



# U.S. Outbreak-Associated Illness Trends: Insights from CDC's National Outbreak Reporting System (NORS) Dataset (2000–2024)

Hanin Almodaweb  
Data Analytics Consultant  
General Assembly Data Science Bootcamp Cohort 2

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## PROBLEM STATEMENT



From 2000–2024, reported illnesses in the United States fluctuated nationally but spiked sharply in 2012, reaching 120,323 cases, a 326% increase from 2000.

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# THE NATIONAL OUTBREAK REPORTING SYSTEM



## About NORS

NORS is the centralized platform that state, local, and territorial health departments use to report outbreaks involving foodborne, waterborne, person-to-person, environmental, and animal-associated enteric diseases.

# DATASET OVERVIEW & DATA DICTIONARY

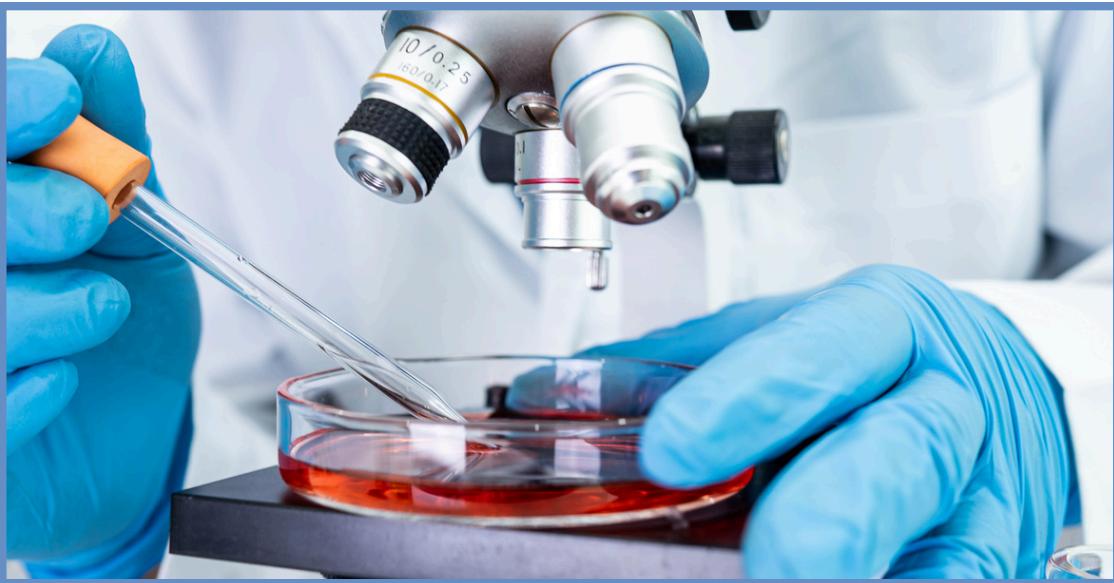
Column Name	Description	Data Type
Year	Year of earliest reported illness onset	Integer
Month	Month of earliest reported illness onset	Integer
Date	Year and month of earliest reported illness onset	Datetime
State	State where exposure occurred; “Multistate” for multi-state outbreaks	Object
Primary Mode	Primary mode of transmission (e.g., food, water, person-to-person)	Object
Etiology	Identified pathogen (genus/species); multiple values separated by semicolons	Object
Serotype or Genotype	Serotype or genotype of identified etiology	Object
Etiology Status	Indicates whether etiology is “Confirmed” or “Suspected”	Object
Setting	Exposure setting (e.g., restaurant, school, nursing home, recreational water)	Object
Illnesses	Estimated total number of primary cases	Float
Hospitalizations	Number of hospitalized primary cases	Float
Deaths	Number of deaths among primary cases	Float
Food Vehicle	Implicated food(s) for foodborne outbreaks; semicolon-separated	Object
Food Contaminated Ingredient	Contaminated ingredient(s) for foodborne outbreaks	Object
IFSAC Category	IFSAC food category of contaminated ingredient	Object
Water Exposure	Type of water exposure (drinking, recreational, environmental) for waterborne outbreaks	Object
Water Type	Venue, water system, or device through which water exposure occurred	Object
Animal Type	Type of animal involved in animal-contact outbreaks	Object

- **Period: 2000–2024**
- **Location: United States**
- **Outbreaks: 62,964**
- **Total reported illnesses: 1,536,265**
- **Average illnesses per outbreak: 24**
- **Peak outbreak year: 2016 (4,331 outbreaks)**
- **Peak illness year: 2012 (120323 illnesses)**

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## KEY TERMS

- **Outbreak:** An event in which two or more cases of illness are linked by a common exposure, setting, or transmission pathway.
- **Etiology:** The specific pathogen responsible for causing an outbreak.
- **Transmission Mode:** The pathway through which an illness spreads (e.g., person-to-person, foodborne, waterborne, environmental contamination).
- **Norovirus:** A highly contagious virus that causes vomiting and diarrhea.



