

**IOWA**

Institute for Public Health  
Practice, Research and Policy

# Introduction to Public Health Surveillance

2024



# Meet your training team



**Anjali Deshpande, PhD, MPH, Clinical Associate Professor, University of Iowa, College of Public Health**



**Vickie Miene, MS, MA, LMHC, Executive Director, Institute for Public Health Practice, Research and Policy**



**Sofie Dollison, MPH, CHES, Program Coordinator, Institute for Public Health Practice, Research and Policy**



**Abigail Stock, MPH, Admin Services Specialist, Institute for Public Health Practice, Research and Policy**

**Training provided in partnership with the Institute for Public Health Practice, Research and Policy through a contract from the Iowa Department of Health and Human Services**

# Our Goal in this Training Module...

---

Together we will learn what surveillance data are, where we can find data we can use, and why it is important to the work of public health.

# At the end of this training module, you will be able to...

---

1. Measure and characterize disease frequency in defined populations using principles of descriptive epidemiology and surveillance
2. Discuss strengths and weaknesses of current surveillance systems in public health
3. Find and use various public health data sources for evidence-based decision making
4. Describe public health surveillance in the 21<sup>st</sup> century

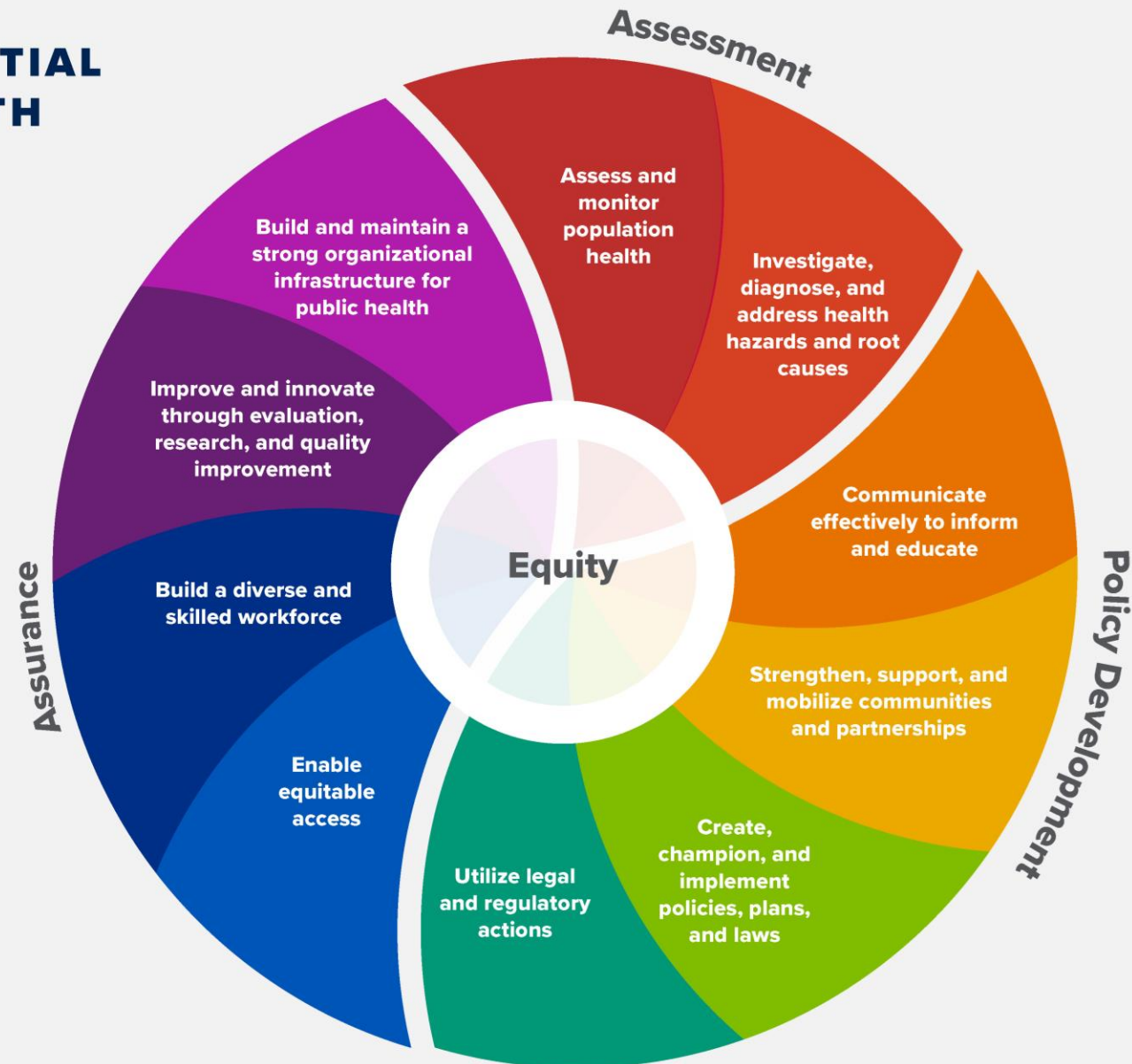
# **Module 1**

## **Descriptive Epidemiology**

# THE 10 ESSENTIAL PUBLIC HEALTH SERVICES

*To protect and promote the health of all people in all communities*

The 10 Essential Public Health Services provide a framework for public health to protect and promote the health of all people in all communities. To achieve optimal health for all, the Essential Public Health Services actively promote policies, systems, and services that enable good health and seek to remove obstacles and systemic and structural barriers, such as poverty, racism, gender discrimination, and other forms of oppression, that have resulted in health inequities. Everyone should have a fair and just opportunity to achieve good health and well-being.



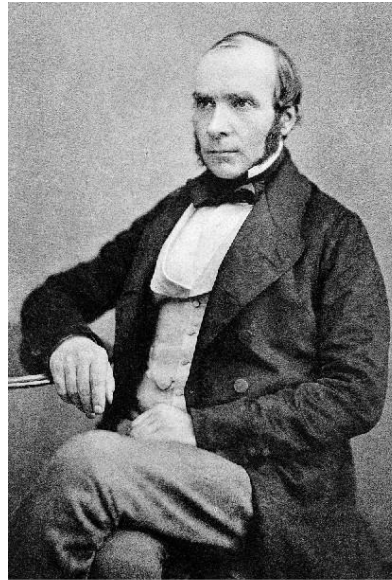
Created 2020

## 10 Essential Public Health Services

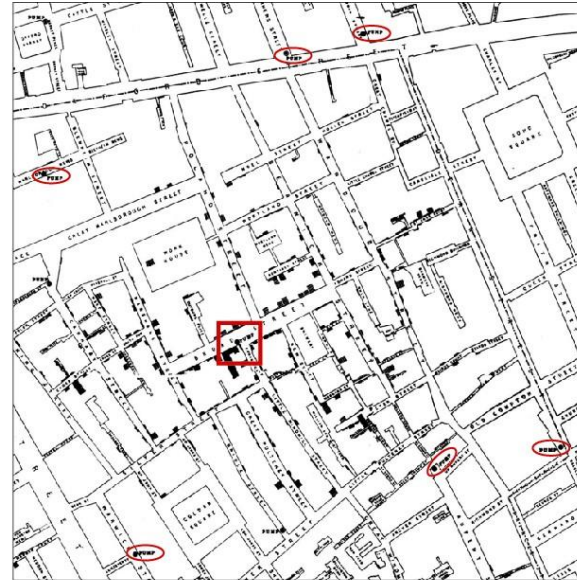


# Epidemiology

- Study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems



(a)



(b)

# Descriptive Epidemiology

---

- Frequency and the distribution of outcomes and risk factors in populations (patterns by person, place, time)
- Assess the extent of a disease
- Can provide hypotheses of etiologic research





