

# The moving epidemic method (MEM) to estimate influenza severity in South Africa

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# Background

- WHO Influenza Severity Assessment, Julia Fitzner
- Effort to quantitatively measure transmission, seriousness and impact of seasonal and pandemic influenza
- 19 participating countries, including **South Africa**



# Ways to Use Data

- Established influenza surveillance systems
- Different purposes but generally describe circulating influenza viruses and percent positivity
- What is transmission? What is seriousness?
- How can we use the data that has been collected in South Africa to describe the severity of influenza seasons?



# Moving Epidemic Method (MEM)\*

- The MEM method allows to establish baseline influenza activity and set thresholds (percentiles)
- Thresholds are used to define descriptive terms (e.g., mild, moderate, severe) for influenza seasons
- R-Studio, MEM package

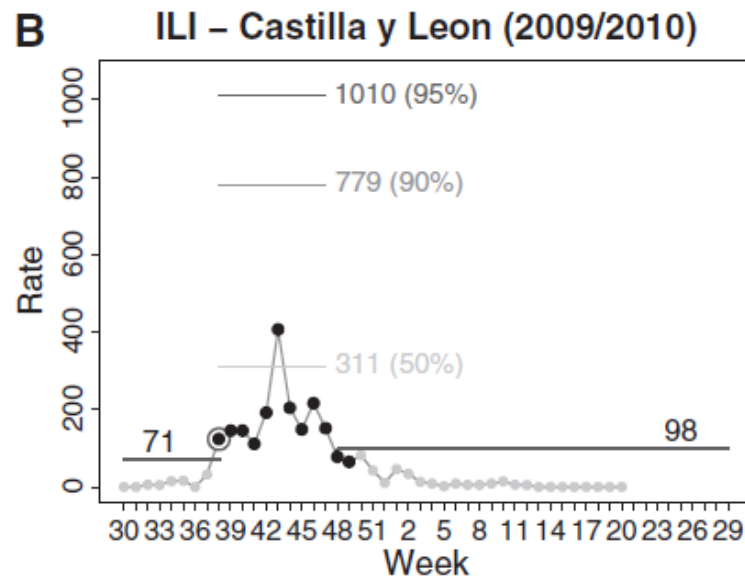
\* Vega T, et al. Influenza surveillance in Europe: establishing epidemic thresholds by the moving epidemic method. *Influenza Other Respir Viruses*. 2013 Jul;7(4):546-58.

Vega T, et al. Influenza surveillance in Europe: comparing intensity levels calculated using the moving epidemic method. *Influenza Other Respir Viruses*. 2015 Sep;9(5):234-46.



# Thresholds

- Mild: median (50<sup>th</sup> percentile)
- Moderate: 90<sup>th</sup> percentile
- Severe: 95<sup>th</sup> percentile



# Peak weekly values and seasonal severity ranking, overall

Season	Data source 1	Data source 2	Data source 3	Severity Ranking
2009/10	7.72	4	8.2	M. Severe
2010/11	4.55	2.1	9.07	Moderate
2011/12	2.39	1.1	7.86	Mild
2012/13	6.06	5.4	9.86	Severe
2013/14	4.6	3.9	8.74	Moderate
2014/15	6.03	9.1	9.25	M. Severe



# Seasonal severity ranking, by age group

Season	Child	Adults	Elderly	Overall
2009/10	Severe	M. Severe	Mild	M. Severe
2010/11	Moderate	Moderate	Moderate	Moderate
2011/12	Mild	Mild	Mild	Mild
2012/13	M. Severe	M. Severe	Severe	Severe
2013/14	Moderate	Severe	Moderate	Moderate
2014/15	M. Severe	Severe	Severe	M. Severe



# South Africa Data Sources

- Viral Watch
  - Network for outpatient influenza-like illness (ILI)
  - Primarily volunteer private practitioners
  - >200 sites
- SARI surveillance
  - Active hospitalized surveillance in 4 provinces
  - Based on WHO protocol





# South Africa Data Sources

- NetCare
  - Inpatient and outpatient administrative data from private hospital network
  - J-codes for pneumonia and influenza
  - No laboratory-confirmation (unlike Viral Watch and SARI)
- Corporate Data Warehouse (CDW)
  - National data bank of all laboratory tests conducted in-country



