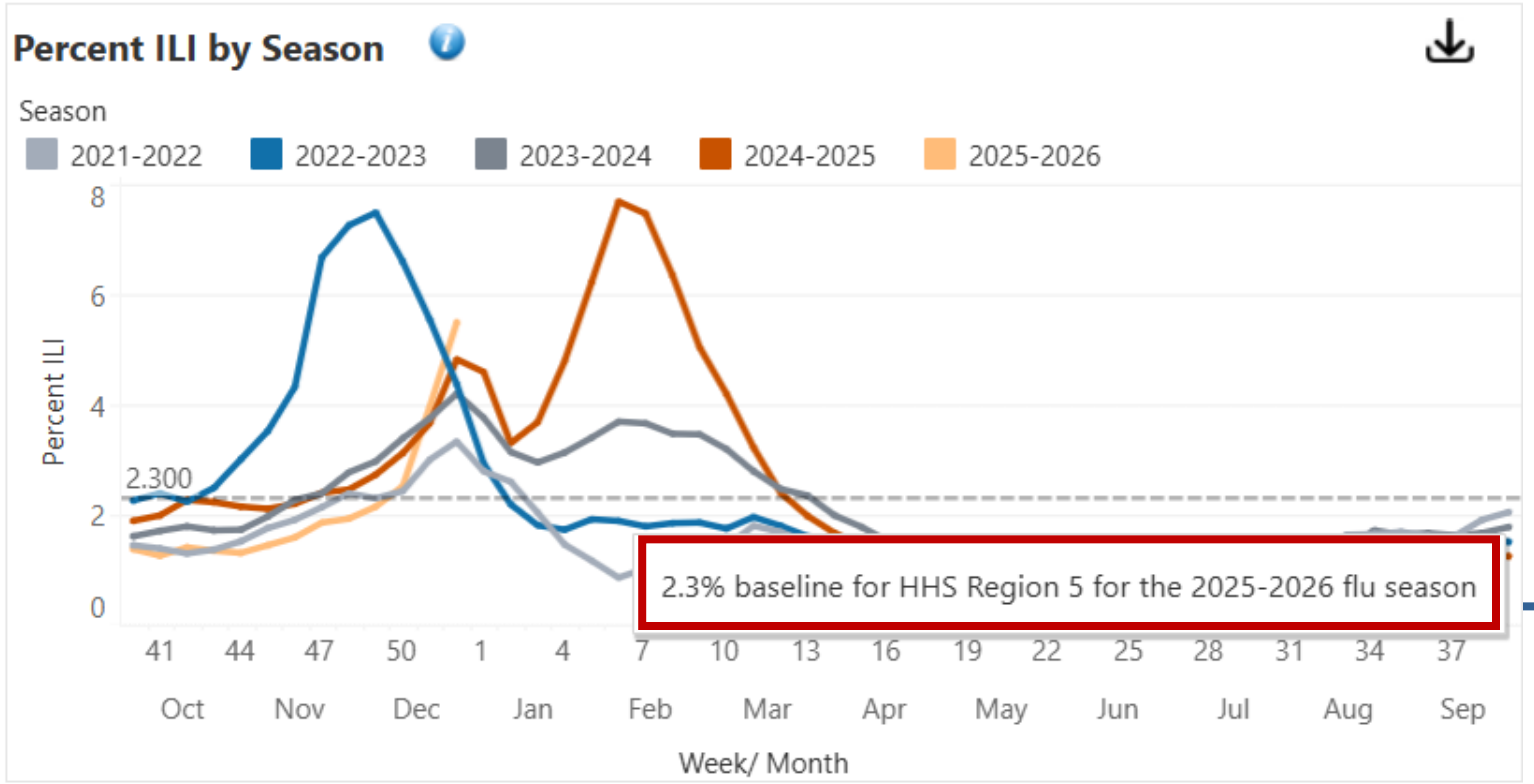
Background

Motivation for Threshold Estimation

- To develop thresholds for Influenza-Like-Illness, Broad Acute Respiratory Indicator, RSV, and COVID-Like-Illness based on Marion-County-Specific data instead of relying on regional (multi-state) thresholds.
- Incorporate these thresholds into decision making process.
- Use these thresholds as a starting point for unified action among stakeholders during flu season.

Regional Influenza-like Illness Surveillance Network (ILINet) Baselines

- Utilized by Indiana Department of Health Influenza Dashboard
- Region 5 covers Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.



IDOH Influenza Dashboard:
https://www.in.gov/health/idepd/respiratory-disease/influenza/influenza-dashboard/

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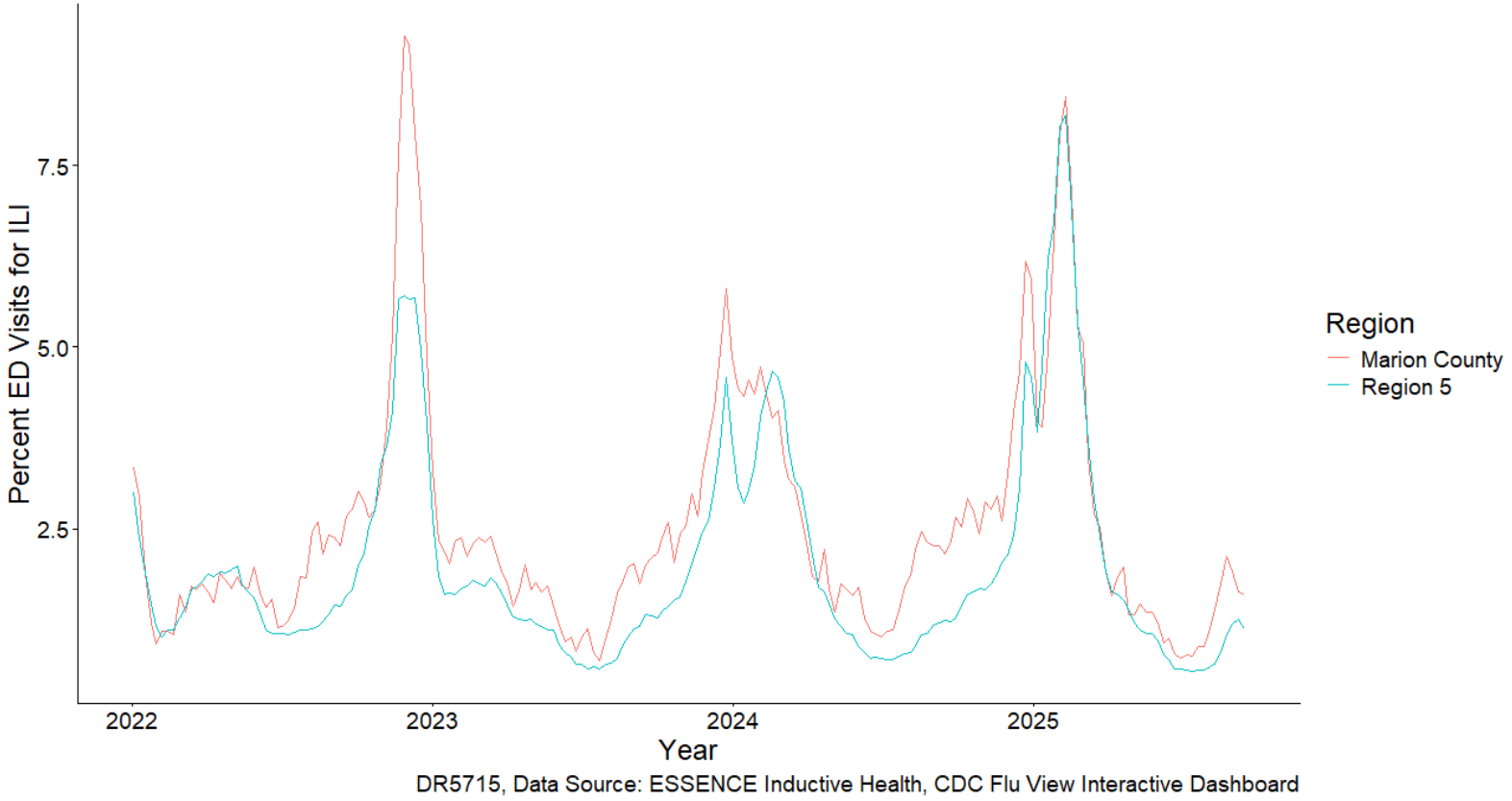
ILI ED Visit Rates for Midwest Region and Marion County, IN

- Percent of ED visits for ILI tends to increase faster in Marion County compared to HHS Region 5 (Midwest), which ILI Net Baselines are based on.