**Types of  
Data We Use  
in Public  
Health**

**Health Outcomes**

**Risk Factors and/or  
Behaviors**

**Demographic  
Characteristics**

**Resource Data (including  
Community  
Characteristics)**

**WHO?**

**WHAT?**

**WHEN?**

**WHERE?**

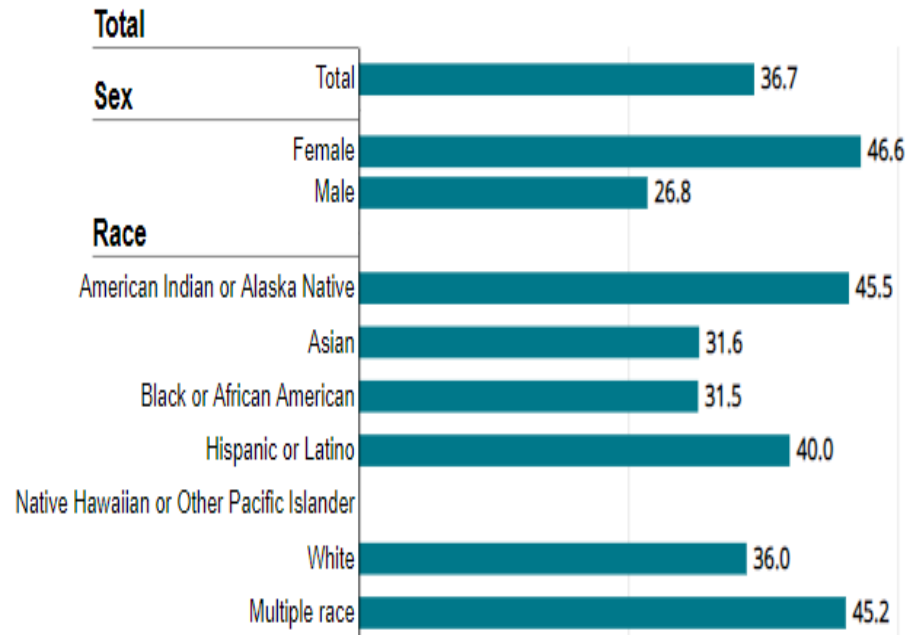
# PERSON

## Unintentional Injuries And Violence

### High School Students Who Felt Sad Or Hopeless\*

Location United States ▼

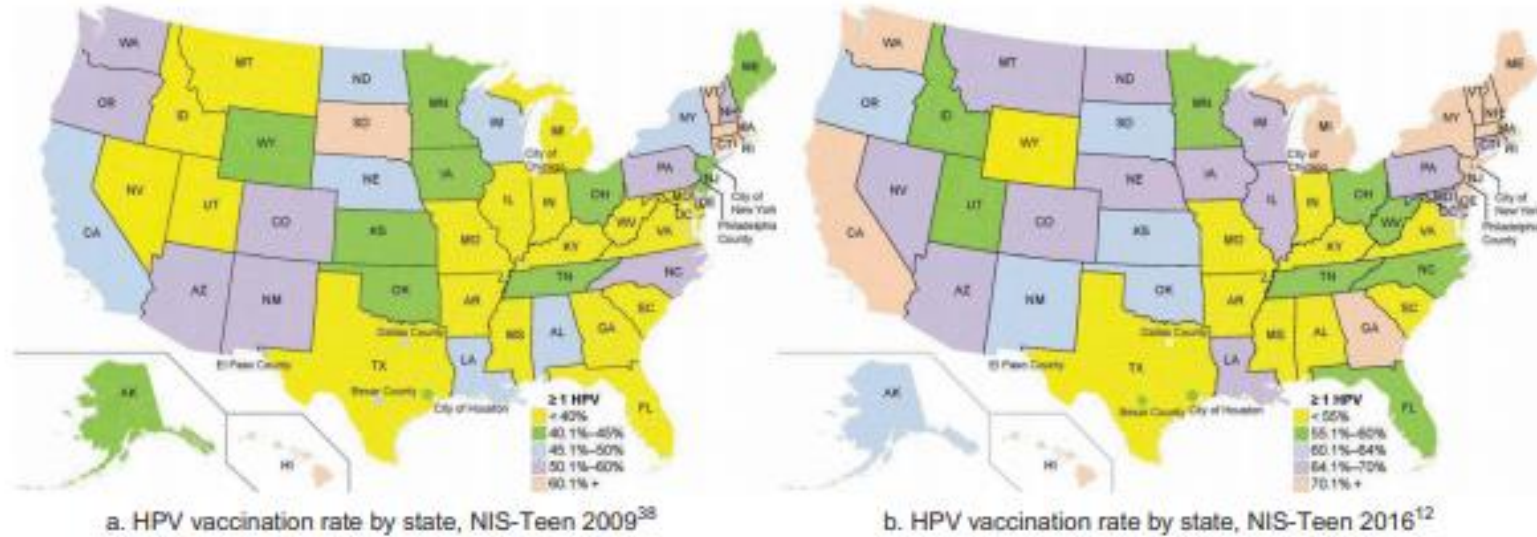
Details From a Specific Year 2019 ▼



# Changes in HPV vaccination initiation ( $\geq 1$ dose) among 13-17 yr old females in the US from 2009 to 2016

US FDA first approved Gardasil in 2006

PLACE, TIME



(Hirth, Human Vaccines & Immunotherapeutics 2019)

**Module 2**  
**Public Health**  
**Surveillance in the US**

# What is Public Health Surveillance?

---

- “the systematic collection, consolidation, analysis, and dissemination of data” (Langmuir 1963)
- “a core public health function that ensures the right information is available at the right time and in the right place to inform public health decisions and actions” (DH PHE 2012)
- “the collection, analysis, and use of data to target public health prevention” (CDC 2024)

# Surveillance-Based Public Health Action

---

- Describe the burden of or potential for disease
- Monitor trends and patterns in disease, risk factors, and agents
- Detect sudden changes in disease occurrence and distribution
- Provide data for programs, policies, and priorities
- Evaluate prevention and control efforts