# Indicators Considered for Transmission (Outpatient data)

1. **Viral Watch:** Proportion lab-confirmed influenza of all ILI
2. **NetCare:** Proportion Pneumonia & Influenza (P&I) outpatient consultations of all outpatient consultations
3. **Combination indicator:** P&I outpatient consultations (from NetCare) adjusted for flu detection rate (from Viral Watch)



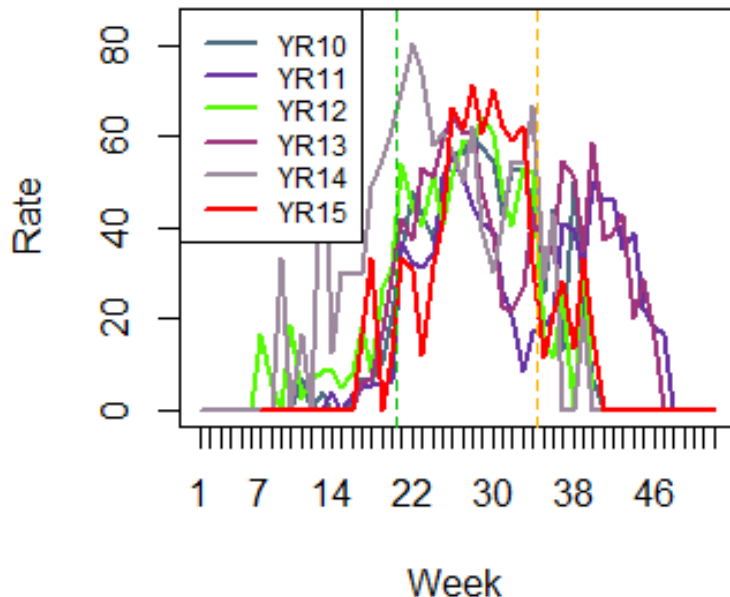
# Viral Watch, 2010 to 2015

## Influenza-positives of all ILI for that week

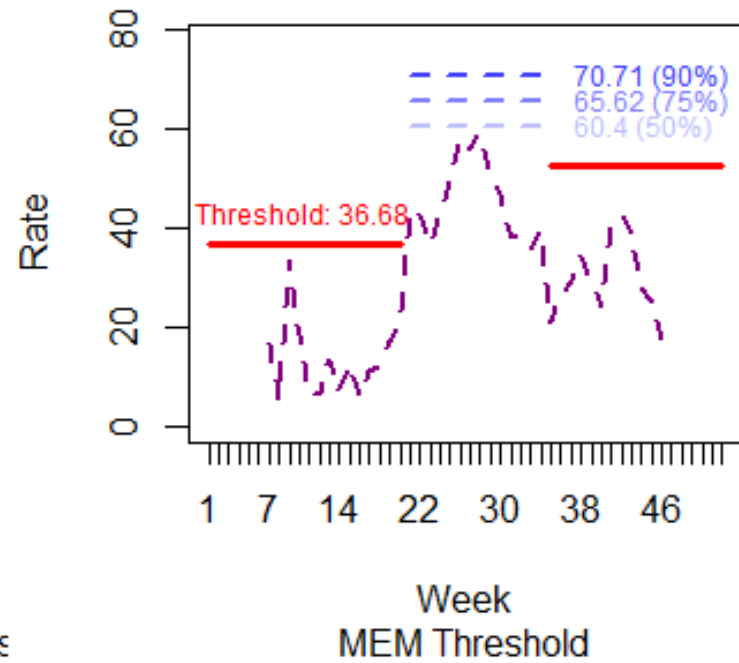
Season begins ~Week 20 (May)

