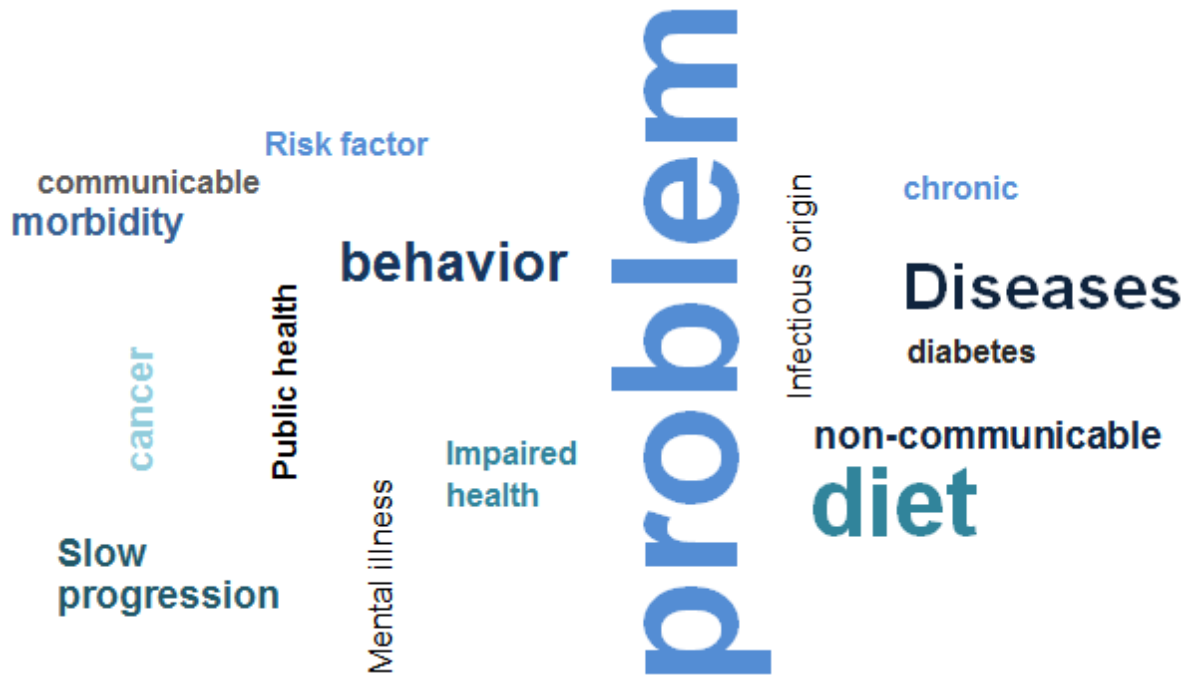


PARTICIPANT GUIDE



Analyze and Interpret Surveillance Data

Created: 2013



Analyze and Interpret Surveillance Data. Atlanta, GA: Centers for Disease Control and Prevention (CDC), 2013.

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Analyze and Interpret Surveillance Data

LEARNING OBJECTIVES

At the end of the training, you will be able to:

- Describe data to collect based on the objective of a surveillance system.
- Identify how to present surveillance data.
- Interpret surveillance data, including trends and patterns.
- Identify groups and geographic areas to be targeted for interventions, based on surveillance data.

ESTIMATED COMPLETION TIME

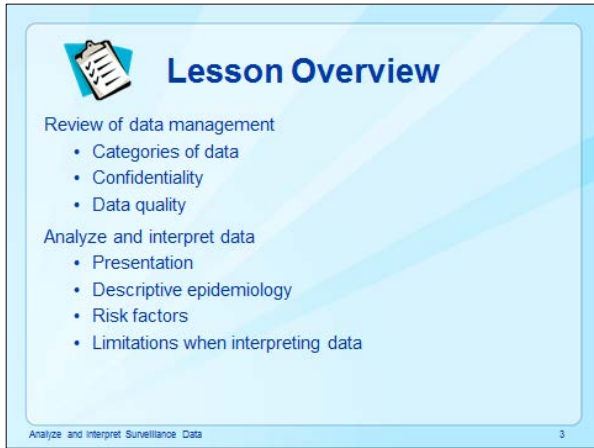
- 3 hours, 30 minutes (1 hour, 50 minutes interactive lecture; 1 hour 40 minutes skill assessment)