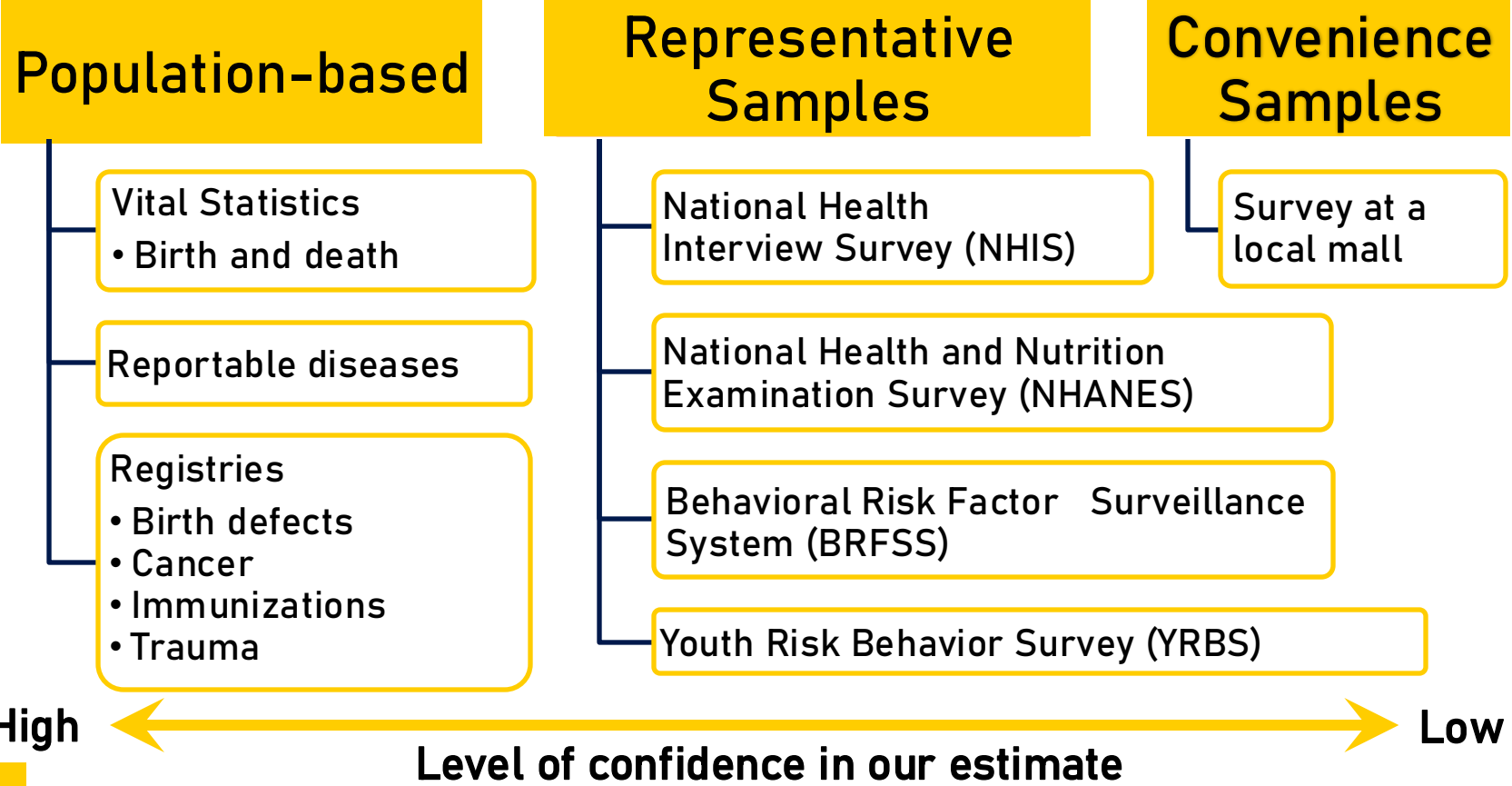
# Public Health Authority in the US

---

- The 12<sup>th</sup> article of the 12<sup>th</sup> amendment to the US Constitution states: *“The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.”*
- The federal govt however has two general authorities that apply to public health surveillance—first that the federal govt must protect the general welfare of the people and second that it has authority over interstate commerce.

# Public Health Surveillance Collection Methods

Provide varying levels of confidence in the data



# Surveillance System Attributes

Attribute	Question It Answers
Usefulness	How useful is the system in accomplishing its objectives?
Data quality	How reliable are the available data? How complete and accurate are data fields in the reports received by the system?
Timeliness	How quickly are reports received?
Flexibility	How quickly can the system adapt to changes?
Simplicity	How easy is the system's operation?

# Surveillance System Attributes

Attribute	Question It Answers
Stability	Does the surveillance system work well? Does it break down often?
Sensitivity	How well does it capture the intended cases?
Predictive value positive	How many of the reported cases meet the case definition?
Representativeness	How good is the system at representing the population under surveillance?
Acceptability	How easy is the system's operation?