Intensity

- Very High (90%) = 71%
- High (75%) = 66%
- Medium (50%) = 60%



ence rates of the seasons matching their relative pos

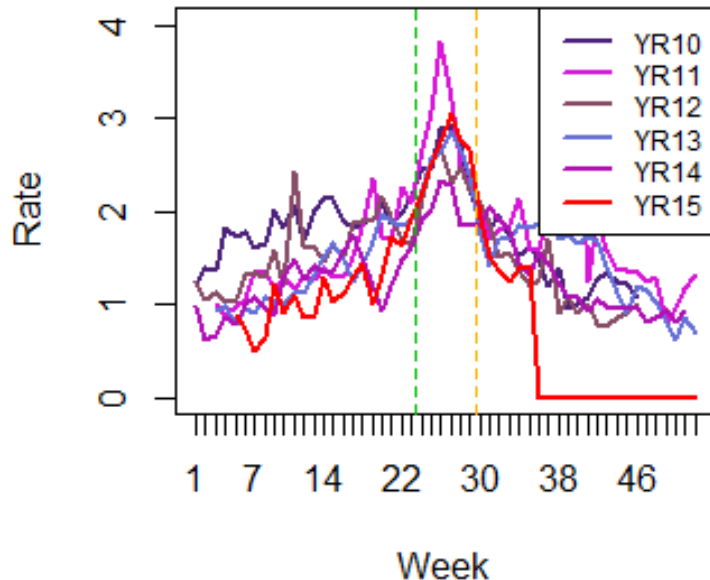


# Net Care, 2010 to 2015

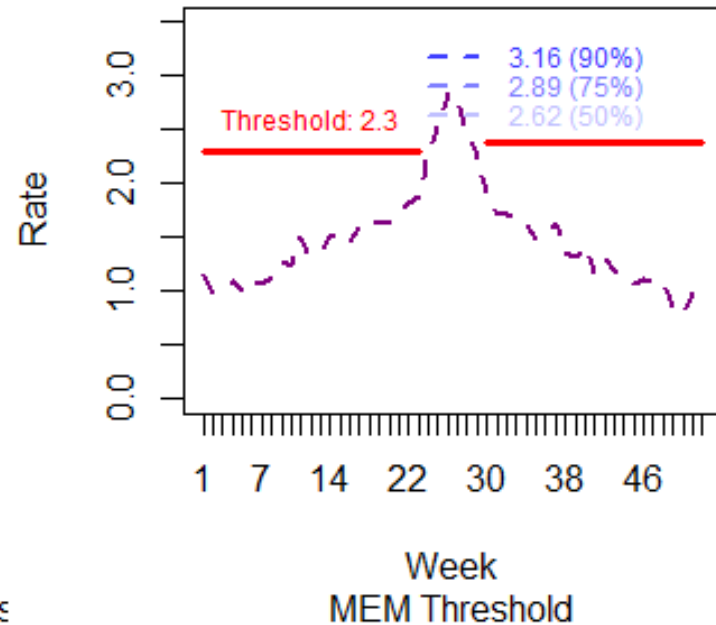
## Outpatient P&I of all outpatient consultations per week

Intensity:

- Very High (90%) = 3.16%
- High (75%) = 2.89%
- Medium (50%) = 2.62%



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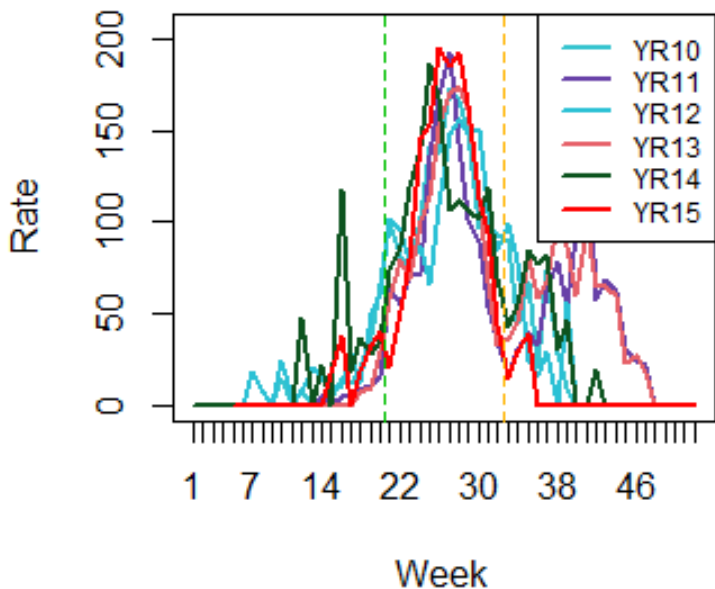