REFERENCES AND RESOURCES

- CDC Global Youth Tobacco Surveillance, 2000–2007. MMWR Surv Summ. Jan 25, 2008;57 Suppl 1:1–32.
- CDC QuickStats: Death Rates for the Three Leading Causes of Injury Death—United States, 1979–2007. MMWR Weekly Report. Aug 6, 2010;59(30):957.
- Central America FETP Basic and Intermediate Curriculum
- Conducting Surveillance
- Organizing and Presenting
- Surveillance Interpretation and Analysis
- Moorman JE, Rudd RA, Johnson CA, et al. National surveillance for asthma—United States, 1980–2004. MMWR Surveill Summ. Oct 19 2007;56(8):1–54.
- Remington RP, Brownson RC, Wegner MV, eds. Chronic Disease Epidemiology and Control. 3rd ed. Washington DC: American Public Health Association; 2010.
- Teutsch SM, Churchill, R. Elliot, eds. Principles and Practice of Public Health Surveillance. 2nd ed. New York: Oxford University Press, Inc.; 2000.
- WHO Global Health Risks. http://www.who.int/healthinfo/global_burden_disease/global_health_risks/en/index.html
- WHO Global Infobase. <https://apps.who.int/infobase/Comparisons.aspx>
- WHO International Classification of Diseases (ICD). <http://www.who.int/classifications/icd/en/>
- WHO Non-communicable Disease Profile, United Republic of Tanzania. <https://apps.who.int/infobase/CountryProfiles.aspx>
- WHO The Global Burden of Disease: 2004 Update. http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html

MODULE CONTENT

Slide	Notes
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 **Lesson Overview**

Review of data management

- Categories of data
- Confidentiality
- Data quality

Analyze and interpret data

- Presentation
- Descriptive epidemiology
- Risk factors
- Limitations when interpreting data

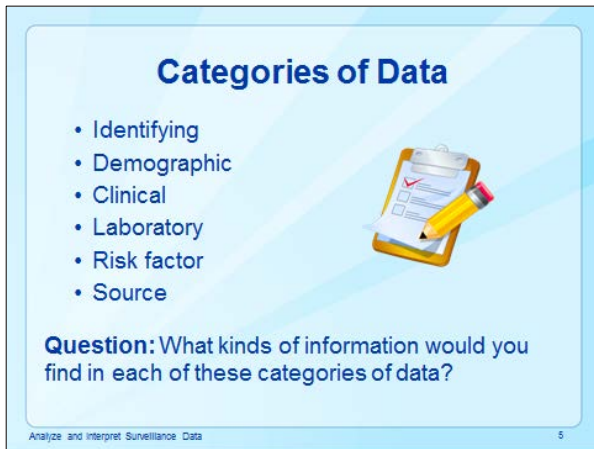
Analyze and Interpret Surveillance Data 3






REVIEW OF DATA MANAGEMENT

Analyze and Interpret Surveillance Data 4



Categories of Data

- Identifying
- Demographic
- Clinical
- Laboratory
- Risk factor
- Source



Question: What kinds of information would you find in each of these categories of data?

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Notes

Confidentiality

- All data must be kept confidential.
- Some surveillance systems do not enter identifying information to protect confidentiality.

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Maintaining Confidentiality

Question: Why is it important to keep surveillance data confidential?

Ways to protect confidentiality:

- Assign a unique ID number to each case or record
- Avoid unintentional disclosure

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Data Quality: Completeness

Completeness can refer to many things:

- Completeness of data collected
 - How much of the data are missing?
- Completeness of reporting
 - Did the surveillance system capture all of the events?



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Key Point: Data should be of high quality and complete.

Slide **Notes**

Question: Completeness

Table 1. Diabetes

Sex	n	%
Male	491	49.1
Female	423	42.3
Missing	86	8.6
Age	n	%
Median	38 years	n/a
Missing	173	17.3
Total	1000	100


Table 2. Asthma

Sex	n	%
Male	921	46.0
Female	874	43.7
Missing	205	10.3
Age	n	%
Median	35 years	n/a
Missing	129	6.4
Total	2000	100

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Data Quality: Validity

- Validity refers to the accuracy of the collected data.
- Sources of errors:
 - Respondent provides inaccurate information
 - Data recorded inaccurately when collected
 - Data entered inaccurately into database



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Key Point: Missing or low quality data can and will change the interpretation of a study.

Question: Validity

Name	Sex	Date of Birth	Date of Diagnosis	Date of Death	Age at Death
Person A	Female	15/07/1954	16/03/2006	03/12/2008	47
Person B	Male	28/04/1963	24/09/2004	27/07/2009	46
Person C	Both	02/09/1948	30/02/2005	18/10/2008	60
Person D	Male	08/11/1943	05/06/2009	11/04/2009	65
Person E	Male	21/01/1792	19/10/2006	09/09/2010	38

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Notes



ANALYZING SURVEILLANCE DATA

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Analysis in Support of Objectives

- Analysis of the data needs clear, measurable objectives.
- Surveillance objectives guide:
 - Types of data collected
 - Types of analyses performed

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Presentation of Results from Analyses

- Results should be presented in a manner that is easy to understand and interpret.
- Formats:
 - Tables
 - Graphs
 - Charts
 - Maps



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Key Point: Always remember who your audience is and keep your presentation simple

Slide

Notes

Descriptive Epidemiology

- Data used to describe the distribution of a health condition or event in a community.
 - Person – who?
 - Place – where?
 - Time – when?