DR5715, Data Source: ESSENCE Inductive Health, CDC Flu View Interactive Dashboard

CDC Flu View Interactive Dashboard: https://gis.cdc.gov/grasp/fluview/fluportaldashboard.html

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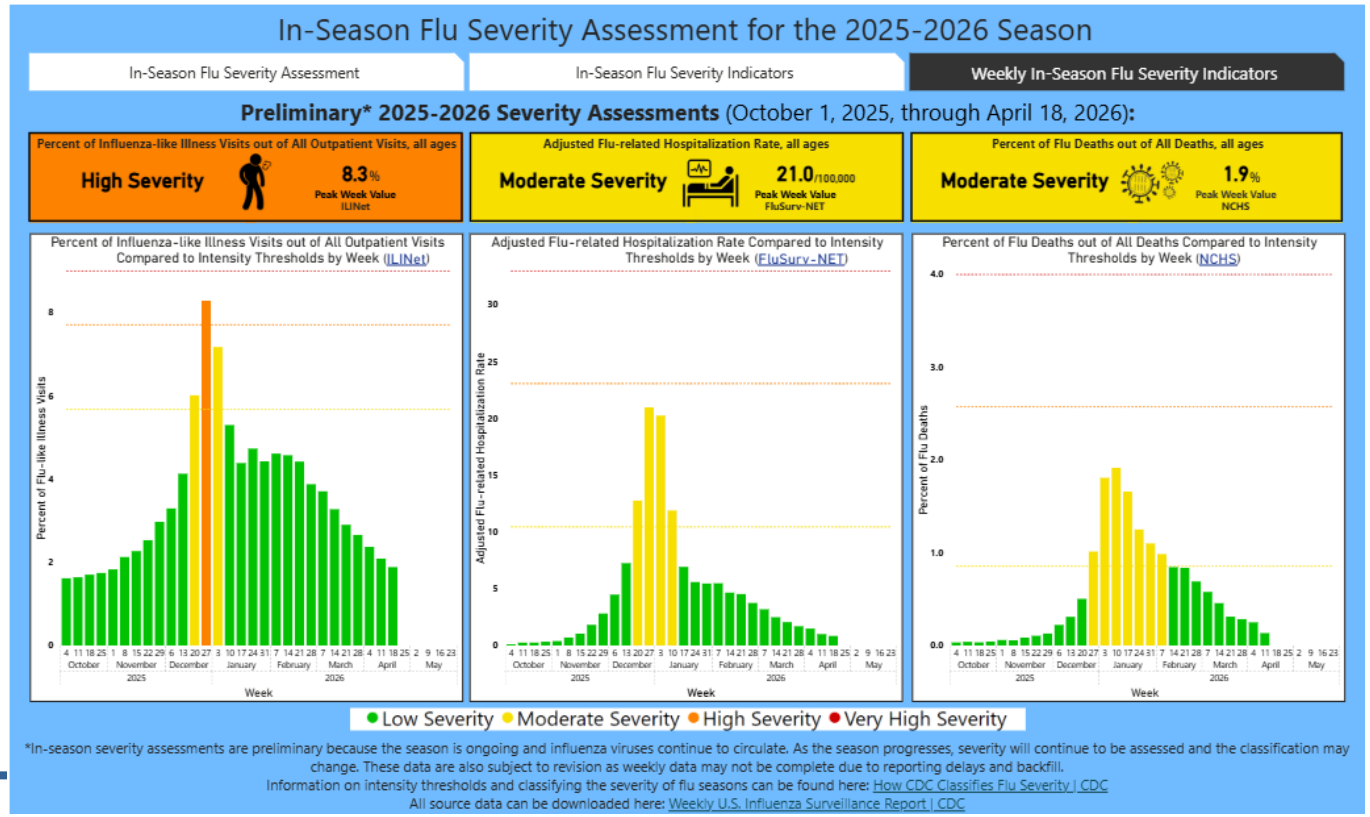
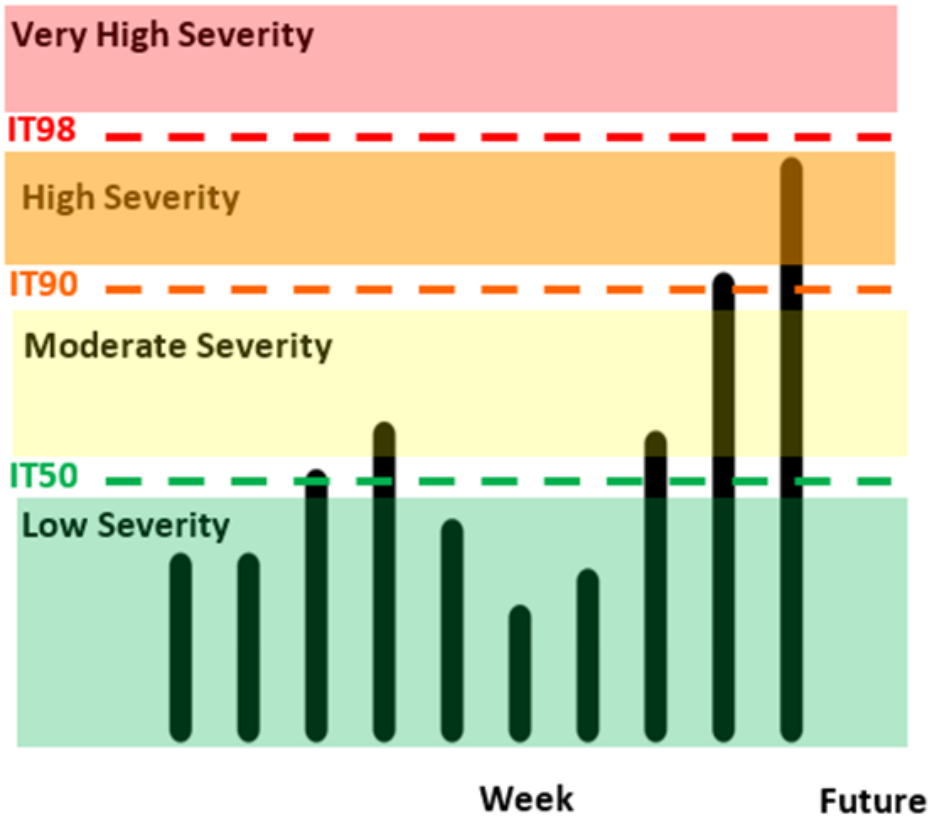
Example of MEM in Use: CDC In-Season Flu Severity Assessment

- The CDC uses MEM to estimate severity thresholds for weekly, in-season flu severity assessments.





Link to weekly dashboard: https://www.cdc.gov/flu/php/surveillance/in-season-severity.html
Link to background/technical details: https://www.cdc.gov/flu/php/surveillance/index.html

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Marion County Weekly Influenza Situation Report

- Sent out every Monday afternoon during flu season.
  - Shared with external partners through an email list and posted on the MCPHD website.
- Includes County- and State-Level trends for Influenza-Like-Illness (ILI) and RSV for children < 5 years old.
- Also includes National trends for ILI and wastewater viral activity levels for county and state.

Weekly reports can be found here:
https://marionhealth.org/programs/administration/epidemiology/seasonal-influenza-weekly-reports/

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Data and Methods Used

Respiratory Indicator Definitions and Overlap

- Broad Acute Respiratory Indicator
  - Includes specific respiratory infections (influenza, RSV, COVID), as well as codes associated with general respiratory illness such as fever, cough, or pneumonia.
  - Identified through chief complaints or discharge diagnosis codes.
- RSV
  - PCR-positive RSV tests.
- Influenza-Like Illness
  - Influenza diagnosis or
  - Fever + cough/sore throat.
  - Identified through chief complaints or discharge diagnosis codes.
- COVID-Like Illness
  - Negative for influenza but have fever and cough/shortness of breath/difficulty breathing.
  - Identified through chief complaints or discharge diagnosis codes.

