

# **Introduction to Population Health**

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# Objectives

- Define health, public health, population health, and its scope.
- Identify key determinants of health.
- Explore foundational concepts and measures in population health.
- Highlight the importance of equity and data in improving population health.

# Defining Health



from ChatGPT with the prompt 'draw someone who is (not) in good health'

# Defining Health

- Most of us know when we are **healthy** and when we are not.
- **Definition:** “*state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*” (WHO)
- To be healthy is a resource for everyday life.
- You don’t live to be healthy!

# What is public health?

- **Definition:** Array of programs and services organized primarily (but not exclusively) by various levels of governments to
  - **protect**
  - **promote**
  - **restore** the health of citizens.

# What is population health?

- **Definition:** The health outcomes of a group of individuals, including the distribution of those outcomes within the group.
- Focus on:
  - Improving health outcomes for populations rather than individuals.
  - Interventions at multiple levels: individual, community, and systemic.
  - Addressing disparities in health.

# Determinants of health

- 1. Biological Factors:** Genetics, age, sex.
- 2. Behavioral Factors:** Lifestyle choices such as diet, physical activity, and smoking.
- 3. Social Environment:** Income, education, social support.
- 4. Physical Environment:** Housing, sanitation, air and water quality.
- 5. Healthcare Access:** Availability, affordability, and quality of care.

# Determinants of health



Göran, D., & Whitehead, M. (1991). Policies and strategies to promote social equity in health.

# How to MEASURE population health

## Metrics and Measures

- Mortality Rates:
  - Life expectancy
    - worldwide [[WHO](#)]
    - usa [[IHME](#)]
  - Infant mortality [[CDC](#)]
- Morbidity Rates: Prevalence and incidence of diseases
  - [[WHO](#)]

# Metrics and Measures

- Composite Metrics:
  - Disability-adjusted life years (DALYs).

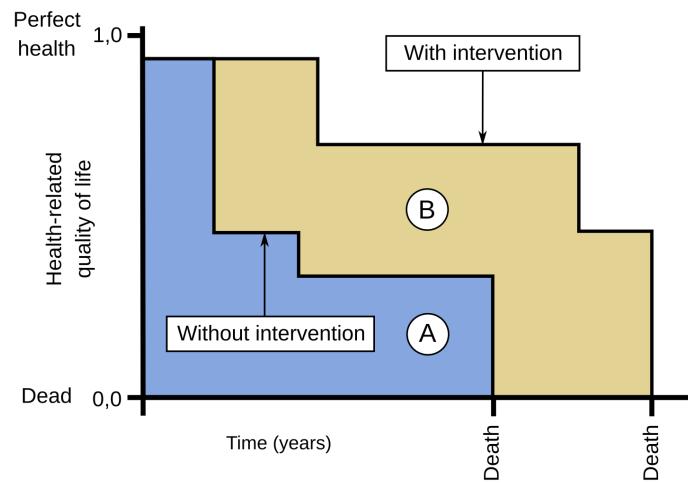


# Metrics and Measures

- **Composite Metrics:**
  - DALYs measure the total burden of disease – both from years of life lost due to premature death and years lived with a disability.
  - One DALY equals one lost year of healthy life.
  - DALY's geographical variation, worldwide [[DALY-world](#)]

# Metrics and Measures

- Composite Metrics:
  - Quality-adjusted life years (QALYs).



- Assess the value of medical interventions.
- One QALY equates to one year in perfect health