# **Module 3**

## **Data for Evidence-Based Decision Making in Public Health**

# Where do we go to get public health data?

---

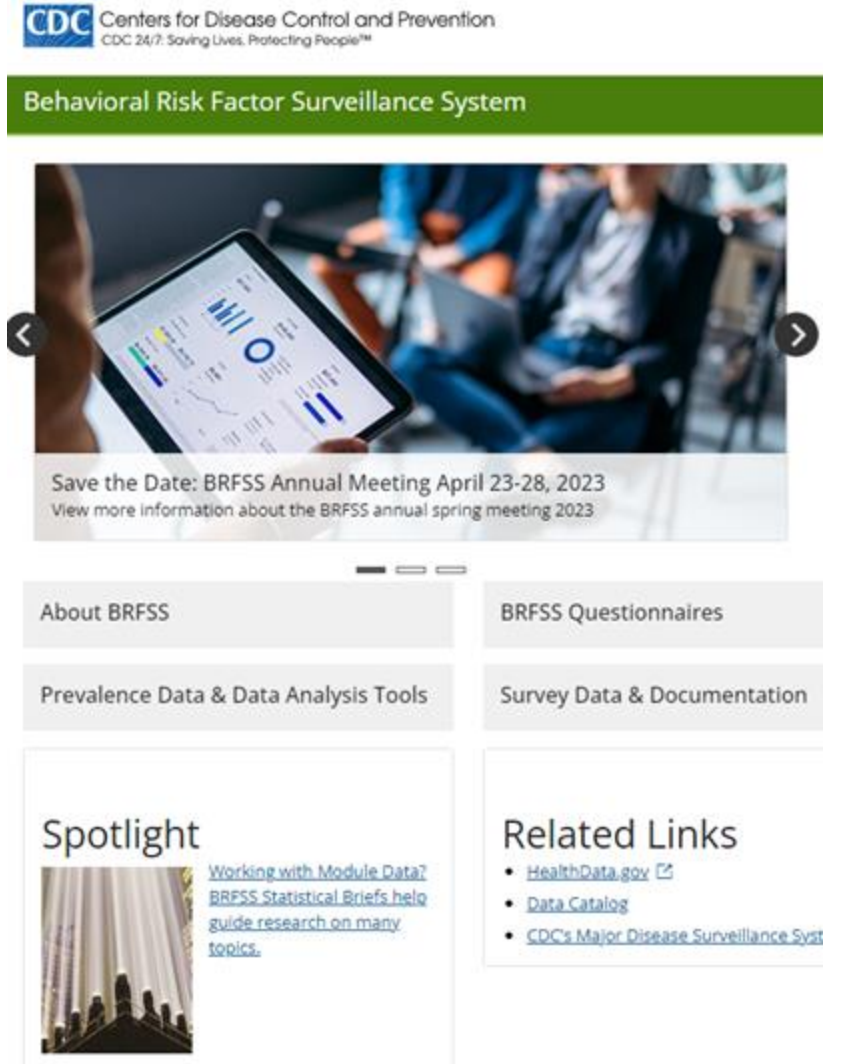


<https://www.public-health.uiowa.edu/iiphrp-data-resources/>



# Data Profile: BRFSS

- **Type of data:** representative sample
- **Who:** randomly selected sample of adults aged 18+ (non-institutionalized), all 50 states, DC and US Territories, phone interviews
- **What:** chronic and communicable disease risk factor prevalence
- **Strengths:** behavioral health risk data, can compare state data with national, questions designed for program needs, states can add questions, some local area data available
- **Limitations:** excludes most institutionalized and those without phones, non-response, self-report



The screenshot shows the CDC Behavioral Risk Factor Surveillance System (BRFSS) website. At the top left is the CDC logo with the text "Centers for Disease Control and Prevention" and "CDC 24/7: Saving Lives. Protecting People™". Below this is a green header bar with the text "Behavioral Risk Factor Surveillance System". The main content area features a large image of a person holding a tablet displaying data charts, with navigation arrows on either side. Below the image is a text box that reads "Save the Date: BRFSS Annual Meeting April 23-28, 2023" and "View more information about the BRFSS annual spring meeting 2023". Below this are several menu items: "About BRFSS", "BRFSS Questionnaires", "Prevalence Data & Data Analysis Tools", and "Survey Data & Documentation". At the bottom, there is a "Spotlight" section with a small image and a link to "Working with Module Data? BRFSS Statistical Briefs help guide research on many topics." To the right of the spotlight is a "Related Links" section with three links: "HealthData.gov", "Data Catalog", and "CDC's Major Disease Surveillance System".