General Approach to Moving Epidemic Method Estimation

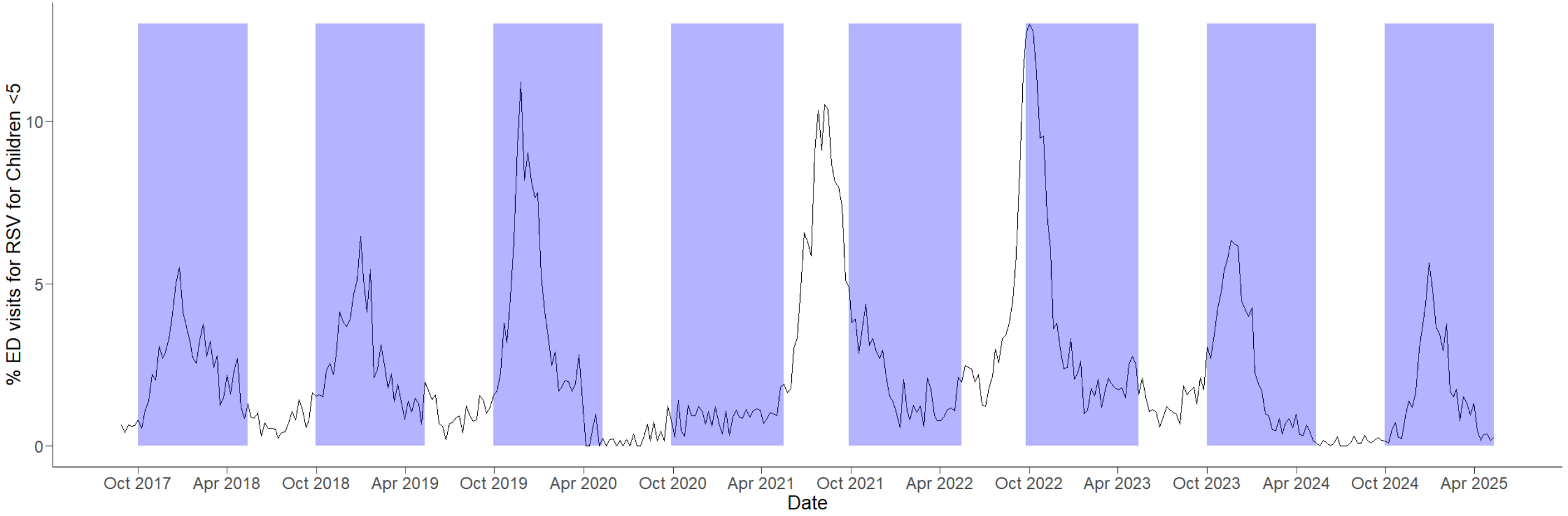
- Data used: Inductive Health ESSENCE data starting with the 2017/2018 flu season.
- Estimate thresholds annually before the start of a new flu season.
- Estimation Approach
  - Assess whether the regular flu season captures annual peaks for the respiratory disease.
    - If it doesn't capture peaks, modify windows so that peaks are captured.
    - If needed, split up double peaks.
  - Calculate MEM thresholds using R statistical software.
  - Assess goodness of fit for threshold by looking at historic data.
    - Determine if sensitivity analyses are needed.

Moving Epidemic Method Estimation Details

- Thresholds are estimated once a year, before a flu season begins.
- The epidemic threshold is estimated by:
  1) determining the epidemic length for each historic season and then
  2) estimating the upper bound of a one-sided confidence interval for pre-epidemic values from historic seasons.
- Intensity thresholds are estimated as the upper bound of one-sided confidence intervals for epidemic values from historic seasons.
- There are parameters we can tune to improve how well the thresholds fit historic data, i.e. improving the balance between sensitivity and specificity for the epidemic threshold.

MEM Threshold Estimation for RSV for Children < 5 Years Old

Plot % ED visits for children under 5 with RSV – Overlay typical flu seasons



- We might consider modifying these windows to better include the peaks we are seeing. For example:
  - Expand the windows forward about 5 weeks
  - Some irregularity during COVID pandemic.

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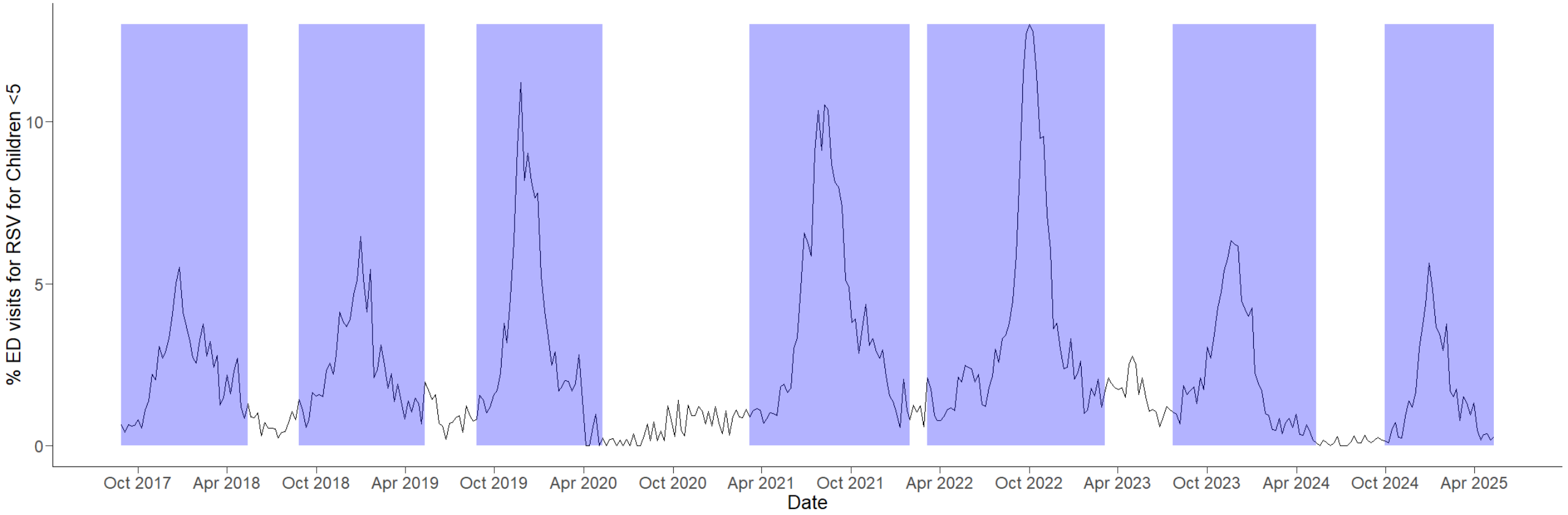
Plot % ED visits for children under 5 with RSV – Modified windows to capture peaks



- Now we have better coverage for the RSV peaks.
- We will use these date ranges to define the RSV “seasons”.
- Note more regular peaks and stable baselines compared to other respiratory disease trends we will examine.

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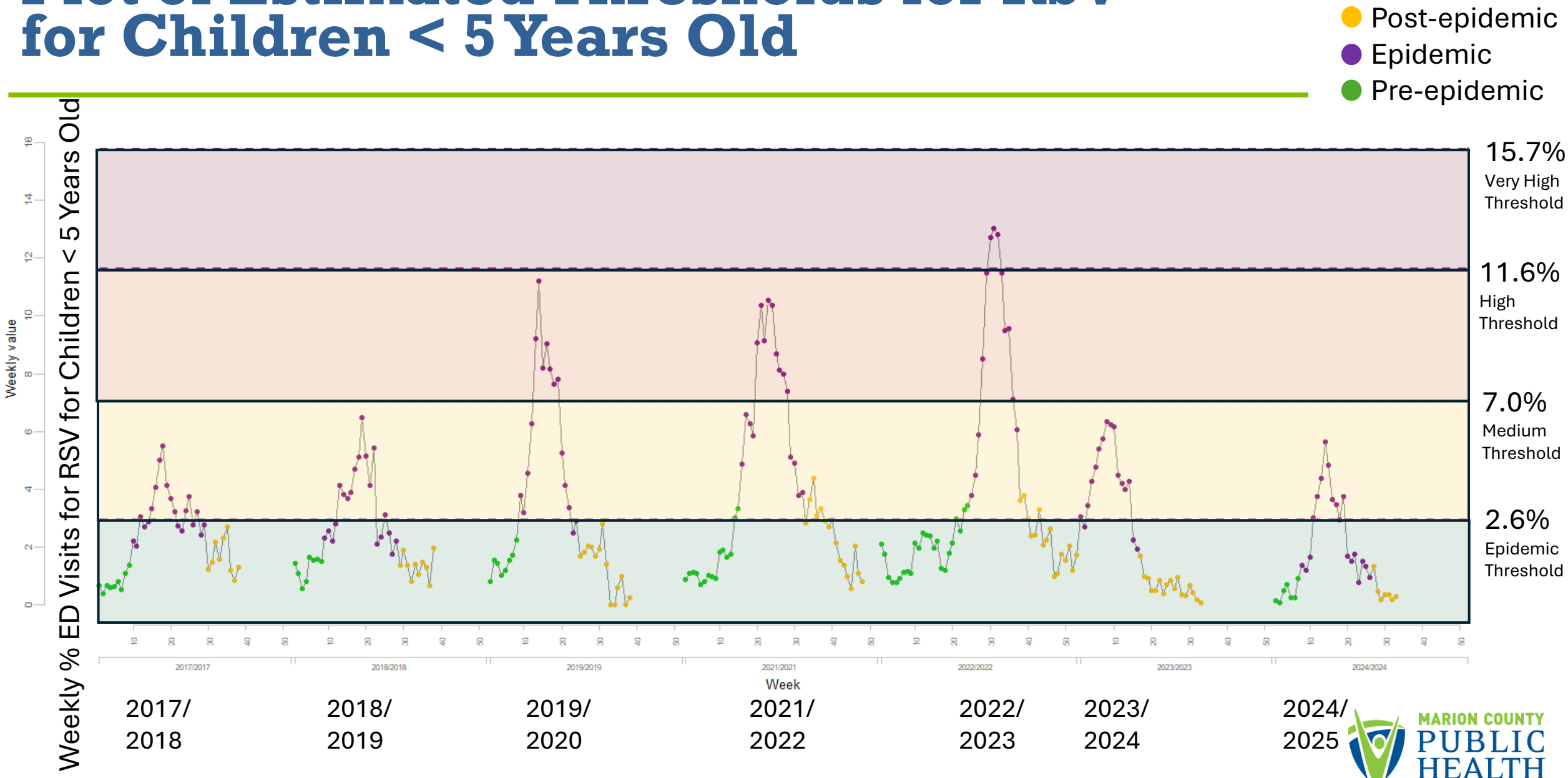
Plot of Estimated Thresholds for RSV for Children < 5 Years Old