# Health disparities

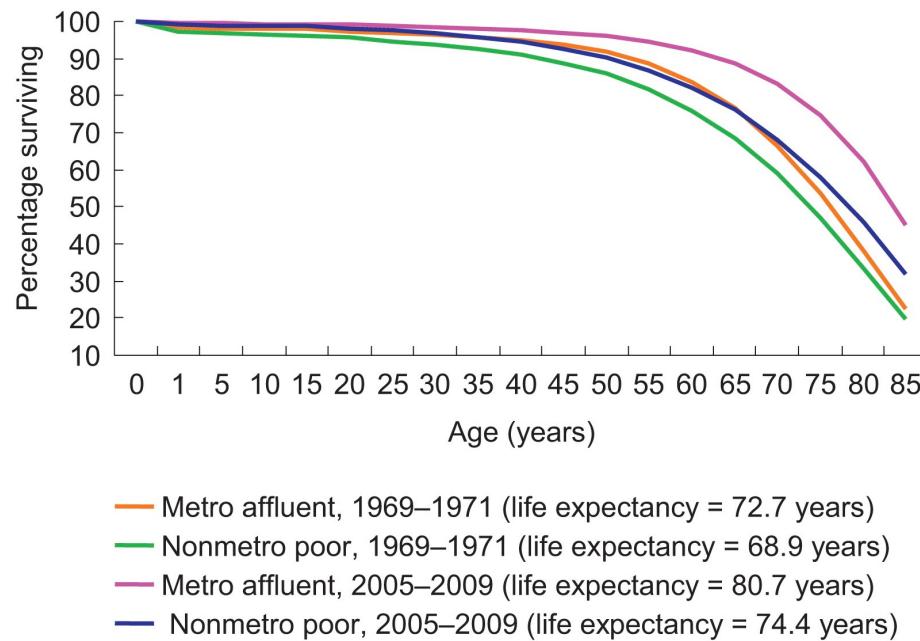
## Understanding inequities

Variations in health outcomes by:

- Socioeconomic status.
- Race/ethnicity.
- Geography.

# Understanding inequities

- Example: Differences in life expectancy between urban and rural populations.



- Addressing disparities to achieve health equity.

# Understanding inequities

- So why do we observe lower life expectancy in rural areas?



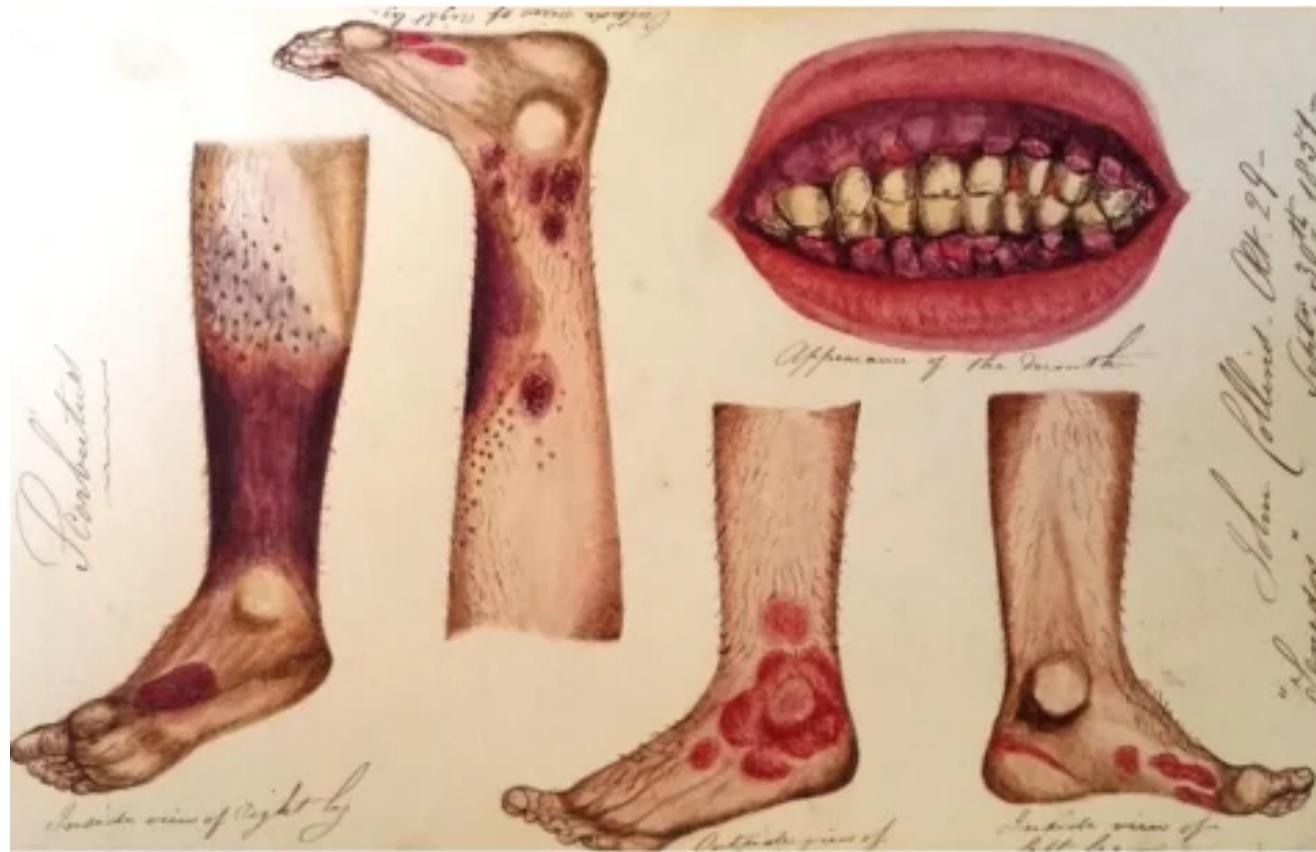
# Interventions in population health

## Levels of intervention

1. **Upstream:** Addressing root causes, such as policies and systemic changes.
2. **Midstream:** Modifying behaviors and environments.
3. **Downstream:** Providing healthcare services and individual interventions.

