

Comparing Health Events in Populations: A Framework for Analysis

Eric Delmelle



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.
-

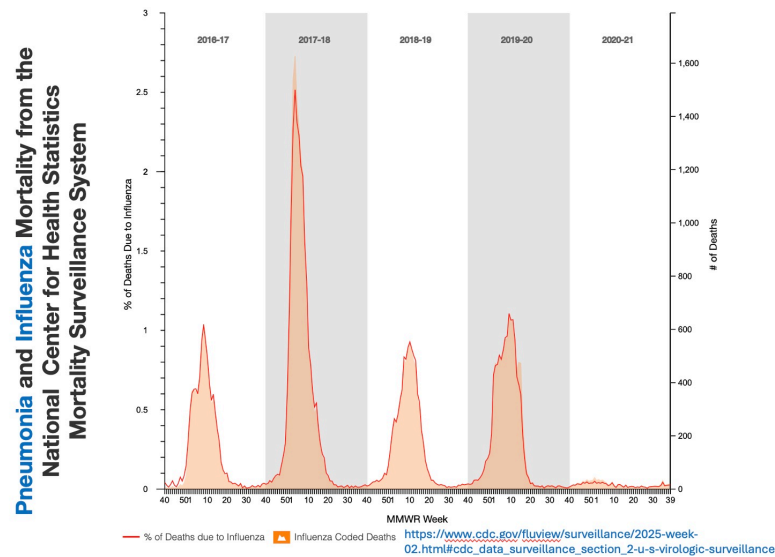
Historical Context

Key Figures:

- **John Snow:** Cholera outbreak mapping.
 - **Ignaz Semmelweis:** Importance of handwashing.
 - **Joseph Goldberger:** Nutritional causes of pellagra.
-

Type of Comparisons

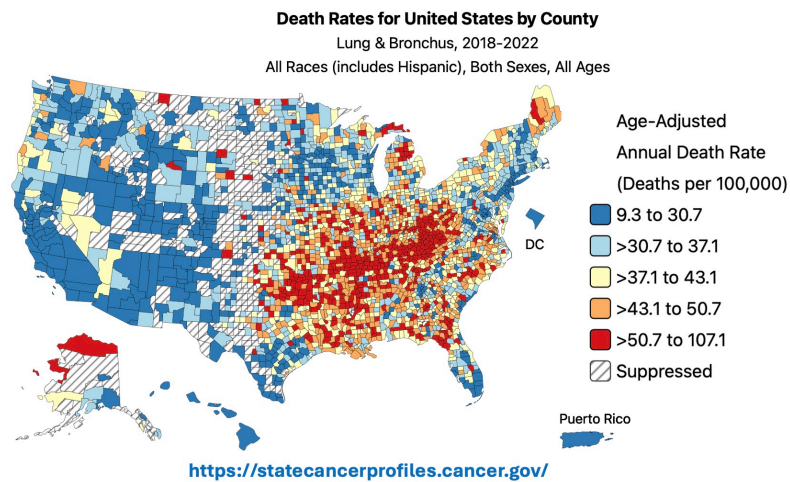
Time-Based



Key Metrics:

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

Place-Based



Example:

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

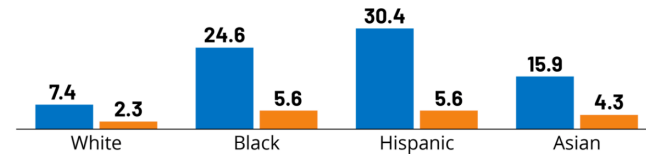
Group-Based

Example:

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

Rate per 10,000, as of July 2020

● Hospitalization Rate ● Death Rate



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.

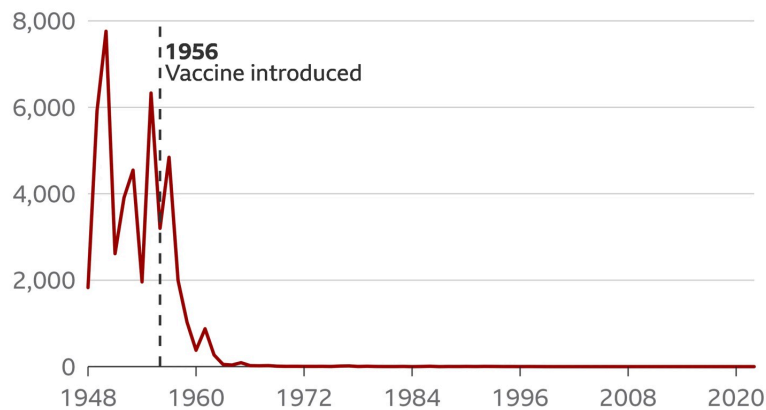
Event-Based

Key Concept:

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

How polio was eradicated

Number of polio cases in England and Wales (1948-2022)



Source: Public Health England

BBC

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).
-

Population vs. Community Health Assessments

Example:

- Community: Identifying food deserts.
 - Population: Obesity prevalence across counties.
-

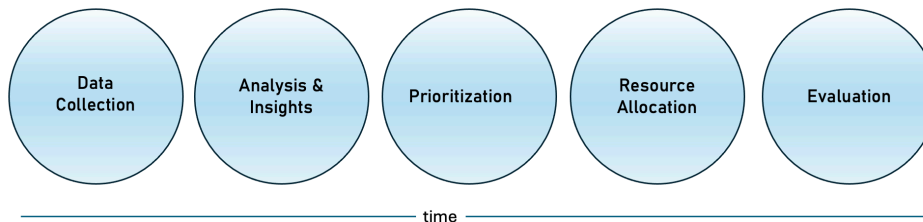
Policy Implications

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.
-

Policy Implications

Visual:



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 metrics to analyze health disparities.

Instructions:

1. Form groups of 3–5.
-

Instructions:

2. Analyze the provided dataset on coursesite
 - 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 on course sites
-

Group Assignments and Analysis Instructions

- **Group A:** Kayla H., Sammie C., Chloe L., Henry S., Vedanth V.
- **Group B:** Prashant K., Lillian L., Ashley P., Cate M., Emily T.
- **Group C:** Shriya P., Evy W., Caithlyn C., Grace S.
- **Group D:** Chris C., Olivia N., Aaron C., Lola S., Alicia A.
- **Group E:** Elmira S., Sebastian S., Mina C., Hudson K., Marwa A.
- **Group F:** Abena A., Xiomara G., Natalie W., Neves H.
- **Group G:** Sophie P., Jessica L., Joy L., , Vladimir V.

Analysis Instructions

- **Analyze the provided dataset on coursesite:**
 - Calculate rates (e.g., incidence, prevalence).

- Identify disparities (e.g., geographic, demographic).
 - Propose targeted interventions.
 - **Presentation Guidelines:**
 - Prepare findings for a **3-minute presentation**.
 - Include key calculations, identified disparities, and proposed interventions.
-