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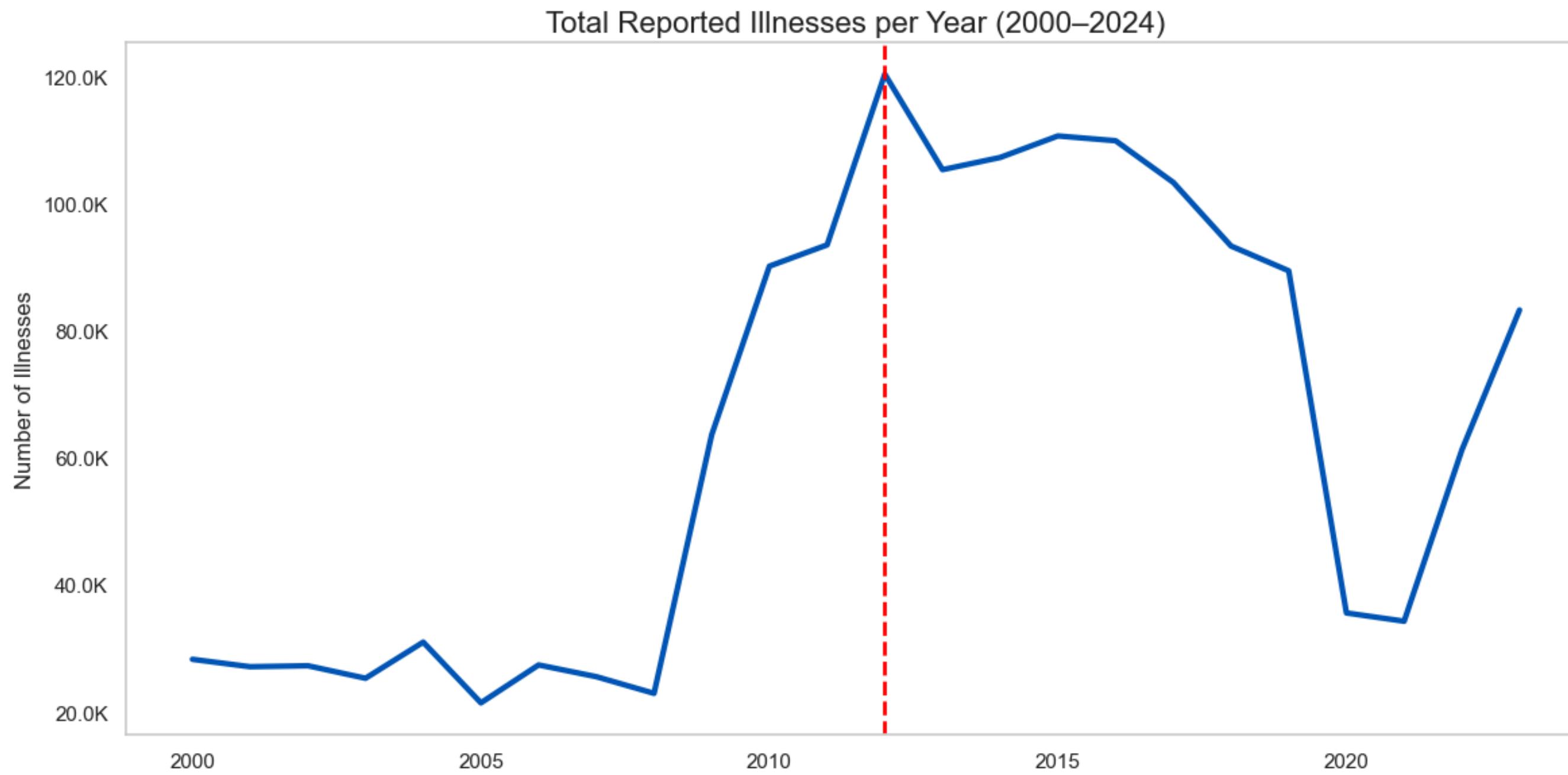
# OBJECTIVES



