Comparing Health Events in Populations: A Framework for Analysis

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Introduction

- **Definition of Health Events**: Disease outbreaks, chronic conditions, injuries, and health behaviors.
- **Importance of Comparisons**: Understanding disparities, identifying risk factors, guiding public health interventions.
- **Key Concepts**: Population health, epidemiology, and biostatistics.

Objectives of Population Health

Four Key Objectives:

1. **Describe**: Understand population-level health outcomes.

2. **Explain**: Identify determinants and drivers of health outcomes.

3. **Predict**: Anticipate future health trends and patterns.

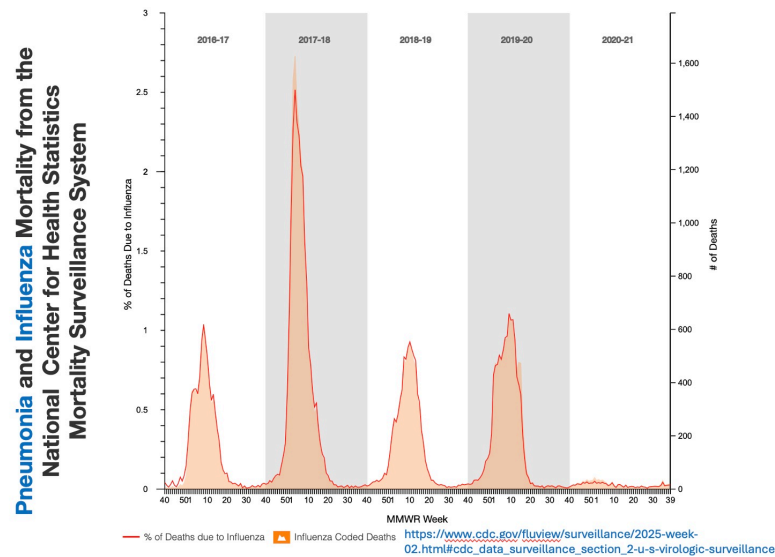4. **Control**: Implement interventions to improve outcomes.

Historical Context

Key Figures:

- **John Snow**: Cholera outbreak mapping.

- **Ignaz Semmelweis**: Importance of handwashing.

- **Joseph Goldberger**: Nutritional causes of pellagra.
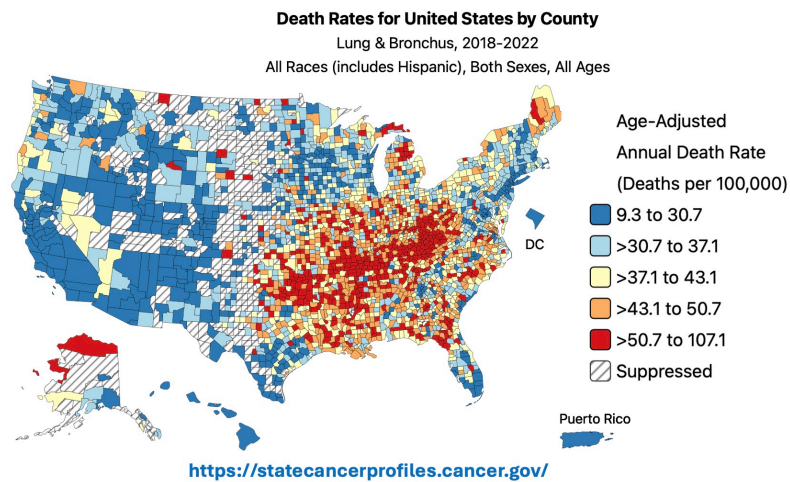

Type of Comparisons

Time-Based

Pneumonia and Influenza Mortality from the National Center for Health Statistics Mortality Surveillance System

https://www.cdc.gov/fluview/surveillance/2025-week-02.html#cdc_data_surveillance_section_2-u-s-virologic-surveillance

Key Metrics:

- **Incidence**: New cases over time.
- **Prevalence**: Existing cases at a given time.

Place-Based

Death Rates for United States by County
Lung & Bronchus, 2018-2022
All Races (includes Hispanic), Both Sexes, All Ages

Age-Adjusted
Annual Death Rate
(Deaths per 100,000)
■ 9.3 to 30.7
□ >30.7 to 37.1
□ >37.1 to 43.1
■ >43.1 to 50.7
■ >50.7 to 107.1
▨ Suppressed

DC

Puerto Rico

https://statecancerprofiles.cancer.gov/
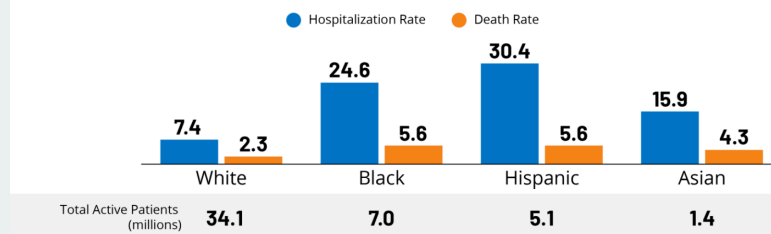
Example:

- **Urban vs. Rural Heart Disease Mortality**:
  - Urban: 50 per 100,000.
  - Rural: 75 per 100,000.