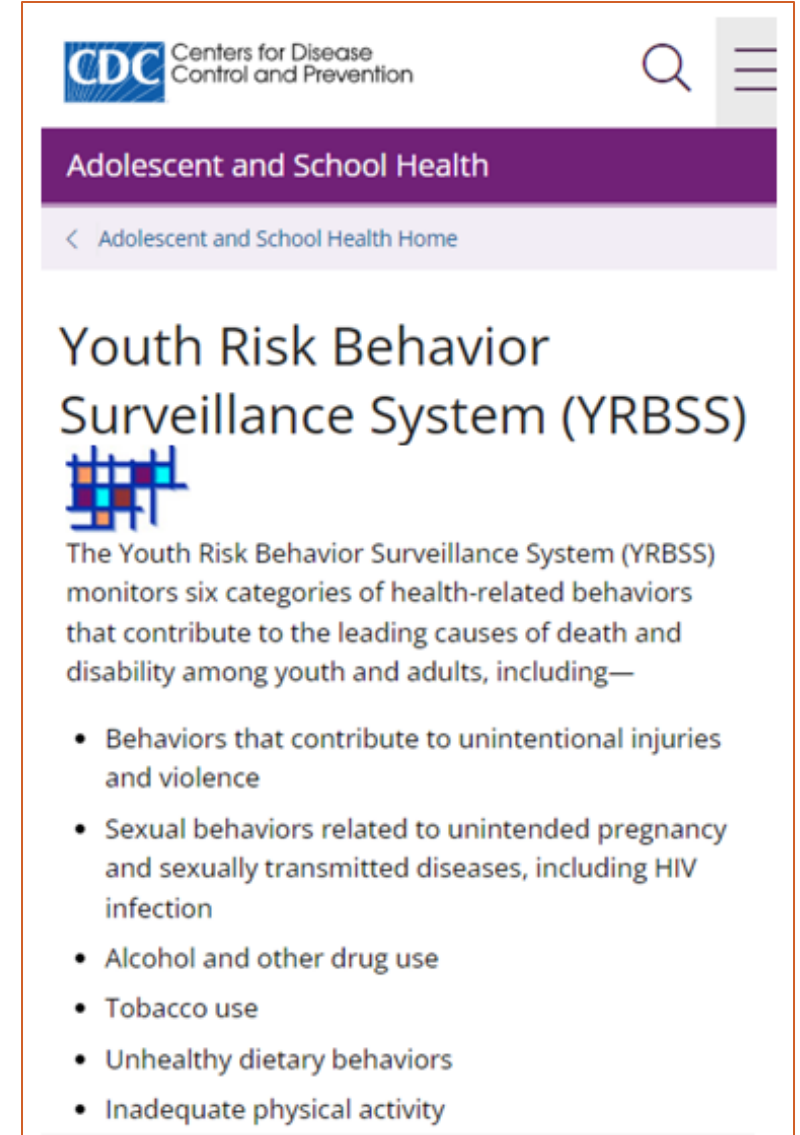
# Data Profile: County Health Rankings & Roadmaps Profile

- **Type of data:** representative sample
- **Who:** US population by counties
- **What:** rankings for health outcomes and health factors among counties
- **Strengths:** county-level, detailed, county comparison tool, user-friendly (no ICD-10 codes)
- **Limitations:** the oldest data is from 2010, uses data from BRFSS so it could have the same limitations



# Data Profile: YRBSS

- **Type of data:** representative sample
- **Who:** random sample of public middle and high school students every other year (random sample of classes within selected school districts)
- **What:** prevalence of health risk behaviors (eating habits, tobacco use, etc.)
- **Strengths:** multiple years for trend analysis
- **Limitations:** not all states participate (most states do high school survey, fewer states do middle school survey), response varies across schools



The screenshot shows the CDC website interface for the Adolescent and School Health section. At the top left is the CDC logo and the text "Centers for Disease Control and Prevention". To the right is a search icon and a menu icon. Below this is a purple header bar with the text "Adolescent and School Health". Underneath is a light purple bar with a back arrow and the text "Adolescent and School Health Home". The main content area features the title "Youth Risk Behavior Surveillance System (YRBSS)" in a large, dark blue font, followed by a colorful grid icon. Below the icon is a paragraph of text: "The Youth Risk Behavior Surveillance System (YRBSS) monitors six categories of health-related behaviors that contribute to the leading causes of death and disability among youth and adults, including—". This is followed by a bulleted list of six categories: "Behaviors that contribute to unintentional injuries and violence", "Sexual behaviors related to unintended pregnancy and sexually transmitted diseases, including HIV infection", "Alcohol and other drug use", "Tobacco use", "Unhealthy dietary behaviors", and "Inadequate physical activity".

CDC Centers for Disease Control and Prevention

Adolescent and School Health

< Adolescent and School Health Home

## Youth Risk Behavior Surveillance System (YRBSS)

The Youth Risk Behavior Surveillance System (YRBSS) monitors six categories of health-related behaviors that contribute to the leading causes of death and disability among youth and adults, including—

- Behaviors that contribute to unintentional injuries and violence
- Sexual behaviors related to unintended pregnancy and sexually transmitted diseases, including HIV infection
- Alcohol and other drug use
- Tobacco use
- Unhealthy dietary behaviors
- Inadequate physical activity

# Data Profile: PLACES - Local Data for Better Health

- **Type of data:** Model-based population-level estimates
- **Who:** US population including all counties, places, census tracts, and Zip Code Tabulation Areas (ZCTAs)
- **What:** small area estimates on 27 chronic disease measures for all US counties, places, census tracts, and ZCTAs
- **Strengths:** valid small area estimates available in a uniform way at the local level regardless of size and urban-rural status
- **Limitations:** currently only 27 measures are available
- **Website:** <https://www.cdc.gov/places/index.html>



PLACES: Local Data for Better Health



PLACES is a collaboration between CDC, the Robert Wood Johnson Foundation, and the CDC Foundation. PLACES provides health data for small areas across the country. This allows local health departments and jurisdictions, regardless of population size and rurality, to better understand the burden and geographic distribution of health measures in their areas and assist them in planning public health interventions.