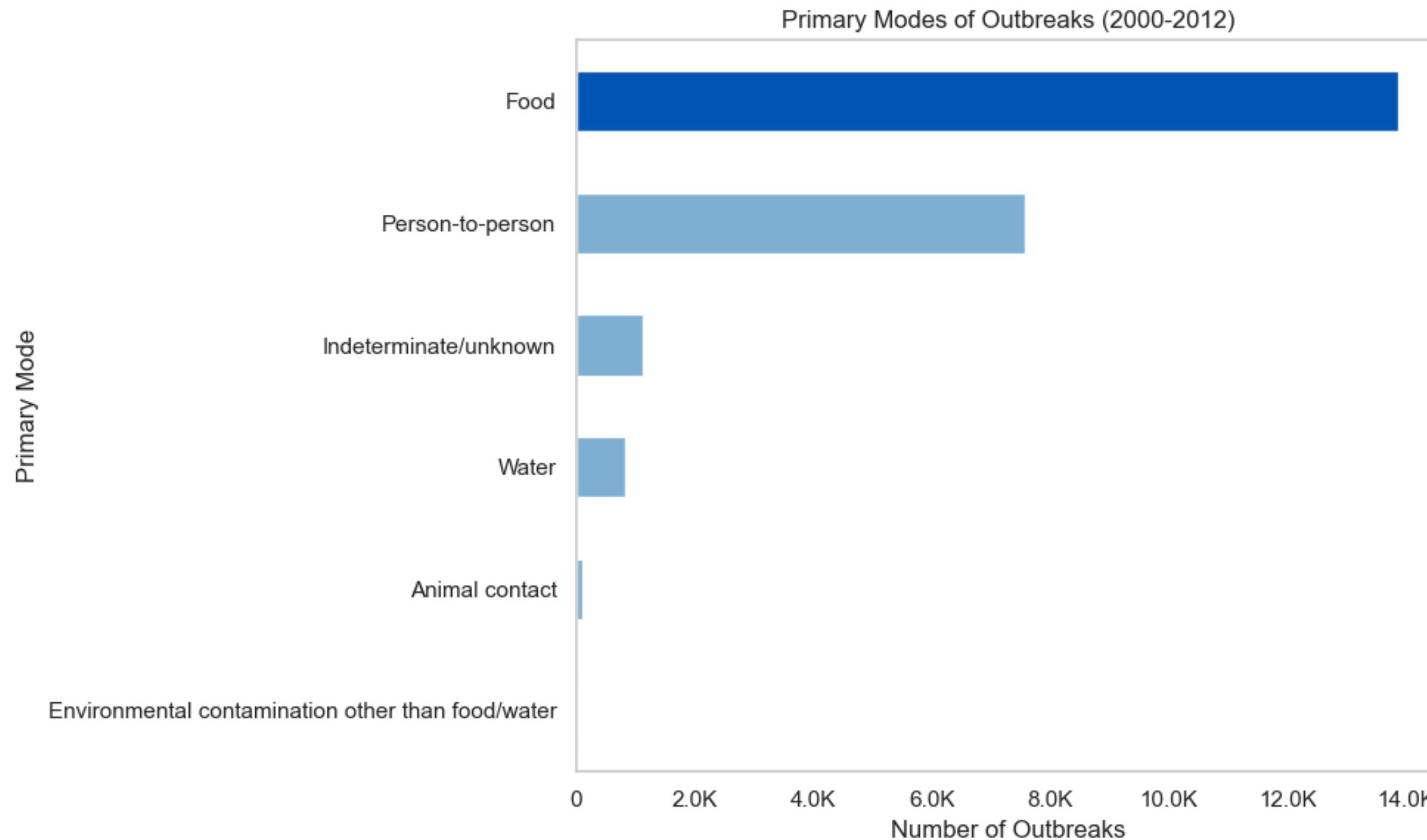
1. What were the annual illness trends from 2000–2024?
  2. How did illness counts differ across primary transmission modes from 2000–2012?
  3. Which etiologies contributed most to illness burden from 2000–2012
  4. Which states experienced the largest increases in illnesses between 2000 and 2012?
  5. What proportion of illnesses occurred in each month from 2000–2012?
  6. How did seasonal patterns in illness incidence change from 2000–2012?
  7. Which settings accounted for the largest proportion of illnesses each year from 2000–2012?
  8. Were illness increases between 2000 and 2012 driven by a higher number of outbreaks or by larger outbreaks?
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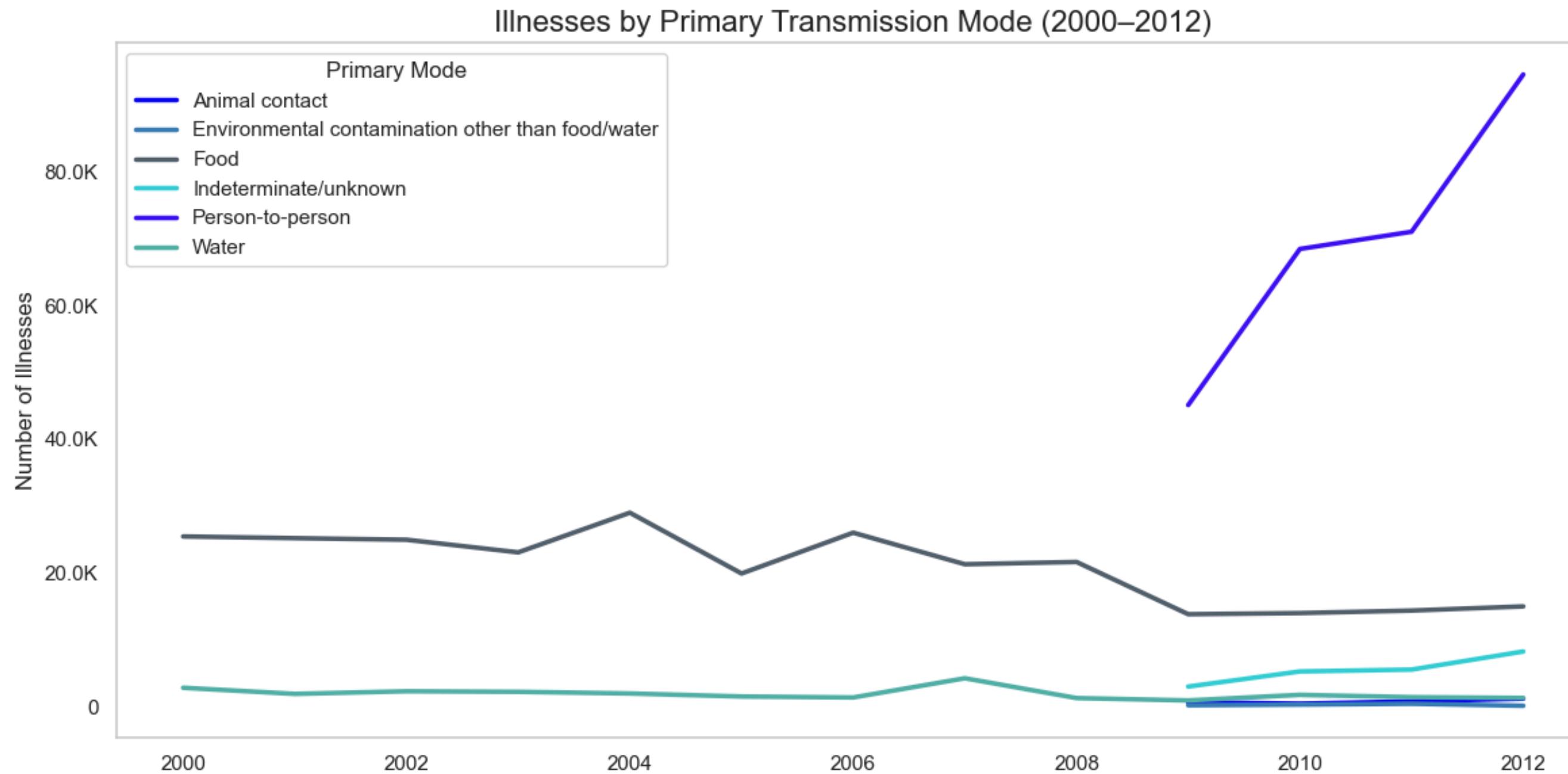
# ANNUAL ILLNESS TRENDS