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MEM Threshold Estimation for Influenza Like Illness (ILI)

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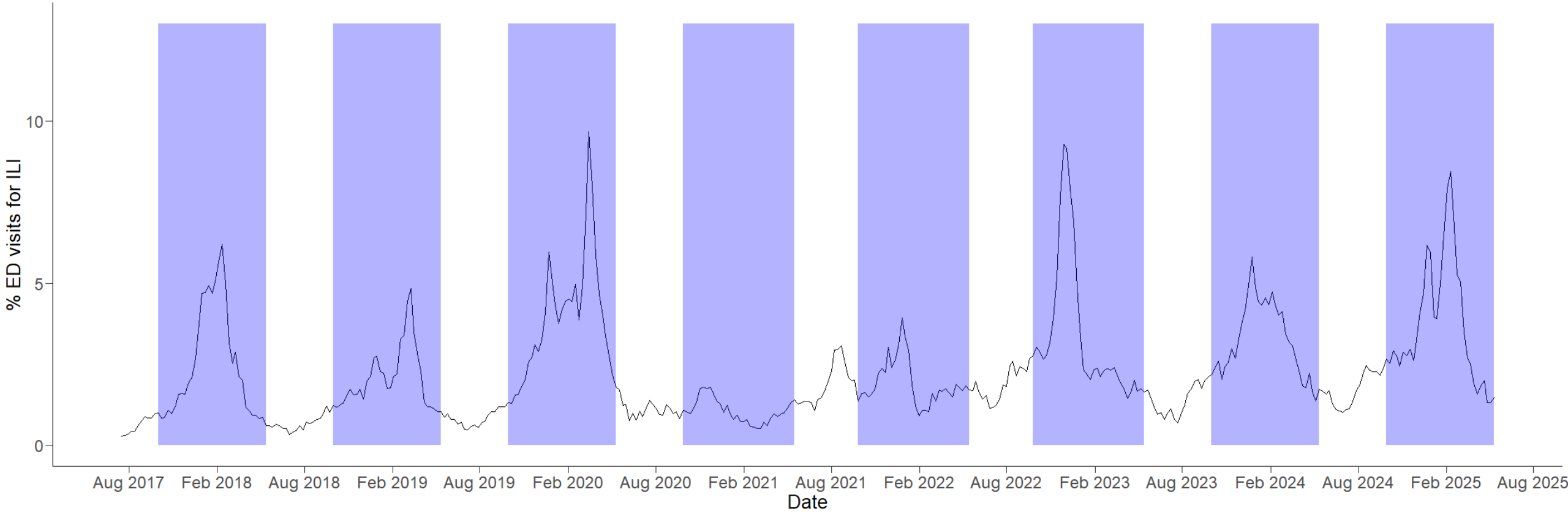
Plot % ED visits for ILI – Assess whether the regular flu season captures annual peaks for ILI



- We might consider modifying these windows to better include the peaks we are seeing. For example:
  - Expand the windows forward 5 weeks
  - One year without a peak during COVID.
  - Modify windows between 2021 – 2022 to capture the two smaller peaks around 2021 and 2022.

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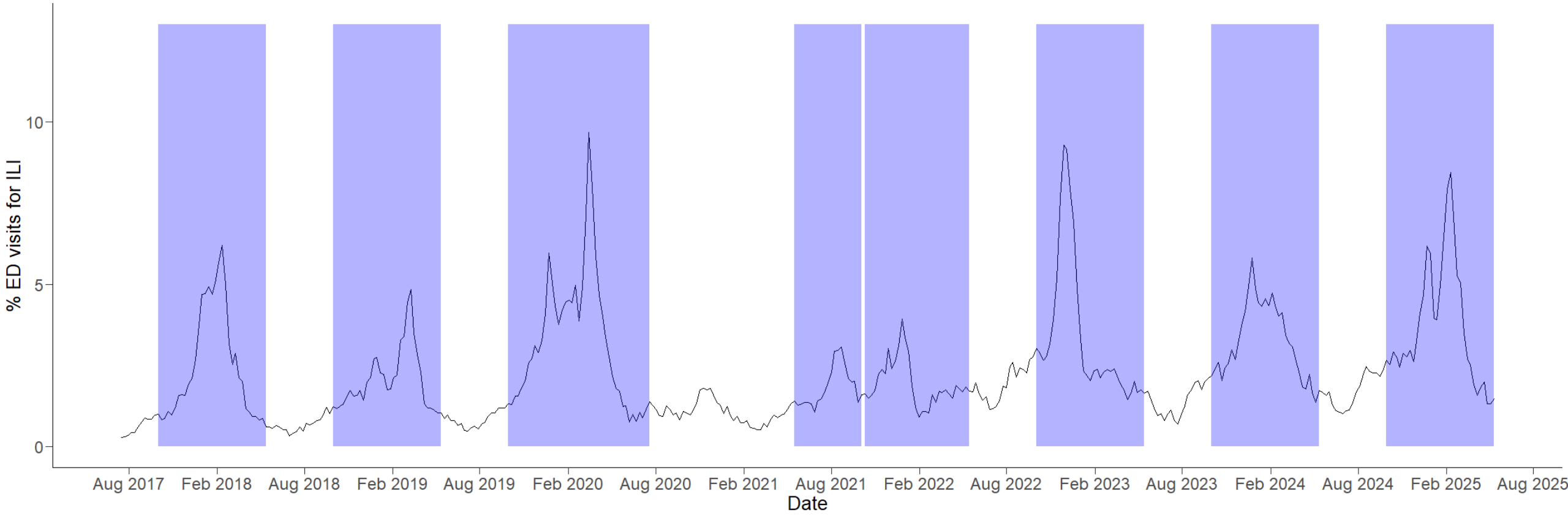
Plot % ED visits for ILI – Modified windows to capture peaks



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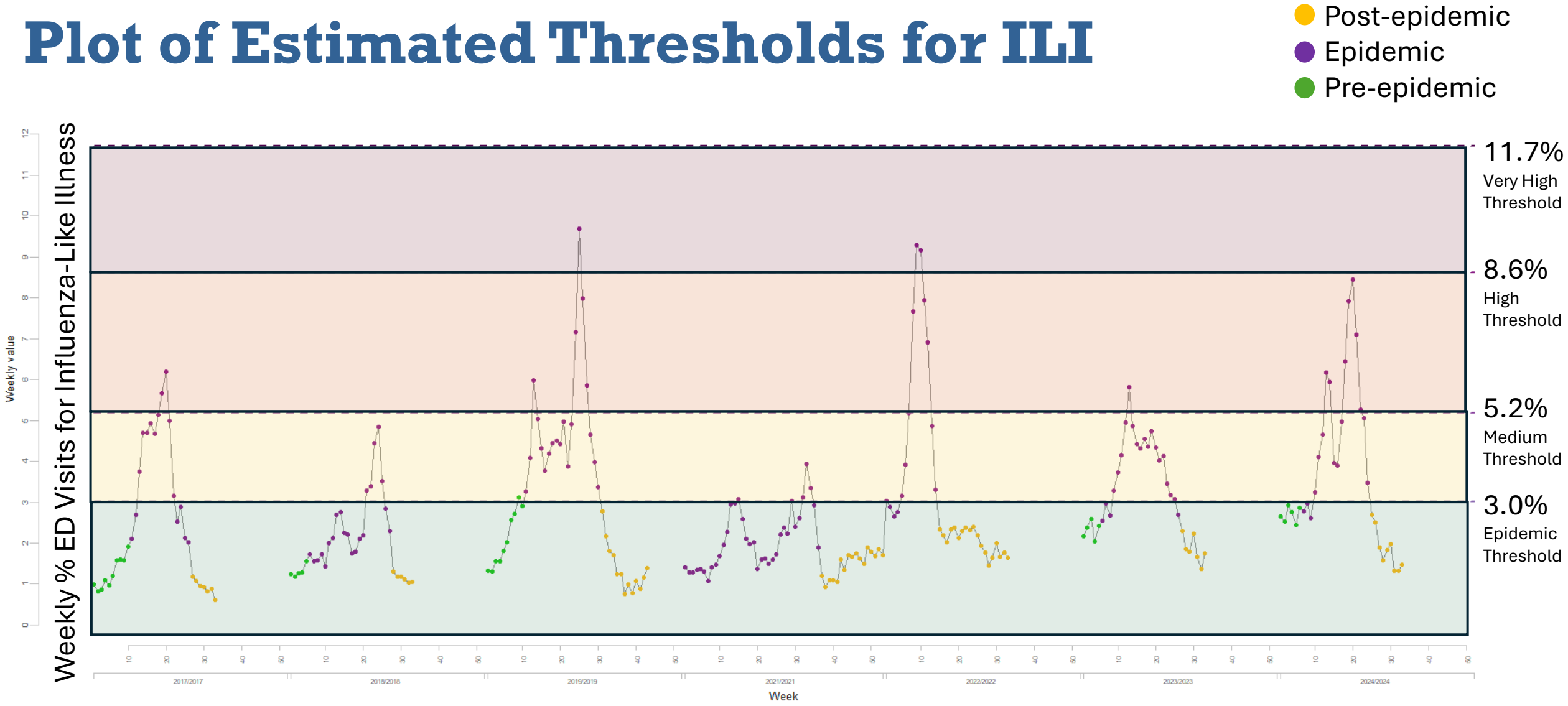
Plot of Estimated Thresholds for ILI