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Person

Who?

- Age
- Sex
- Marital status
- Occupation



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Question: Person

Prevalence of obesity (body mass index ≥ 30 kg/m²) among men aged 18-59 years old, Brazil, 2006

Age (years)	Prevalence (%)	95% Confidence Interval
18-25	4.3	3.1, 5.5
26-32	10.9	8.3, 13.6
33-40	14.9	12.7, 17.1
41-48	14.1	12.0, 16.3
49-59	16.5	13.9, 19.2

Source: Moura EC, Claro RM. Estimates of obesity trends in Brazil, 2006-2009. Int J Public Health. 2011 May 26.

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Slide **Notes**

Place

- Where?
 - Residence
 - Workplace
 - Location of exposure
 - Location of diagnosis and/or treatment
- Maps can describe health conditions by place.

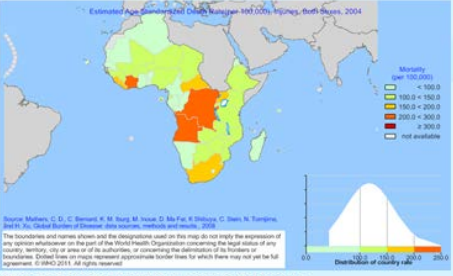


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Key Point: Data related to place mean that they are a factor because of geography of a population.

Question: Place

Estimated Age Standardized Death Rate (per 100,000), Injuries, Both Sexes, 2004



Source: Murray, C. D., C. Bernard, K. M. Song, M. Joshi, D. Ma, F. S. Shkolze, C. Stein, N. Tompkins, and M. Yu. Global Burden of Disease: data sources, methods and results, 2008.


The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate borders where they are shown and not the full agreement. © WHO 2011. All rights reserved.

Source: WHO Global Infobase. <https://apps.who.int/infobase/Comparisons.asp>

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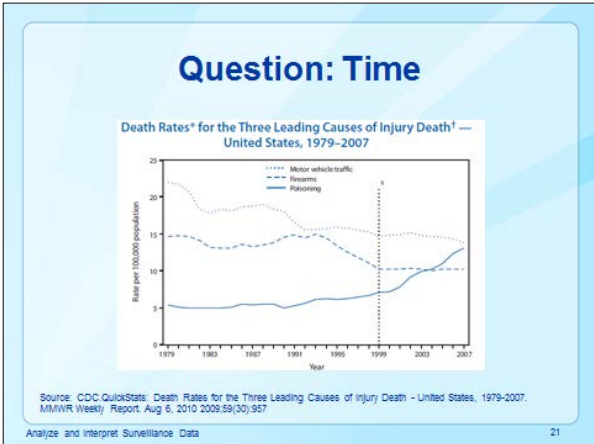
Time


- When?
- Look for trends over time
- Examples: year, day of week, season




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Slide **Notes**



- ### Risk Factors
- Risk factors commonly associated with NCDs
 - Alcohol consumption
 - Diet and nutrition
 - Genetics
 - Lack of physical activity
 - Tobacco use
- 
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Key Point: NCDs are non-communicable chronic diseases.

- ### Types of Risk Factors
- **Modifiable** – can be changed by the individual
 - Lifestyle choices
 - **Nonmodifiable** – cannot be changed by the individual
 - Age
 - Family history (hereditary)
 - Race or ethnicity
 - Sex
- 
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Slide **Notes**

Question 1: Risk Factors

Adapted from Chronic Disease Risk Factors Among Participants in Medical Examination, by Selected Demographic Characteristics

High Blood Pressure	Age Groups				Total
	18-34 % (SE)	35-49 % (SE)	50-64 % (SE)	≥ 65 % (SE)	
Self-reported	2.5 (0.095)	11.3 (1.87)	35.9 (4.05)	34.1 (6.82)	15.2 (1.52)
Measured	9.4 (2.30)	28.3 (3.53)	55.2 (3.78)	61.4 (5.52)	30.2 (1.83)

Source: Zindan M, Beibelsi A, Waite H, Mowdad AH. Obesity and diabetes in Jordan: findings from the Behavioral Risk Factors Surveillance System, 2004. Prev Chronic Dis, 2008;5(1). http://www.cdc.gov/pod/issues/2008/jan/05_0172.htm. Accessed June, 1, 2012.

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Key Point: In this chart, a relationship between high blood pressure and age group exists.