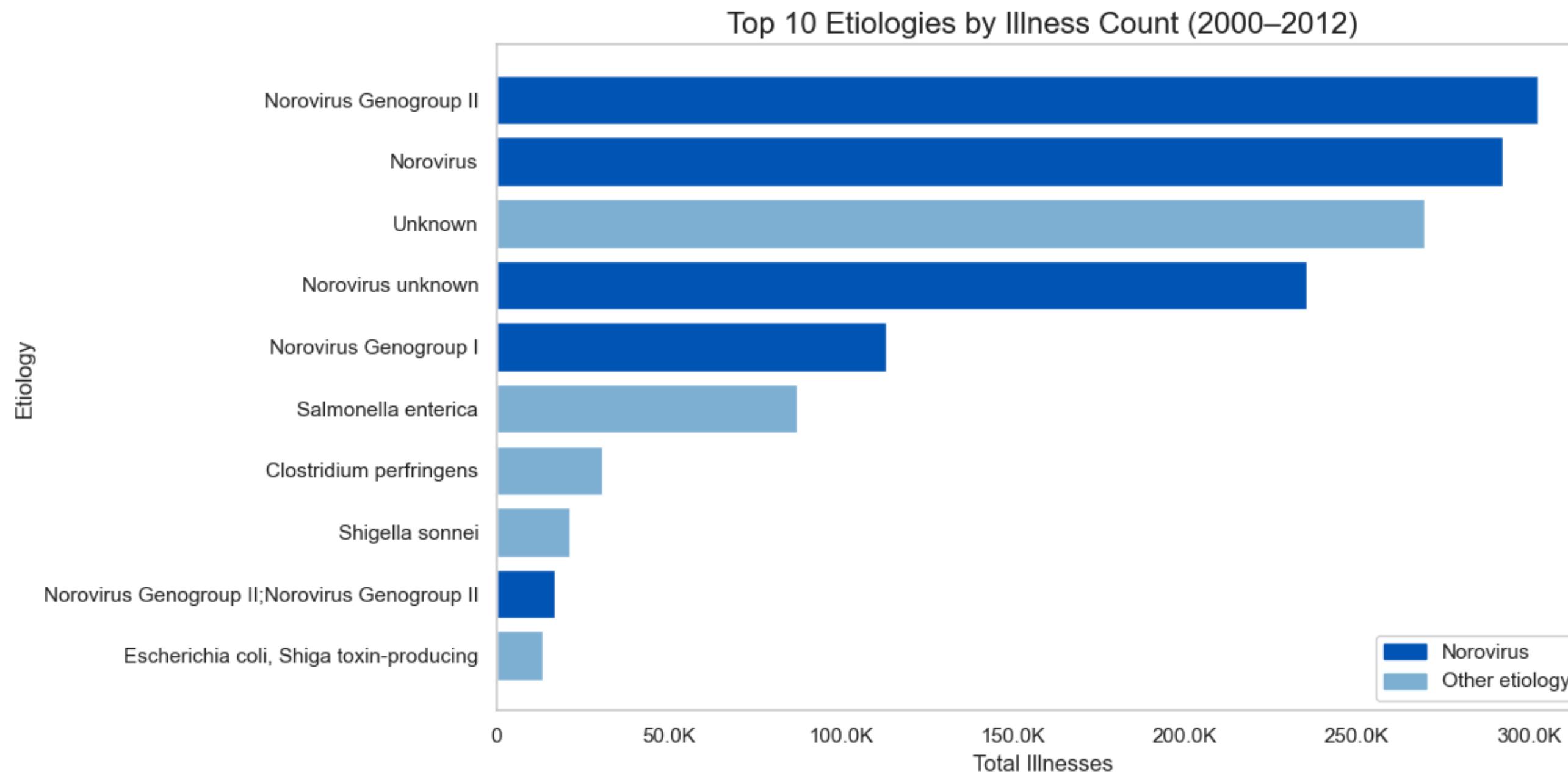
# TRANSMISSION MODE SHIFTS



# TRANSMISSION MODE SHIFTS

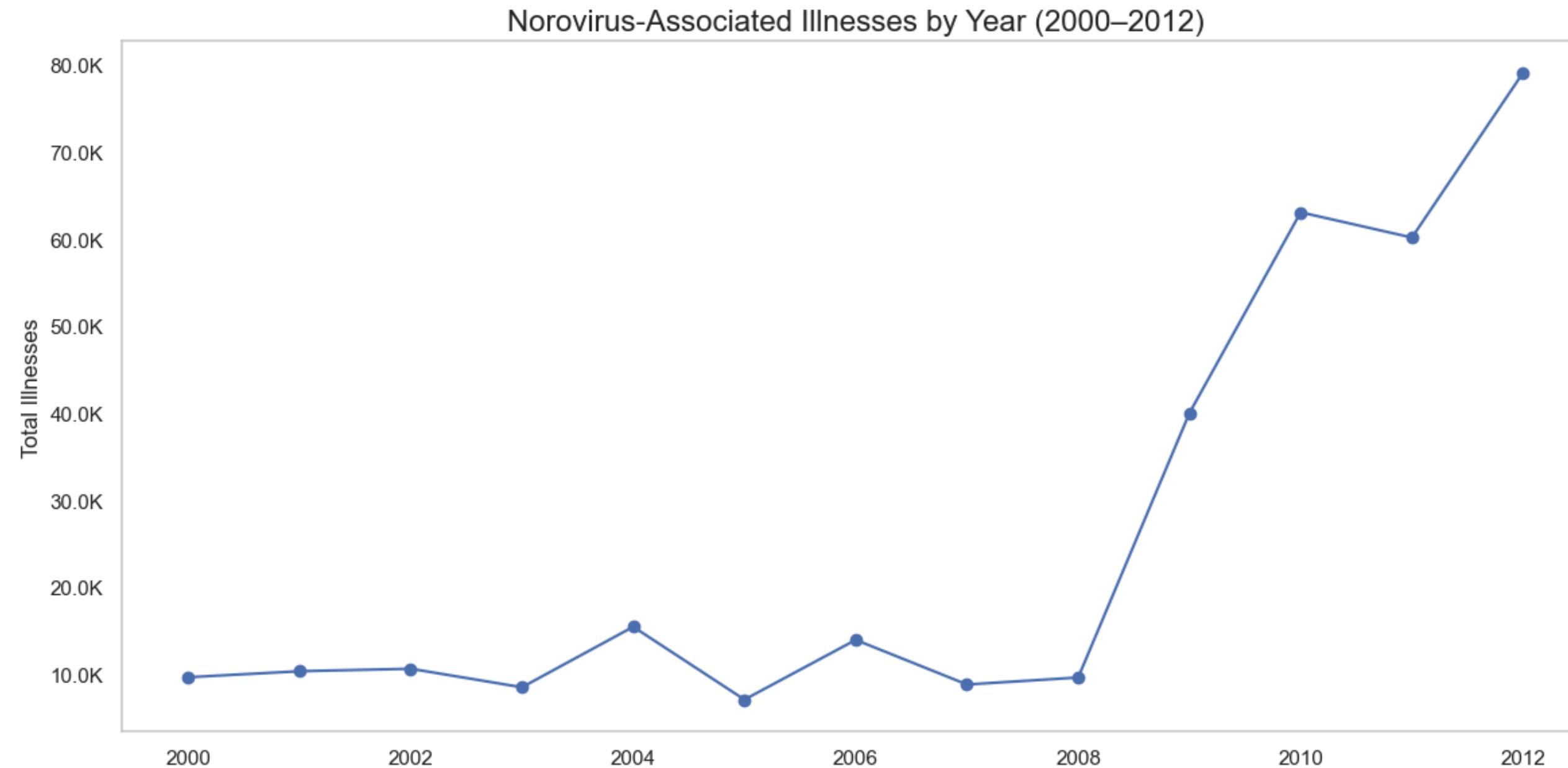


# ETIOLOGY TRENDS

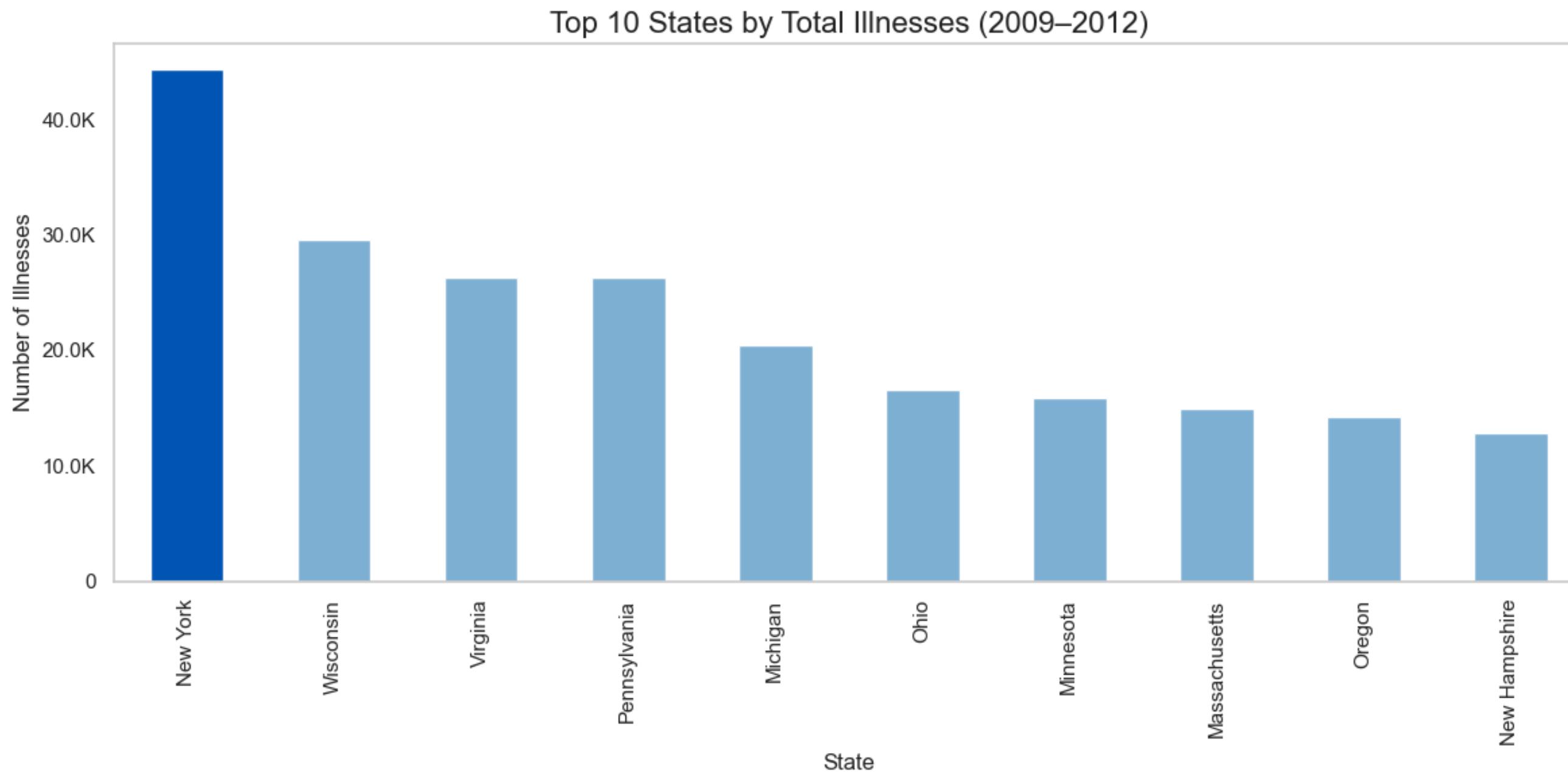


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## ETIOLOGY TRENDS

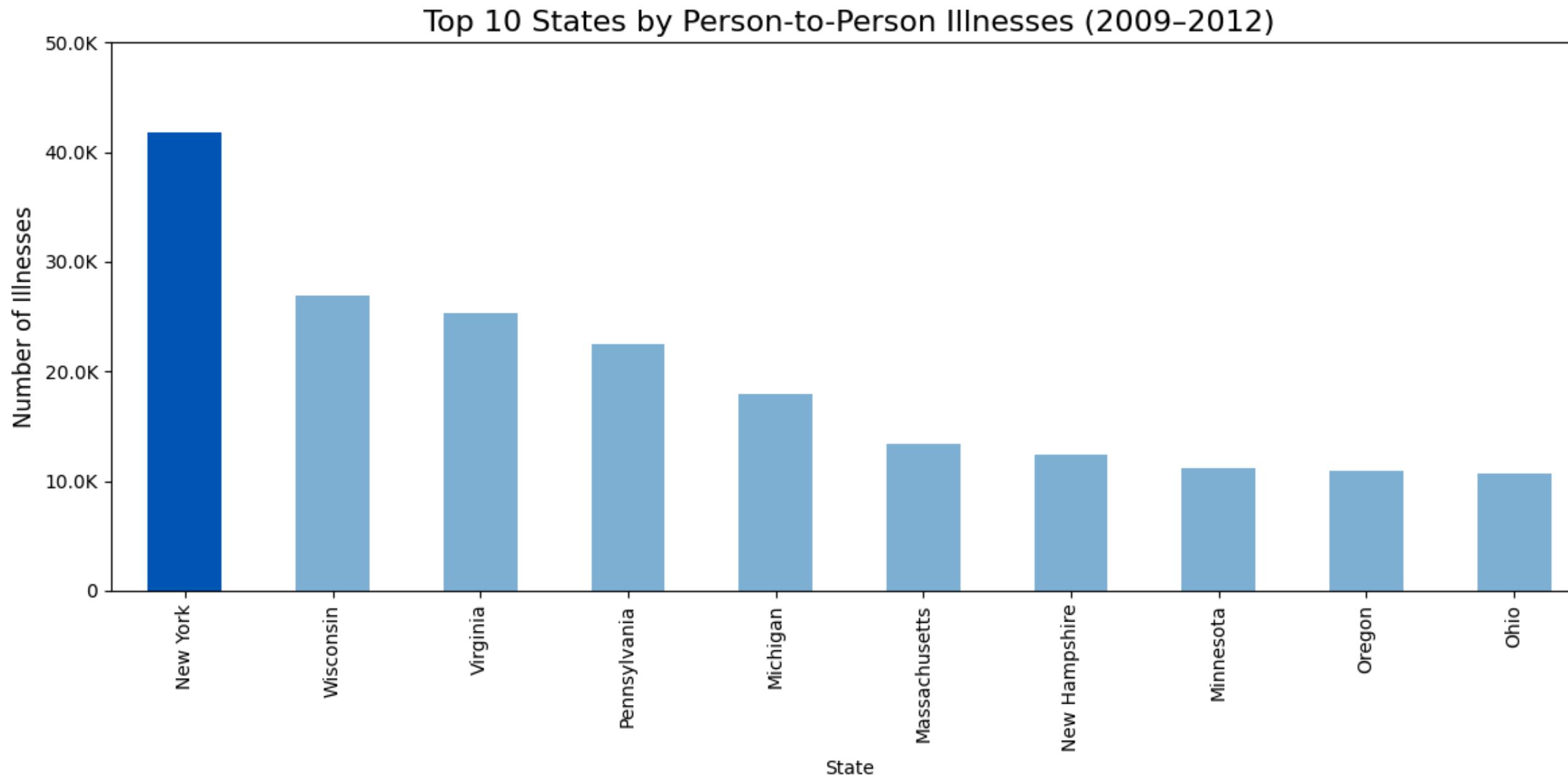


# GEOGRAPHIC DISTRIBUTION

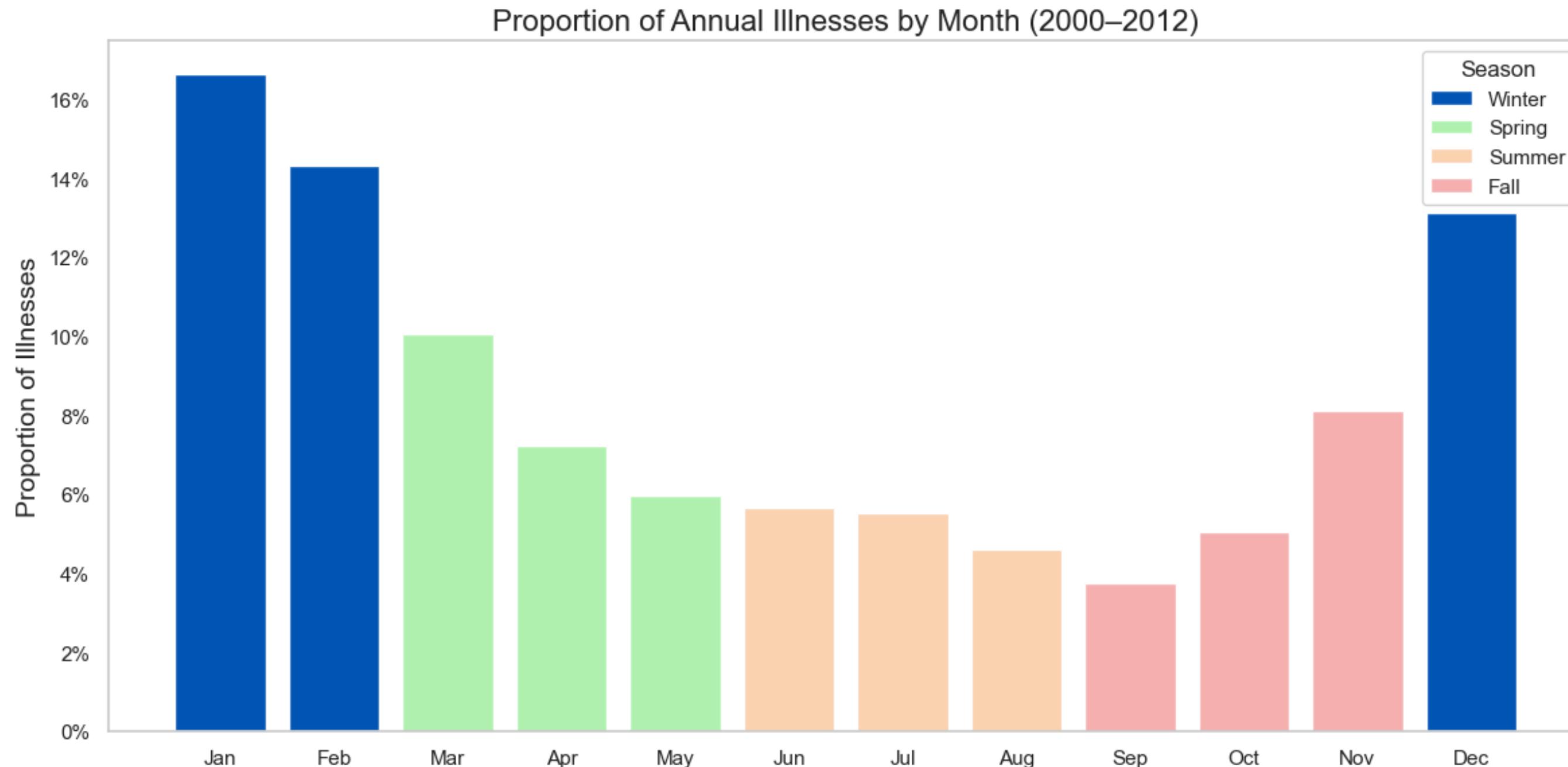


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# GEOGRAPHIC DISTRIBUTION

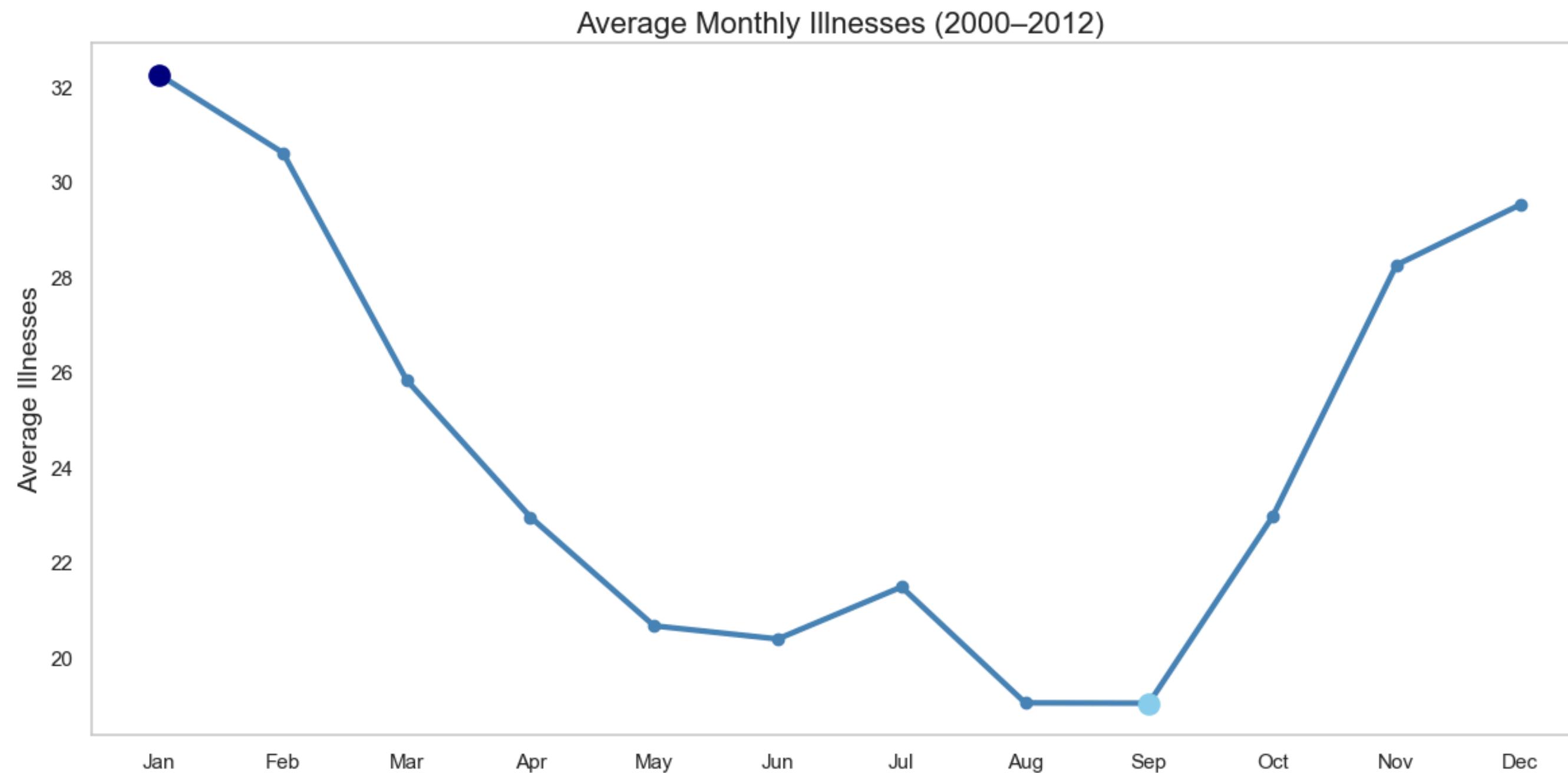


# SEASONAL PATTERNS

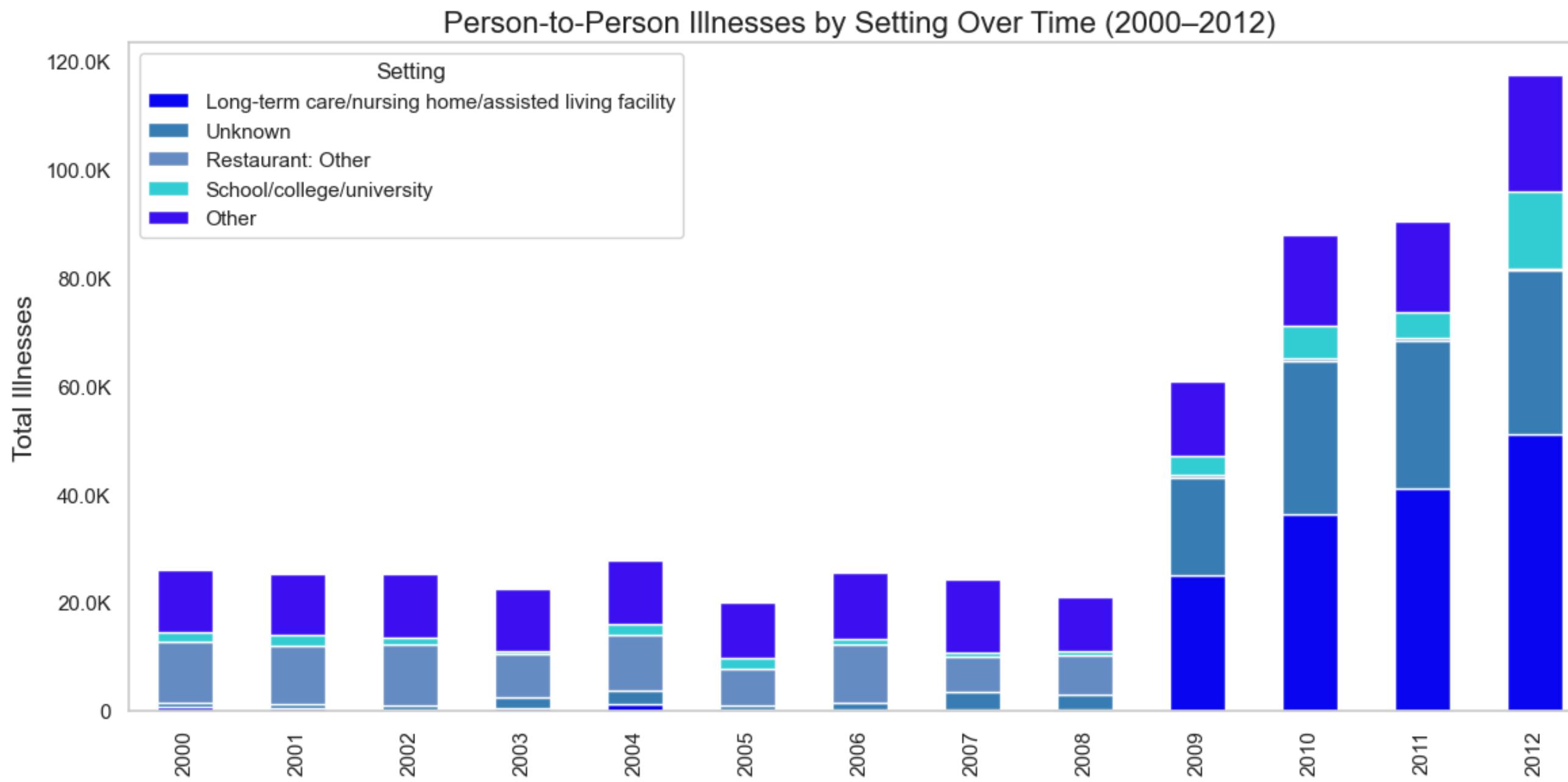