PLACES provides model-based, population-level analysis and community estimates of health measures to all counties, places (incorporated and census designated places), census tracts, and ZIP Code Tabulation Areas (ZCTAs) across the United States. [Learn more about PLACES.](#)





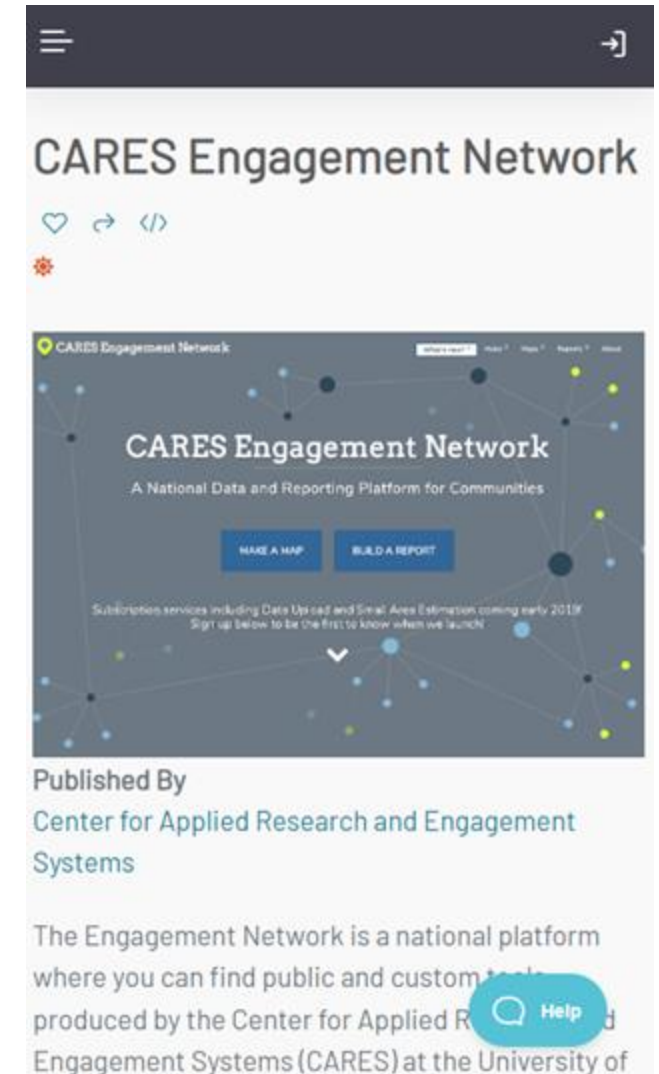
# Data Profile: City Health Dashboard

- **Type of data:** Model-based population-level estimates
- **Who:** US population including over 750 cities with populations > 50,000
- **What:** small area estimates on 35+ health and “drivers of health” metrics that align with CHR&R
- **Strengths:** valid small area estimates available in a uniform way at the local level for cities (goes beyond the 500 cities project to now include small and midsize cities too);
- **Limitations:** currently only ~35 measures are available; does not provide data for rural geographies; limited ability to disaggregate data or look at data over time currently

The screenshot shows the City Health Dashboard interface. At the top, it says "City Health DASHBOARD" with a menu icon. Below that, a date "Mar. 31, 2023" is displayed. A blue banner contains the text: "JUST RELEASED - new unemployment data is available on the Dashboard! Check out the Unemployment: Current, City-Level metric for data through November 2022, available now in your city. See what's new". The main section is titled "Explore health in your city" and features a search bar with the placeholder text "Enter city or state" and a magnifying glass icon. Below the search bar is a map of the United States with the text "SCROLL FOR MORE RESOURCES" and a downward arrow icon. At the bottom, there is a section titled "Research & Reports" with a link to "Life Expectancy and Built Environments in the U.S.: A Multilevel Analysis" dated "Mar. 17, 2023".

# Data Profile: CARES Engagement Network – Community Commons

- **Type of data:** Model-based population-level estimates
- **Who:** US population with most indicators for adults 18+
- **What:** county-level estimates on health and “drivers of health” metrics
- **Strengths:** valid small area estimates available in a uniform way for US counties; can generate state maps that show county rates; provides comparison of county to state and US; can generate a CHNA report with methodology.
- **Limitations:** free version has a limited though sufficient number of indicators; cannot generate custom queries; limited standard disaggregated data





# Data Profile: CDC Wonder

- **Type of data:** population-based
- **Who:** US population
- **What:** incidence and mortality data
- **Strengths:** detailed, high-quality data over many years
- **Limitations:** you have to have a good bit of knowledge about ICD-10 codes and epi verbiage



## CDC WONDER

[FAQs](#) [Help](#) [Contact Us](#) [WONDER Search](#)

### CDC WONDER

WONDER online databases utilize a rich ad-hoc query system for the analysis of public health data. Reports and other query systems are also available.

