

# 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.
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## Defining Health



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

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## 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!
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### 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.
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### 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.
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### 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.
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## Determinants of health

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

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## 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](#)]
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### Metrics and Measures

- **Composite Metrics:**



- Disability-adjusted life years (**DALYs**).

## Metrics and Measures

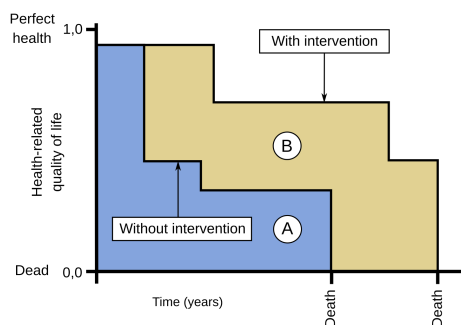
- **Composite Metrics:**

- 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

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## Health disparities

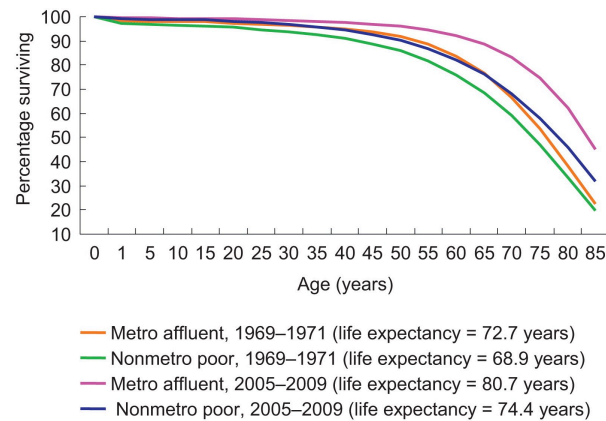
### Understanding inequities

Variations in health outcomes by:

- Socioeconomic status.
  - Race/ethnicity.
  - Geography.
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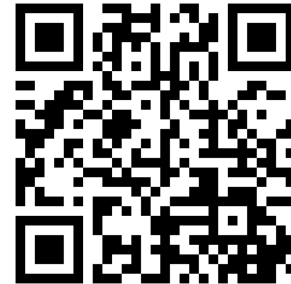
### Understanding inequities

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



- Addressing disparities to achieve health equity.
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## Understanding inequities



- So why do we observe lower life expectancy in rural areas?
  - <https://www.menti.com/alvwf32gwyfj>
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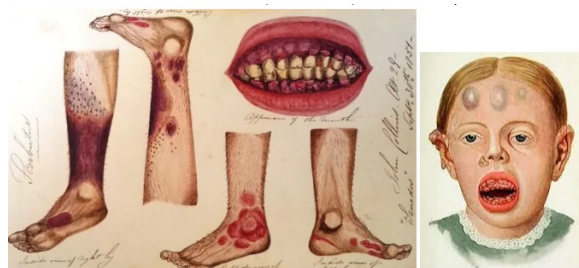
## Interventions in population health

### 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.
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## 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).
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## 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.
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## 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.
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## 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.
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## Case Studies #2

### John Snow and Cholera



- check this video [youTube](#)
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### 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.
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### 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.
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## 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.
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## 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.
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## GROUP EXERCISE

### Objective

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

### Step 1: Form Groups

- Divide into small groups of 3–5 students.
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## 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
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## 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)?
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## 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.
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## 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.
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## 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.
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