2017/2018

2018/2019

2019/2020

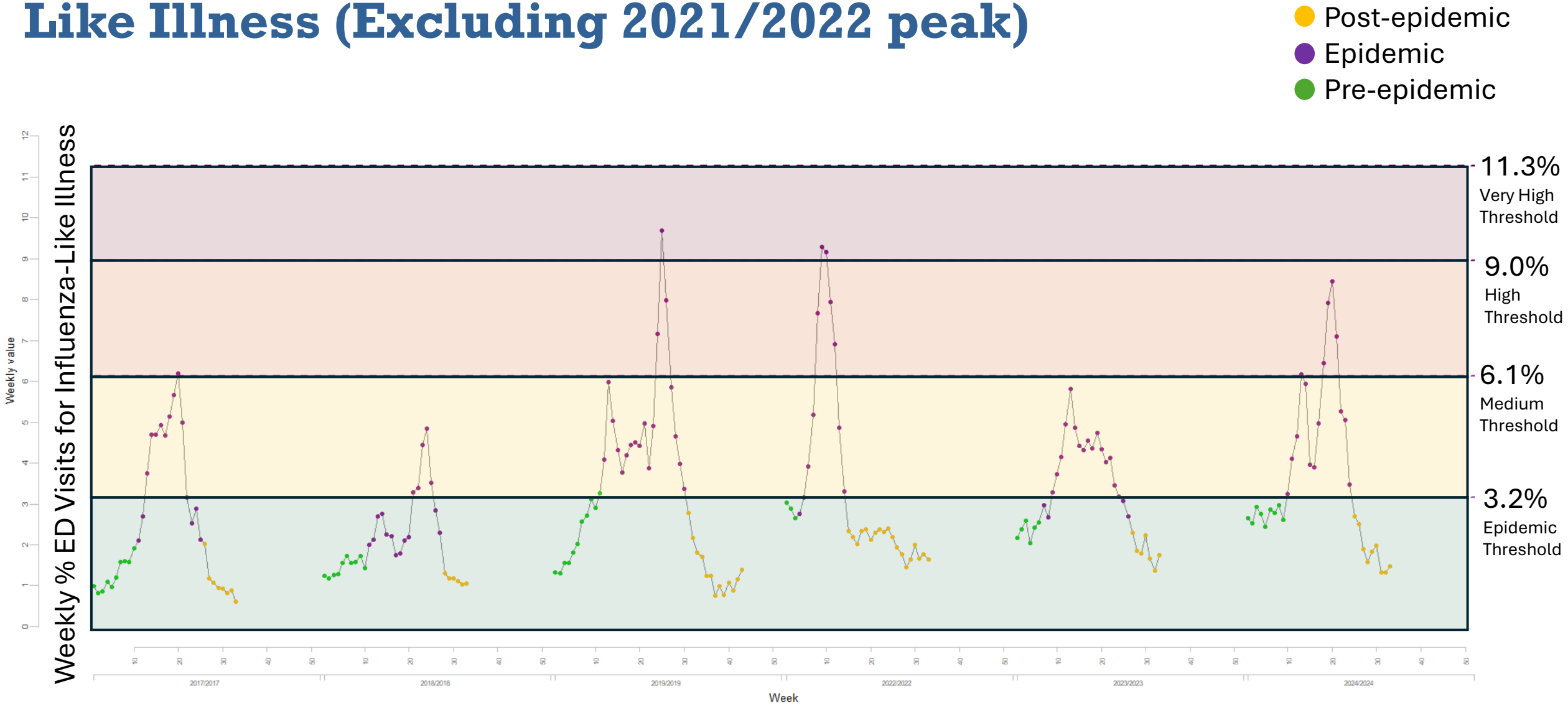
2021/2022

2022/2023

2023/2024

2024/2025

Plot of Estimated Thresholds for Influenza-Like Illness (Excluding 2021/2022 peak)



MEM Threshold Estimation for Broad Acute Respiratory Indicator

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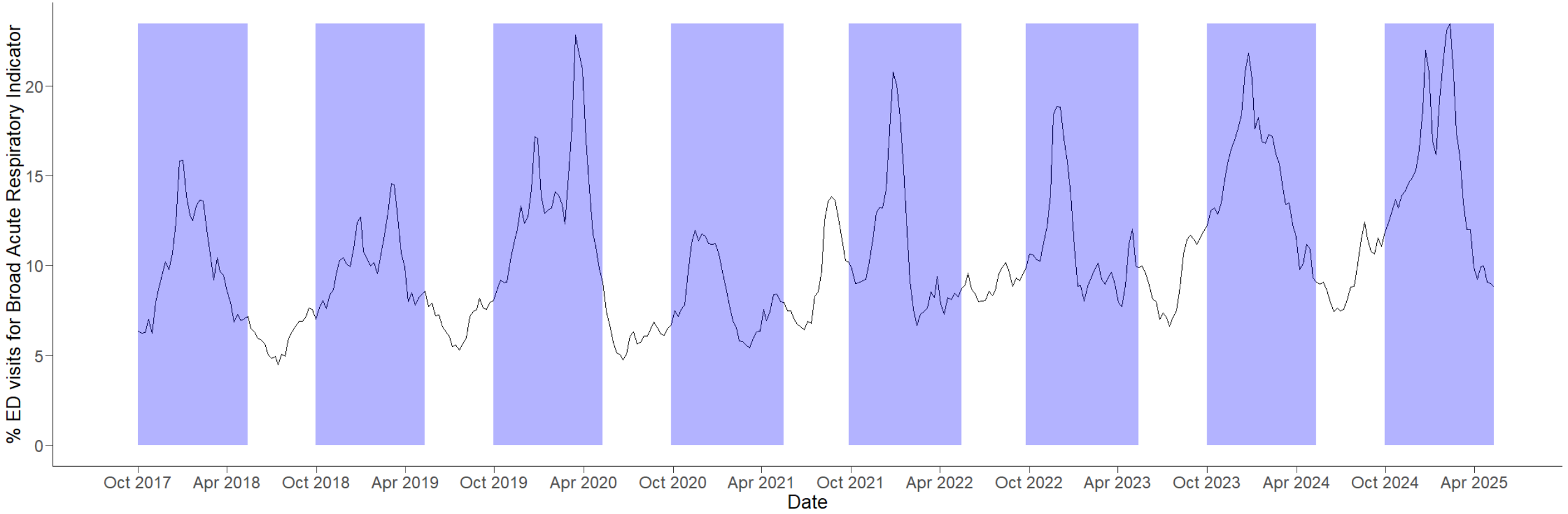
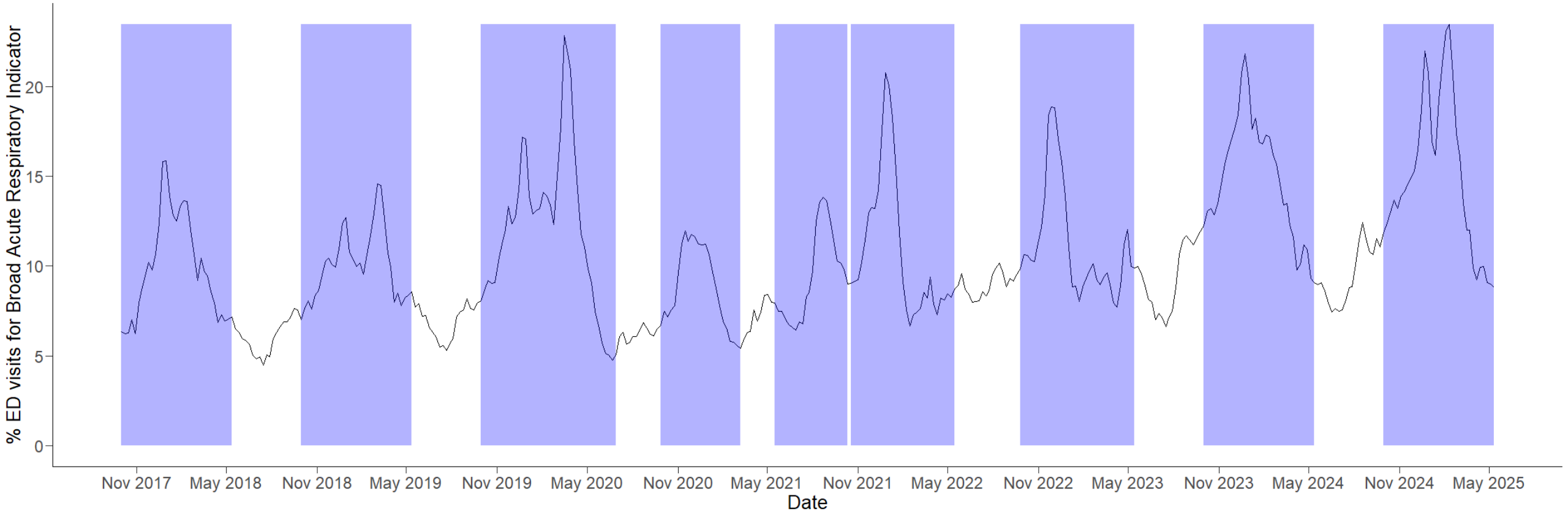
Broad Acute Respiratory Disease – Overlay Typical Flu Seasons