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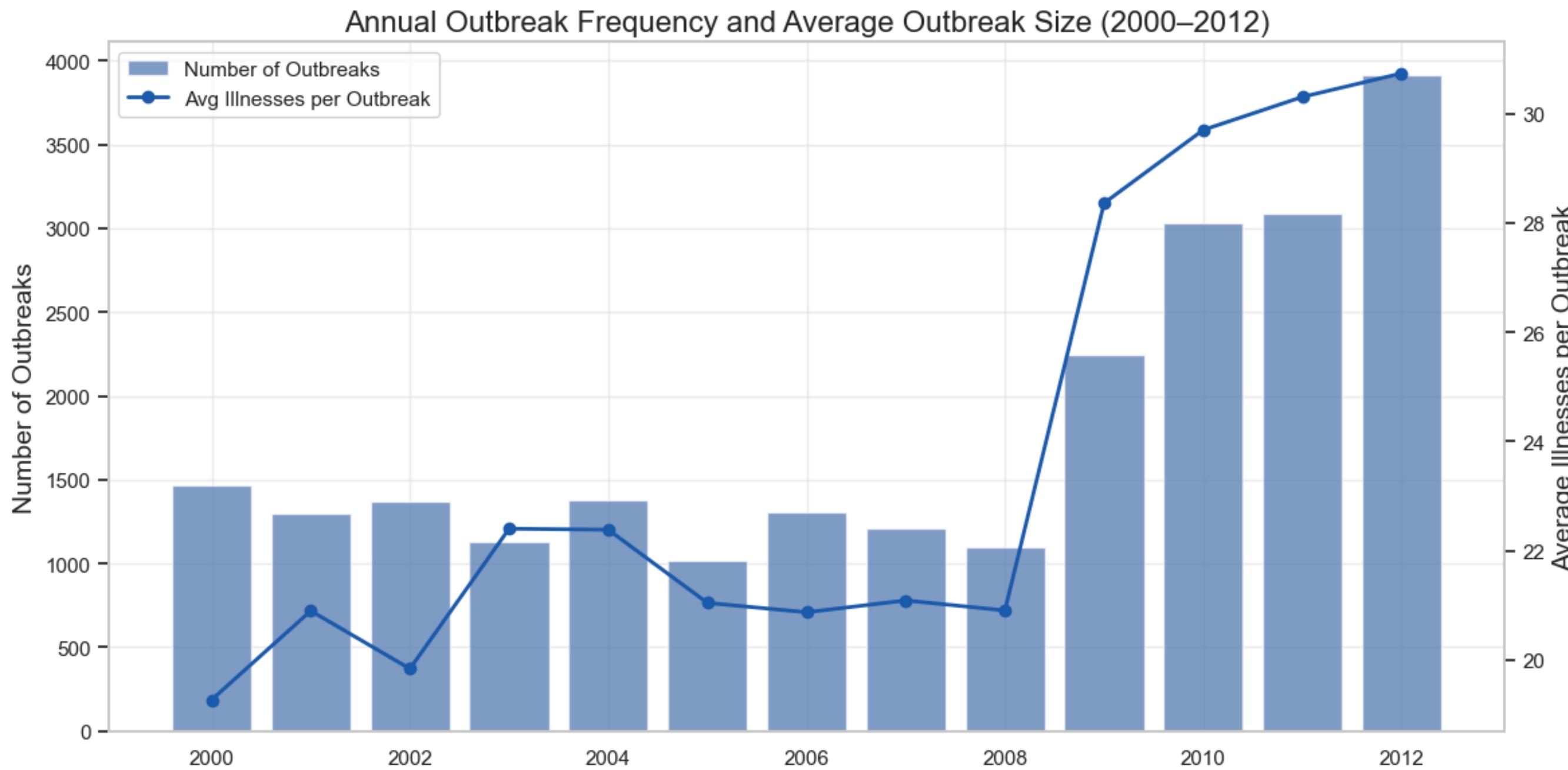
## SEASONAL PATTERNS



# - SETTING-BASED CONTRIBUTION



# OUTBREAK FREQUENCY VS. OUTBREAK SIZE



# Conclusions

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Illnesses were stable until 2008, then surged sharply, peaking in 2012

Rise driven by more outbreaks rather than larger outbreak sizes

Person-to-person spread became dominant after 2009

Most illnesses occurred in NY, VA, PA, WI, and MI