# Case studies #1

## Scurvy Among Sailors



# Upstreams intervention

- Addressing root causes:
  - Identifying the dietary deficiencies (lack of vitamin C) as the fundamental cause of scurvy.
  - Enacting policies that mandated the inclusion of citrus fruits like lemons and limes in sailors' rations (e.g., British Navy's adoption of lemon juice in the 18th century).

# Midstreams intervention

- **Modifying behaviors and environments:**
  - Educating ship captains and sailors about the importance of fresh fruit and vegetables in preventing scurvy.
  - Creating onboard systems to store and distribute citrus fruits to ensure consistent consumption.

# Downstreams intervention

- **Providing healthcare services and individual interventions:**
  - Administering citrus fruits or vitamin C to sailors who were already showing symptoms of scurvy.
  - Treating symptoms of scurvy directly (e.g., wound care, hydration) to mitigate immediate health risks.

# Summary

- The case study of scurvy exemplifies how upstream, midstream, and downstream interventions collectively address population health challenges:
  - **Upstream** policies ensure systemic changes (e.g., mandated citrus provisioning).
  - **Midstream** efforts focus on creating supportive environments and promoting healthy behaviors.
  - **Downstream** actions treat individual cases, alleviating acute suffering and mortality.

# Case Studies #2

## John Snow and Cholera



- check this video YouTube

# Upstream Intervention

- Addressing root causes:
  - Investigated the cholera outbreaks in London and identified **contaminated water** as the **primary source of transmission**.
  - Advocated for systemic changes to the water and sewage systems, emphasizing the importance of **clean drinking water**.
  - Collaborated with policymakers to promote sanitary reforms, leading to infrastructure improvements.

# Midstream Intervention

- **Modifying behaviors and environments:**
  - Educated the public about the risks of contaminated water and the importance of using clean water sources.
  - Marked contaminated water pumps, such as the infamous **Broad Street pump**, to prevent further usage.
  - Distributed educational materials to raise awareness about disease prevention and hygiene practices.

# Downstream Intervention

- **Providing healthcare services and individual interventions:**
  - Encouraged immediate medical attention for cholera victims, focusing on hydration and supportive care.
  - Promoted boiling water as a short-term individual intervention to reduce the risk of consuming contaminated water.
  - Worked with communities to treat cholera cases and manage local outbreaks effectively.

# Summary

- The John Snow cholera case highlights the importance of a multi-level approach to public health challenges:
  - **Upstream** interventions address systemic issues, such as contaminated water supplies.
  - **Midstream** efforts focus on behavior change and creating safer environments, like closing the Broad Street pump.
  - **Downstream** actions provide immediate relief and treatment to affected individuals, reducing mortality during outbreaks.



# GROUP EXERCISE

# Objective

- Analyze a population health issue,
- Identify key determinants,
- Propose interventions
- Groups will brainstorm for 10 minutes, followed by brief presentations.

# Instructions for Group Work

## Step 1: Form Groups

- Divide into small groups of 3–5 students.

# Instructions for Group Work

## Step 2: Choose a Scenario (2 minutes)

- Select one population health issue or propose your own:
  - Childhood Obesity
  - Air Pollution
  - Vaccine Hesitancy
  - Access to Healthy Food
  - Mental Health Among Adolescents
  - Smoking in Low-Income Communities

# Instructions for Group Work

## Step 3: Analyze the Issue (5 minutes)

- Identify key determinants of health:
  - Social, economic, environmental, or behavioral factors.
- Discuss:
  - How do these determinants impact health outcomes?
  - Are there disparities (e.g., geographic, racial, or socioeconomic)?

# Instructions for Group Work

## Step 4: Propose Interventions (5 minutes)

- Develop two interventions:
  1. **Upstream Intervention:** Systemic or policy-level solutions.
  2. **Midstream Intervention:** Community-level or individual-focused actions.

# Instructions for Group Work

## Step 5: Present to class (2 minutes)

- Develop two interventions:
  1. **Upstream Intervention:** Systemic or policy-level solutions.
  2. **Midstream Intervention:** Community-level or individual-focused actions.

# Summary

## Key Takeaways

- Population health focuses on **groups** rather than individuals.
- Health outcomes are shaped by a range of determinants, from biological to societal.
- Equity is a core principle of population health.
- Data and metrics are essential tools for identifying needs and evaluating interventions.