[WONDER Systems](#)

[Topics](#)

[A-Z Index](#)

#### WONDER Online Databases

- ▶ [AIDS Public Use Data](#)
- ▶ [Births](#)
- ▶ [Cancer Statistics](#)

#### Deaths:

##### All Ages:

- ▶ [Underlying Cause of Death](#)
- ▶ [Multiple Cause of Death \(Provisional\)](#)
- ▶ [Multiple Cause of Death \(Final\)](#)
- ▶ [U.S. - Mexico Border Area Mortality](#)
- ▶ [Compressed Mortality](#)
- ▶ [Fetal Deaths](#)
- ▶ [Infant Deaths](#)

#### Environment:

- ▶ [Heat Wave Days May-September](#)
- ▶ [Daily Air Temperatures & Heat Index](#)
- ▶ [Daily Land Surface Temperatures](#)

#### National Notifiable Conditions

- ▶ [NNDSS Annual Summary Data Query](#)
- ▶ [NNDSS Annual Tables](#)
- ▶ [NNDSS Weekly Tables](#)

#### Reports and References

- ▶ [Prevention Guidelines \(Archive\)](#)
- ▶ [Scientific Data and Documentation \(Archive\)](#)

#### Other Query Systems

- ▶ [Healthy People 2010 \(Archive\)](#)
- ▶ [122 Cities Weekly Mortality \(Archive\)](#)

**Module 4**  
**Public Health Surveillance**  
**in the 21<sup>st</sup> Century**

# Data Modernization Initiative

## DATA · PEOPLE · POLICIES

WE NEED TO *MOVE THE COUNTRY FORWARD*



“Data is the oxygen that powers our ability to detect and respond to threats to health and we are at a pivotal moment in the modernization of the public health data infrastructure.”

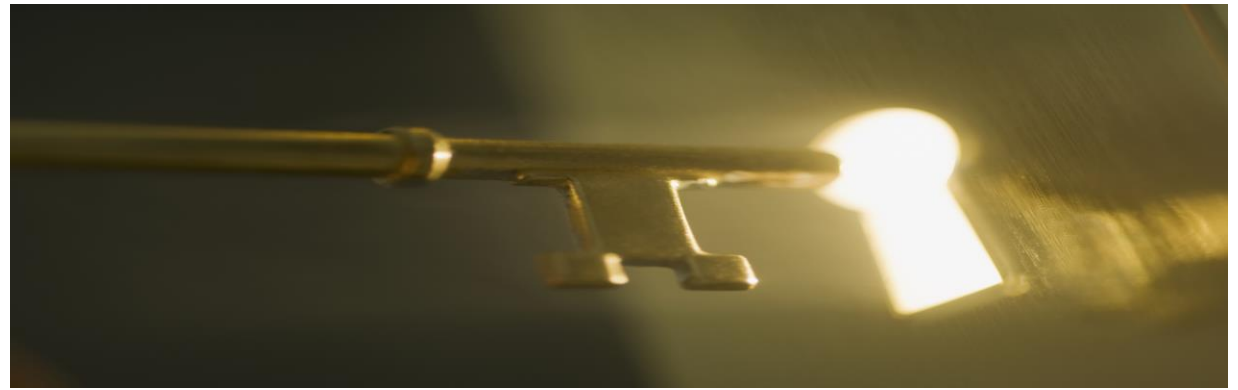
*Dr. Mandy Cohen, CDC Director*

The ultimate goal of CDC's Data Modernization Initiative (DMI) is to get better, faster, actionable insights for decision-making at all levels of public health.

Our vision is to create one public health community that can engage robustly with healthcare, communicate meaningfully with the public, improve health equity, and have the means to protect and promote health.

# Key Takeaways

---



- Public health surveillance is an important function of state and federal public health agencies.
- Surveillance efforts allow us to address the core public health function of Assessment.
- There are a number of surveillance systems available to describe the burden of communicable and chronic diseases as well as health behaviors and social determinants of health.
- As states and the federal government modernize current surveillance systems, there are numerous opportunities to enhance disease surveillance through the use of EHR data, genomics, spatial data, etc.

# Data Training Opportunities

Data Basics

Tackling Data

Visualize This

Disaggregate It

Check out our website  
to see upcoming  
training dates!



**IOWA**

**Thank you!**

[anjali-deshpande@uiowa.edu](mailto:anjali-deshpande@uiowa.edu)

[vickie-miene@uiowa.edu](mailto:vickie-miene@uiowa.edu)

[sofie-dollison@uiowa.edu](mailto:sofie-dollison@uiowa.edu)

[abigail-stock@uiowa.edu](mailto:abigail-stock@uiowa.edu)

  
Institute  
for Public  
Health  
Practice,  
Research  
and Policy