Group-Based

Example:

COVID-19 Hospitalization and Death Rates among Active Epic Patients by Race/Ethnicity

Rate per 10,000, as of July 2020

	White	Black	Hispanic	Asian
Hospitalization Rate	7.4	24.6	30.4	15.9
Death Rate	2.3	5.6	5.6	4.3
Total Active Patients (millions)	34.1	7.0	5.1	1.4

NOTE: Rates for Black, Hispanic, and Asian patients are statistically significantly different from White patients at the p<0.05 level.
Persons of Hispanic origin may be of any race but are categorized as Hispanic; other groups are non-Hispanic.
Data for other racial groups not shown due to insufficient data.
SOURCE: Epic and KFF analysis of Epic Health Record System COVID-19 related data as of July 2020.
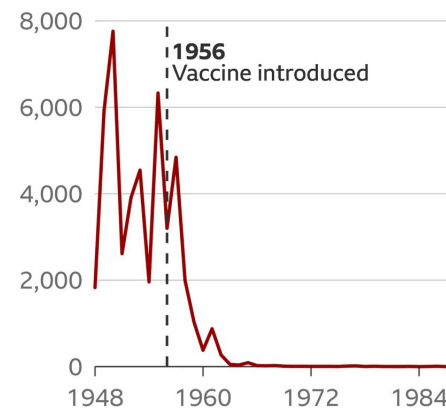
KFF

- Health disparities by race, age, and income.

Event-Based

Key Concept:

How polio was eradicated
Number of polio cases in England a...

1956
Vaccine introduced

Source: Public Health England

- Natural experiments: Before vs. after policy changes or interventions.

Additional Event-Based Example

Measures of Comparison

Key Metrics:

- **Age-Standardized Rates**: Adjusted to eliminate age structure differences.
- **Attributable Risk**: Measures the impact of specific risk factors on outcomes.

Levels of Analysis

Frameworks:

- **Individual-Level**: Biostatistical and clinical trials.
- **Population-Level**: Geographic and demographic patterns.

Determinants of Health

Categories:

1. **Social and Economic Factors**
2. **Environmental Conditions**
3. **Behavioral and Genetic Influences**

Challenges in Comparisons

Key Challenges:

- **Data Quality**: Inaccuracies or incomplete datasets.

- **Ethical Considerations**: Privacy and fair comparisons.

Population vs. Community Health Assessments

Key Differences:

- **Community Health Assessments**:
    - Focus on local needs/resources.
    - Qualitative methods (e.g., interviews).

- **Population Health Assessments**:
    - Broad, systemic focus.

    - Quantitative data (e.g., chronic disease rates).

Example:

- Community: Identifying food deserts.

- Population: Obesity prevalence across counties.

Policy Implications

Using Comparisons to Drive Change:

1. **Set Priorities**: Identify at-risk groups (e.g., elderly, low-income communities).

2. **Develop Interventions**: Targeted programs (e.g., tobacco cessation).

3. **Advocate for Policy Change**: Use data for systemic reforms.

Visual:

- Flowchart illustrating how data-driven comparisons inform resource allocation.

Interactive Example

Dataset Example:

Population	Cases	Rate (per 100,000)
Urban	200	50
Rural	300	75

Prompt:

- "What does this suggest about resource allocation?"

Recap and Transition

Key Takeaways:

- Importance of describing, explaining, predicting, and controlling health events.

- Tools and methods to compare health outcomes.

- Practical implications for population health strategies.

Next:

- Group activity: Apply concepts to a real-world health disparity.

Group Activity: Population Health Comparison

Objective:

Apply Chapter 1 concepts to analyze health disparities.

Instructions:

1. Form groups of 3–5.

2. Analyze the provided dataset:
   - Calculate rates (e.g., incidence, prevalence).
   - Identify disparities (e.g., geographic, demographic).
   - Propose targeted interventions.

3. Prepare to present findings in 3 minutes.

Materials:

- Preloaded Excel/Google Sheets or printed tables.

- Calculators or online tools.