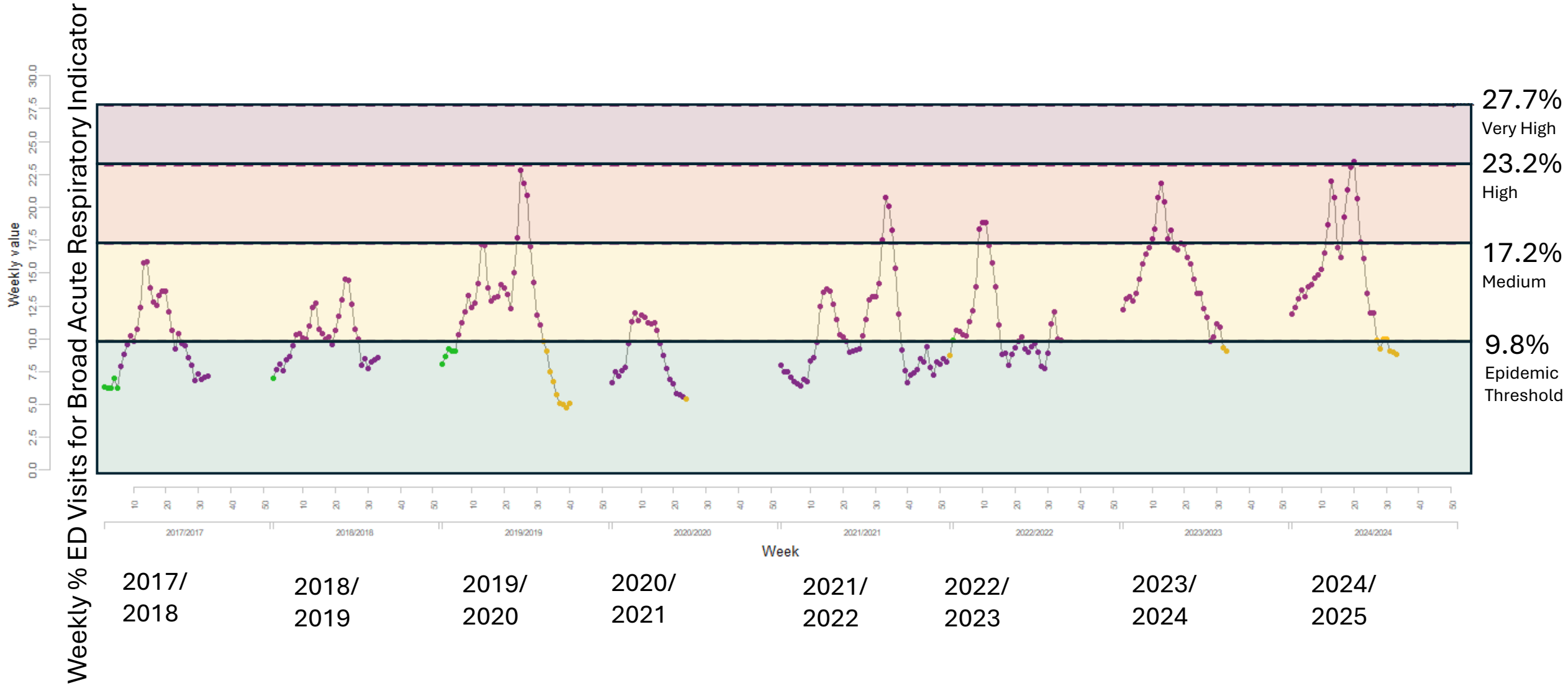
- Note general increasing trend for the baseline the last few years during flu season
- Some unusual patterns between years 2020- 2023

Broad Acute Respiratory Disease – Modified windows to capture peaks

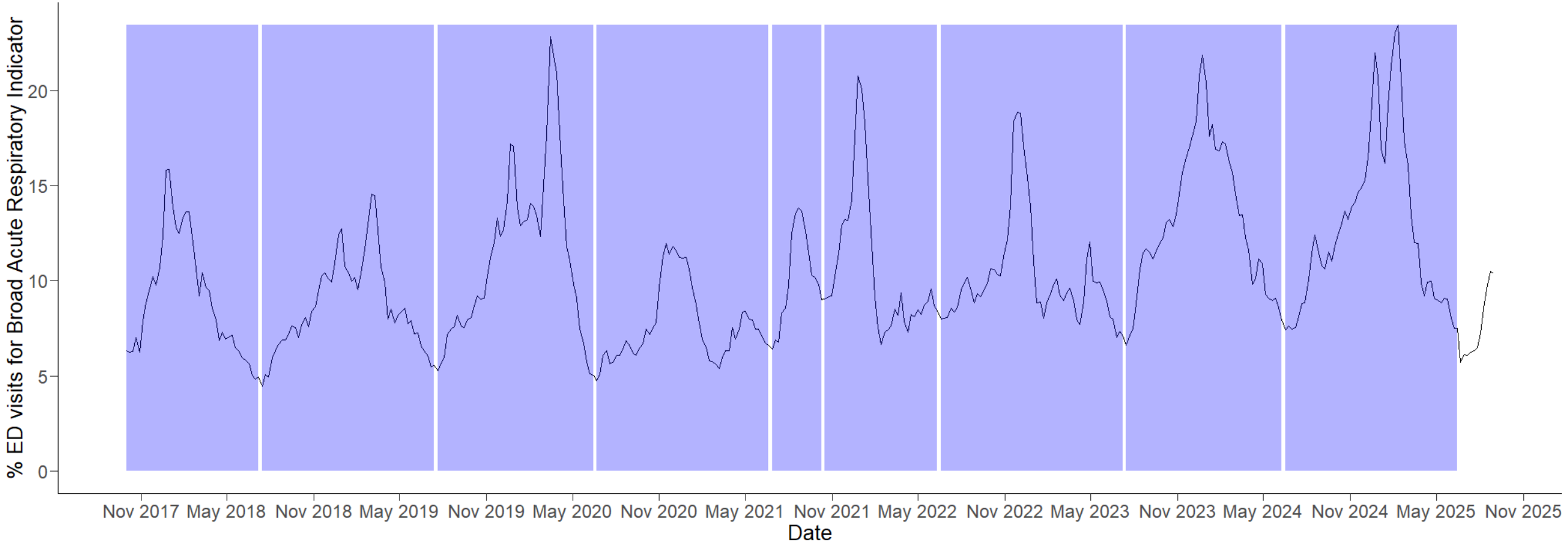


- Note splitting double peaks in 2021/2022.
- Potentially other double peaks – likely because representing multiple conditions.
- Baseline much higher in recent flu seasons (2023/2024 and 2024/2025)