# Intensity Combination Indicator, 2010 to 2015

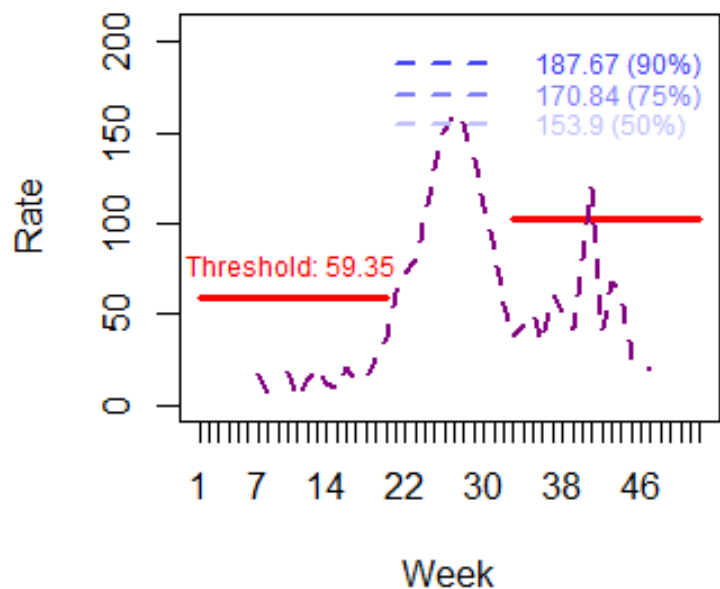
Outpatient: Proportion P&I of all consultations adjusted for flu detection rate

Intensity:

- Very High (90%) = 187.67
- High (75%) = 170.84
- Medium (50%) = 153.9



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Week  
MEM Threshold

# Comparison of three transmission indicators

Year	Viral Watch Influenza-positives over all ILI for that week	Net Care Outpatient P&I over all outpatient admissions per week	Combination Indicator Proportion P&I of all consultations adjusted for flu detection rate
2009	Very High	Very High	Very High
2010	Medium	High	High
2011	Low	Very High	Very High
2012	Medium	Medium	Medium
2013	Medium	Medium	Medium
2014	Very High	Low	High
2015	Very High	High	Very High



# Indicators Considered for Seriousness (Inpatient data)

1. **SARI:** Proportion lab-confirmed influenza of all SARI
2. **NetCare:** Proportion P&I inpatient admissions of all inpatient admissions
3. **Combination indicator:** P&I inpatient consultations (from NetCare) adjusted for influenza detection rate (from SARI)

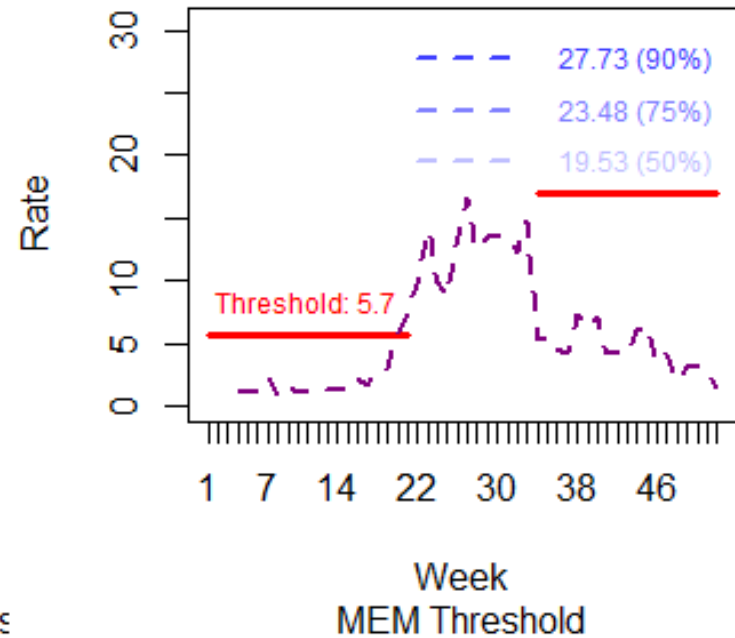
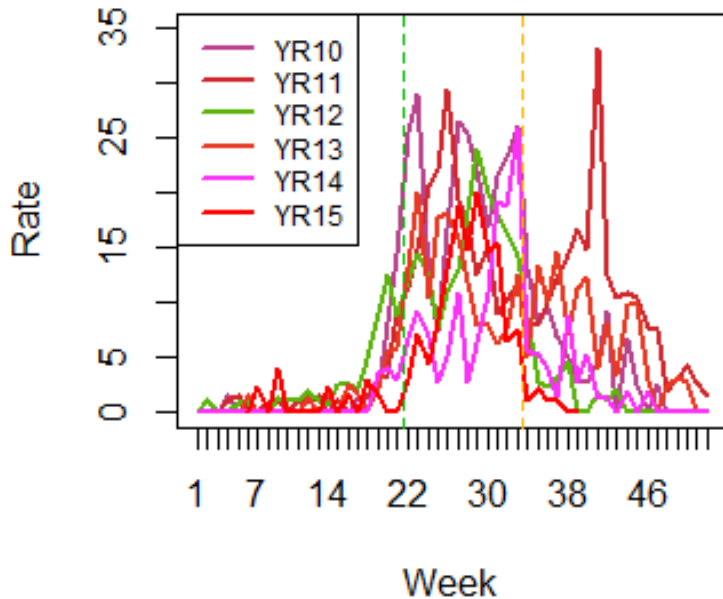