Strong winter peaks; lowest activity in summer-early fall

Long-term care/nursing homes were the largest contributors; Norovirus circulation

# Limitations

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Population-Level Data

Ecological Fallacy Risk

Data Completeness and Reporting Variability

Limited Covariates

Geographic Aggregation

# Background Context

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## Emergence of GII.4 Variants

Highly transmissible norovirus strains, especially Sydney 2012, drove widespread outbreaks in institutions and replaced earlier variants between 2009–2012.

## Enhanced Surveillance (NoroSTAT)

The CDC's sentinel network improved reporting timeliness and completeness, capturing more outbreaks, including smaller clusters, after 2012.

# Recommendations

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## Surveillance & Preparedness

- Enhance surveillance and reporting
- Monitor outbreak frequency
- Maintain annual reviews of outbreak patterns
- Strengthen state-level outbreak preparedness

## Targeted Interventions in High-Risk Settings

- Prioritize long-term care, nursing homes, and other congregate facilities
- Implement hygiene training, worker health policies, and regular audits
- Focus prevention on person-to-person transmission pathways

## Public Awareness & Research

- Conduct public awareness campaigns
- Implement infection control strategies
- Support research into a norovirus vaccine
- Allocate resources based on historical outbreak and illness data

# Next Steps

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# References

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