Plot of Estimated Thresholds for BARI – Flu Season Data



Broad Acute Respiratory Disease – Re-define Seasons



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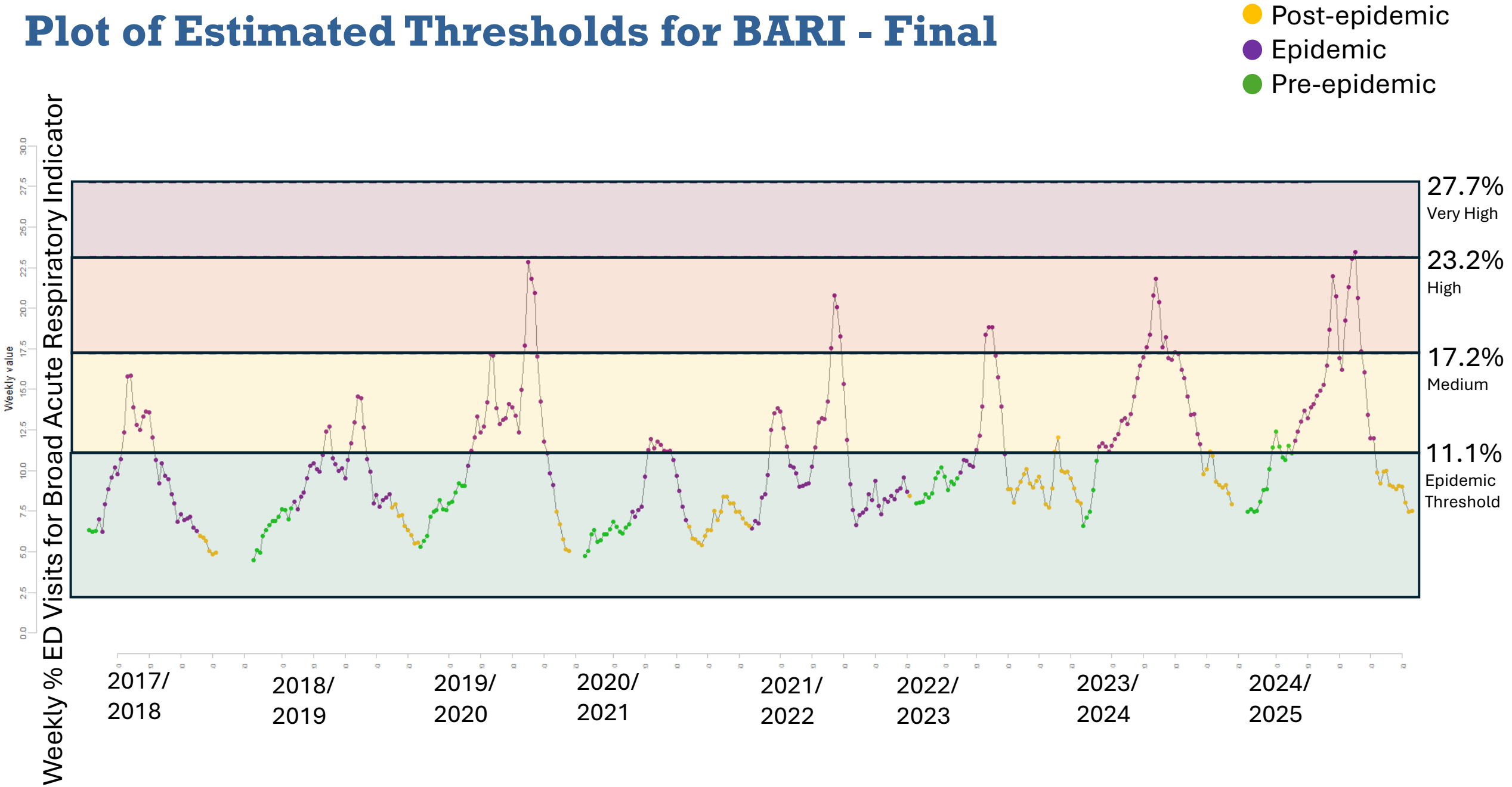
Plot of Estimated Thresholds for BARI - Final



Input from stakeholders we've presented to

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Sharing with external partners

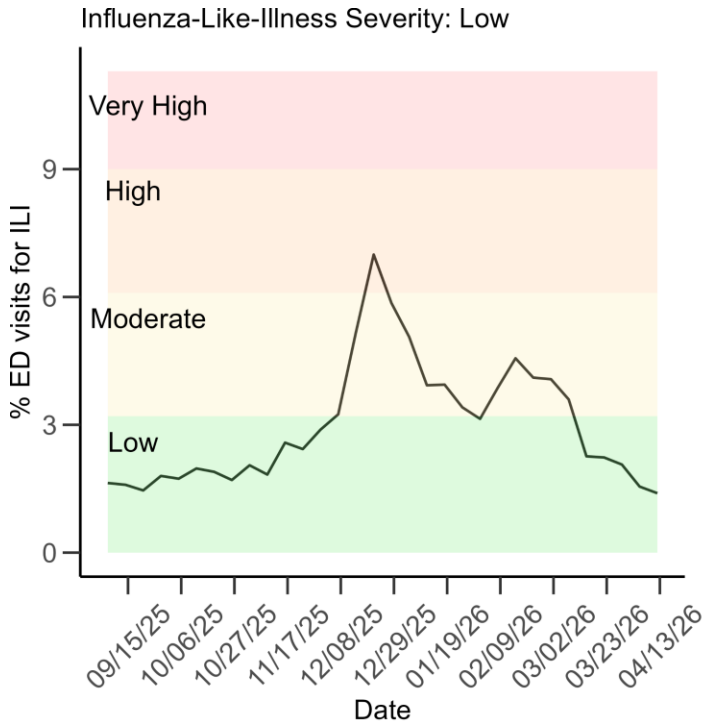
- What we shared
  - Threshold estimation process
  - Estimated Thresholds for RSV, ILI, CLI, and Broad Acute Respiratory Disease
- Partners we've talked to:
  - Local infectious disease expert
  - Small group of Infection Preventionists from three local hospital systems
  - Indiana Coalition of Patient Safety Workgroup
  - Respiratory Disease Epidemiologists from the Indiana Department of Health

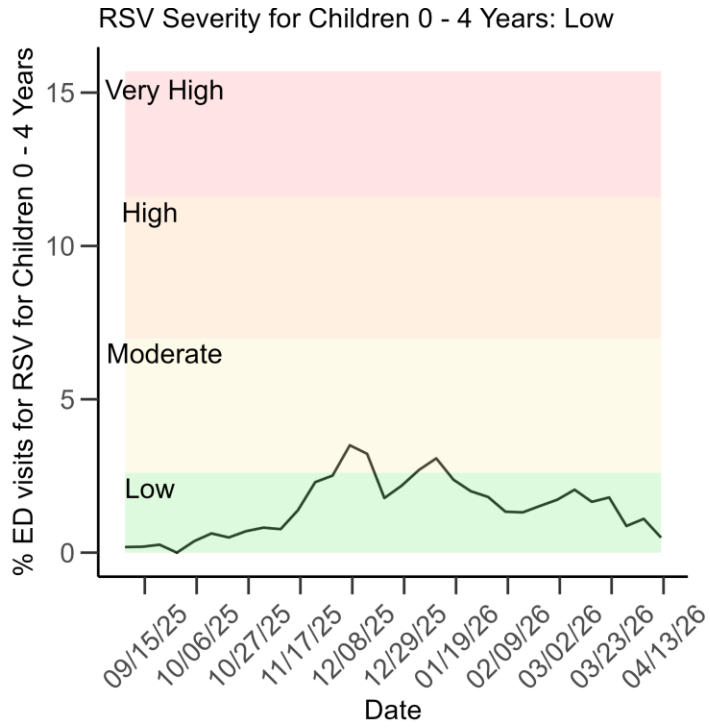
Highlights from External Partner Feedback

- Interest in thresholds, especially color-coding intensity thresholds (like CDC uses) and adapting messaging based on severity.
- Would like weekly wastewater data updates
  - Spike in disease detection in wastewater data frequently precedes a spike in ED visit cases.
- Infection preventionists from hospital partners shared that they monitor both local and regional data during flu season.
  - Also shared interest in broad acute respiratory disease data.

Plan for Current Flu Season and Next Steps

- During flu season:
  - Monitor weekly ED visit rates relative to thresholds we estimated.
  - Send internal alerts if we have surpassed a threshold.
  - Provide weekly severity updates for ILI and RSV to external partners through our Weekly Influenza Situation report.