# SARI, 2010 to 2015

## Influenza-positives of all SARIs per week

Severity:

- Very High (90%) = 27.73%
- High (75%) = 23.48%
- Medium (50%) = 19.53%



ence rates of the seasons matching their relative pos

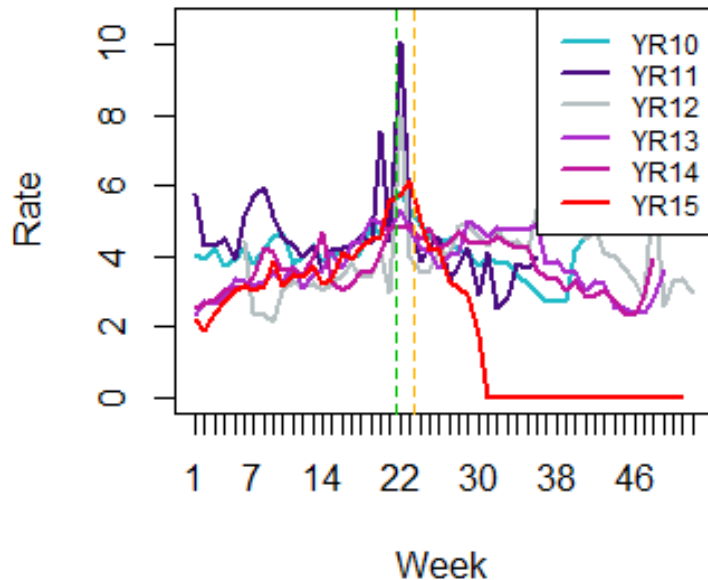


# Net Care, 2010 to 2015

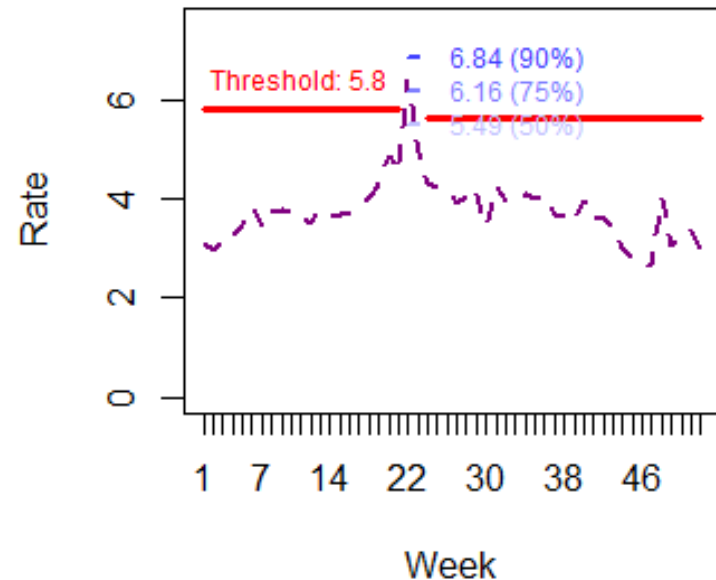
## Inpatient P&I of all inpatient admissions per week

Severity:

- Very High (90%) = 6.84%
- High (75%) = 6.16%
- Medium (50%) = 5.49%



ence rates of the seasons matching their relative pos



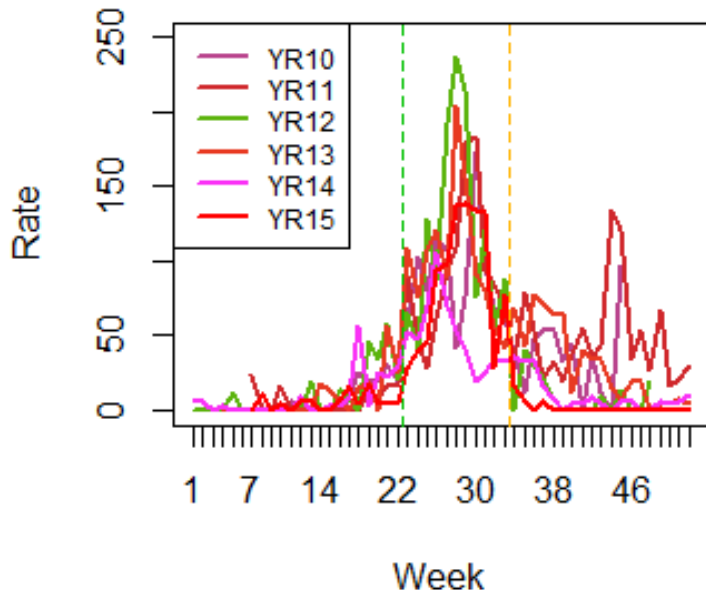
MEM Threshold

# Severity Combination Indicator, 2010 to 2015

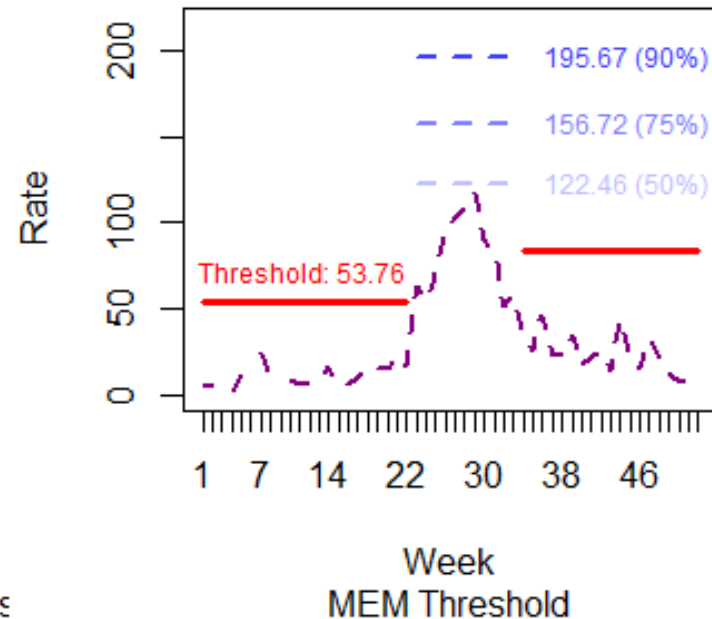
## Proportion P&I of all admissions adjusted for flu detection rate

Intensity/Severity:

- Very High (90%) = 195.67%
- High (75%) = 156.72%
- Medium (50%) = 122.46%



ence rates of the seasons matching their relative pos



MEM Threshold

# Comparison of three seriousness indicators

Year	SARI Influenza-positives over all SARIs per week	Net Care Inpatient P&I over all inpatient admissions per week	Combination Indicator Proportion P&I of all admissions adjusted for flu detection rate
2009	Very High	Very High	Very High
2010	Very High	Medium	High
2011	Very High	Very High	High
2012	High	Very High	Very High
2013	Medium	Low	Very High
2014	High	Low	Low
2015	High	Medium	Medium



# Conclusions

- Data from a number of sources in South Africa could be used to estimate transmission and seriousness
- Results using different sources were not always consistent
  - Pandemic year (2009) was identified as very high transmission and seriousness by all indicators
- Unable to measure impact
- Plan to finalize analyses and write manuscript



# Lessons Learned

- Indicators that have little variability (i.e., small numbers) or have thresholds that are close together are not ideal
- Setting less thresholds (2 instead of 3) may help simplify the methodology
- Data source used needs to be long-standing and consistent year to year (challenging in some settings)
- Immense amount of variability across surveillance systems, comparability is a challenge



Thank you