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Plan for Current Flu Season and Next Steps

- At the end of this flu season:
  - Evaluate the usefulness of thresholds by asking internal leadership and external partners for feedback, estimate new thresholds, and compare new thresholds to the 2025/2026 thresholds.
  - Potentially adjust our messaging or discuss actions which the health department or hospital systems may take in the future.
- Incorporating thresholds into interactive respiratory illness dashboard

Acute Respiratory Illness Dashboard

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Purpose

- To track trends in Marion County, Indiana, and the US for respiratory illnesses (ILI, CLI, and RSV)
- To detect outbreaks early and monitor severity of illnesses
- To compare current flu season with previous flu seasons

Data and Methods Used

Data and Methods Used

- Emergency department visit data
  - Inductive Health ESSENCE data for Marion County
  - NSSP emergency department data for Indiana and the US (publicly available)
- R statistical software to pull the data
  - Used APIs to query data from ESSENCE and NSSP
  - Brought the data into R and converted them into data frames
  - Cleaned and exported the data into CSV files
- Power BI to create the dashboard
  - Imported those CSV files into Power BI
  - Created line graphs with the data

Dashboard vs Weekly Influenza Situation Report

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Similarities

- Both are used to monitor respiratory illness data
- Both include Marion County data
  - ILI ED visits for the last 10 flu seasons
  - ILI ED visits by age group
  - RSV ED visits for ages 0-4
  - Thresholds for ILI and RSV severity
- Both include Indiana and US ILI activity

Differences

- Dashboard has more data
  - Marion County respiratory illness ED visits by age and race and ethnicity
  - Indiana respiratory illness ED visits
  - US respiratory illness ED visits by age and race and ethnicity
- Flu report has more wording

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Marion County Influenza Situation Report
2025-2026 Seasonal Influenza Week 15
(April 12, 2026 – April 18, 2026)

Marion County Public Health Department, IN 2026-04-20

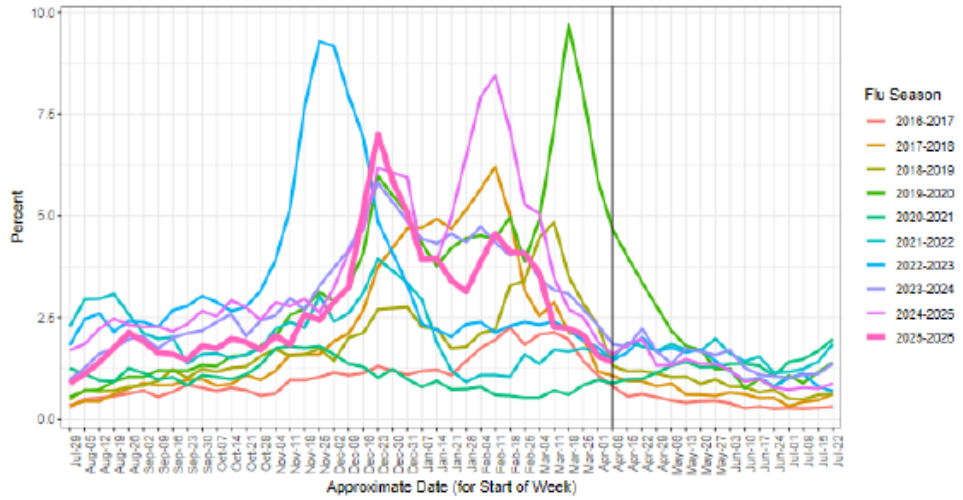
Please send comments or suggestions about content to epidemiology@hhcorp.org.

To subscribe to this report, email your name and email address to epidemiology@marionhealth.org, with subject "Add to Weekly Flu Report distribution list".

Overview

Influenza-Like Illness (ILI) emergency department (ED) visits **decreased**, and RSV ED visits **decreased** during this past week. ILI ED visits in Marion County **decreased** during Week 15, a 10.3% **decrease** compared to Week 14. For children aged 0-4 years old, ILI ED visits **decreased** by 6.5%, while for children aged 5-17 years old, ILI ED visits **increased** by 33.8%.

Percent of ILI Related ED Visits for the Last 10 Flu Seasons



DR1202 Ariane Thomas MCPHD EPI (epidemiology@marionhealth.org) Data Source: Inductive Health ESSENCE 2026-04-20

Influenza and RSV Surveillance – Week 15, April 12, 2026 – April 18, 2026
Marion County

Influenza

- During Week 14, **1.39% or 183 of Marion County ED visits had ILI symptoms.** The current percentage is lower than last week (1.55% or 193 visits).
- In Marion County hospitals, the age group 0-4 years old had the highest percentage of ILI-related ED visits at 4.02% (41 visits), followed by 5-17 years old at 2.10% (32 visits).
- The median percentage of ILI-related ED visits for Week 15 over the last five years is 1.49%.

RSV

- The percentage of Respiratory Syncytial Virus (RSV)-related ED visits for 0-4 years old was **0.50% (5 visits)** during Week 15. This percentage is lower compared to last week (1.10% or 11 visits).
- RSV is a common respiratory virus that is the most common cause of bronchiolitis and pneumonia for children under one year of age in the U.S.

Marion County Influenza Situation Report
2025-2026 Seasonal Influenza Week 15
(April 12, 2026 – April 18, 2026)
Marion County Public Health Department, IN 2026-04-20
Please send comments or suggestions about content to epidemiology@hhcorp.org.
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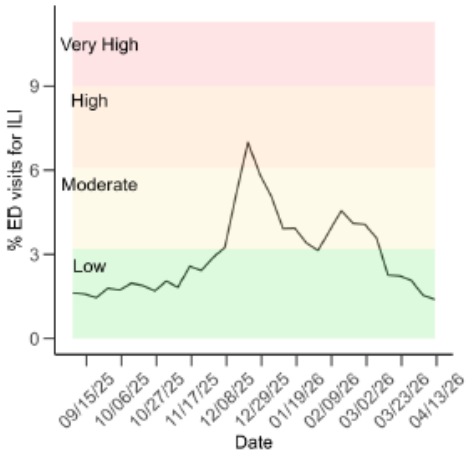
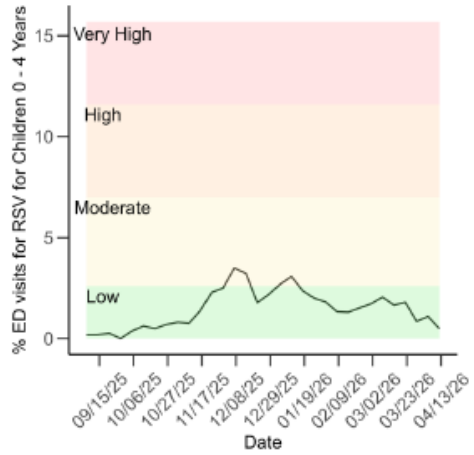
Thresholds for ILI and RSV Severity – Week 15, April 12, 2026 – April 18, 2026
Marion County

- In Marion County, the severity of ILI is **low** and the severity of RSV for children 0 - 4 years old is **low** for Week 15. Severity thresholds were estimated using Marion County data from flu seasons 2017/2018 to 2024/2025.

Influenza-Like-Illness Severity: Low



RSV Severity for Children 0 - 4 Years: Low



Influenza Surveillance – Week 14, April 5, 2026 – April 11, 2026
Marion County

- During Week 14, **1.55% or 193 of Marion County ED visits had ILI symptoms.**
- In Marion County hospitals, the age group 0-4 years old had the highest percentage of ILI-related ED visits at 4.30% (43 visits), followed by 5-17 years old at 1.57% (21 visits).

Indiana
https://www.in.gov/health/idepd/respiratory-disease/influenza/influenza-dashboard/

- Indiana is experiencing **Minimal** ILI activity.
- IDOH reported 1.37% ILI at ED and urgent care visits and 1.40% ILI at sentinel provider sites.
- **One influenza-associated death has been reported** during Week 14. A total of 245 deaths have been reported since the beginning of the season.

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Dashboard Demonstration

Timeline and Next Steps

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Timeline

- 10 months so far
  - **August 2025:** created a plan to build a respiratory illness dashboard
  - **September 2025:** received Power BI training on creating dashboards
  - **October 2025:** collected data and began coding
  - **November 2025:** began building the dashboard into Power BI
  - **December 2025 – February 2026:** continued editing/designing the dashboard
  - **February 2026 – March 2026:** set up automatic dashboard refresh
  - **March 2026:** had final edit and review of the dashboard

Next Steps

- Meet with security and compliance team for approval
- Publish the dashboard
- Include a link to the dashboard in the Weekly Influenza Situation report
- Evaluate the dashboard by asking internal and external partners for feedback

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Key Takeaways

Key Takeaways - Thresholds

- Local trends may differ from state or regional trends, and thresholds based on local data can help account for that.
- Tools to estimate MEM thresholds are free through R statistical software but may take a little trial and error to estimate.
  - Especially when accommodating unusual trends due to the introduction of COVID.
- Local infection preventionists have expressed interest in the thresholds as tools for communication, and evaluation of threshold usefulness is ongoing.

Key Takeaways - Respiratory Dashboard

- The dashboard monitors respiratory illness data on the local, state, and national level
- R statistical software and Power BI were used to create the dashboard
- The dashboard will be published and evaluated for its effectiveness

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References

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References

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Thank you!

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