Question 2: Risk Factors

Percentage of deaths over age 30 caused by tobacco, 2004

Source: WHO Global Health Risks. Accessed on January 13, 2011 at http://www.who.int/healthinfo/global_burden_diseases/global_health_risks/en/index.html

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Interpreting Modifiable Risk Factor Data

- Individuals choose to engage in modifiable factors.
- Recommendations often encourage people to change behavior and make better health-related decisions.

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Slide

Notes

Interpreting Non-modifiable Risk Factor Data Tips

Use caution and sensitivity

- People do not choose to have non-modifiable risk factors.
- Children, women, and people from certain races or ethnic groups may be vulnerable populations.
- Vulnerable populations may be stigmatized if data are not interpreted appropriately.



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Interpreting Non-modifiable Risk Factor Data

- Be aware of non-modifiable risk factors.
- Cannot recommend changes.
- Can recommend reducing modifiable risk factors among people with non-modifiable factors.
 - Example: Risk of obesity increases with age:
 - Cannot modify age
 - Can increase physical activity or improve diet among older people



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Limitations of Surveillance Data

- Underreporting of cases
- Not representative of entire population
- Changes in case definition over time



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Key Point: The key to interpreting surveillance data accurately is to know the limitations of your data.

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Notes

Underreporting

Failure to report a health condition or vital event, as required by law, to proper officials

- Due to individuals being unaware of their responsibility to report
- Common in passive surveillance systems
 - Notifiable disease reporting systems
 - Vital events registration
 - Morbidity registries

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Example of Underreporting

Can you share an example of underreporting that you may have experienced in your work?



Analyze and Interpret Surveillance Data

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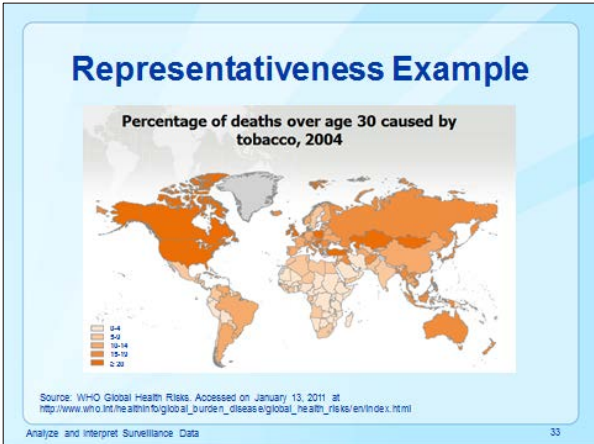
Representativeness

- Definition: How accurately data reflect the occurrence and distribution of a disease in a population
- Affected by
 - Exclusion of particular subpopulations
 - Changes in reporting practices
 - Differences in reporting practices

Analyze and Interpret Surveillance Data

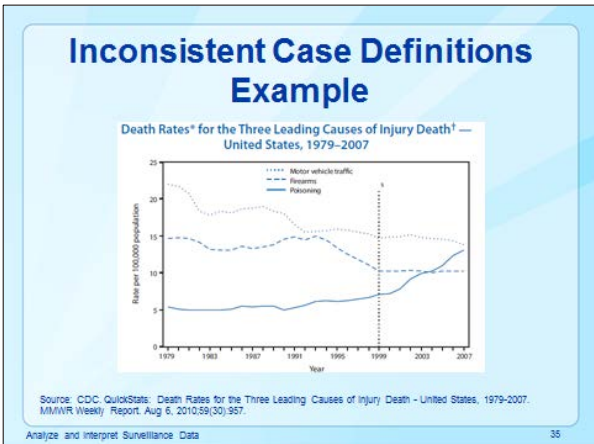
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Key Point: Surveillance data should be representative of the true distribution of a disease, so that health officials can effectively reduce the disease.



- ### Inconsistent Case Definitions
- Case definitions
 - Standard criteria
 - Used by public health officials to classify a health condition
 - Data limitations
 - When definitions are not used consistently
 - When looking at trends, a revised definition can lead to dramatic yet misleading changes
 - Need to consider when interpreting data
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Key Point: If different case definitions are used for many studies (without acknowledgment), then trends in data may be interpreted incorrectly.



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Ensuring Consistent Case Definitions

- **International Classification of Diseases (ICD) codes**
 - International set of criteria used to classify health conditions and deaths
 - Used for clinical, epidemiological, and managerial purposes
 - Permits comparison of calculated morbidity and mortality between countries
 - Periodic revisions to incorporate new health conditions as well as advances in science and technology



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Review Notes



REVIEW

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Part 2. Select Heart Disease-specific Mortality Counts and Rates in the US (20 minutes)

3. Using Figure 1, describe the trend observed in CVD-related mortality among males and females from 1979-2007.

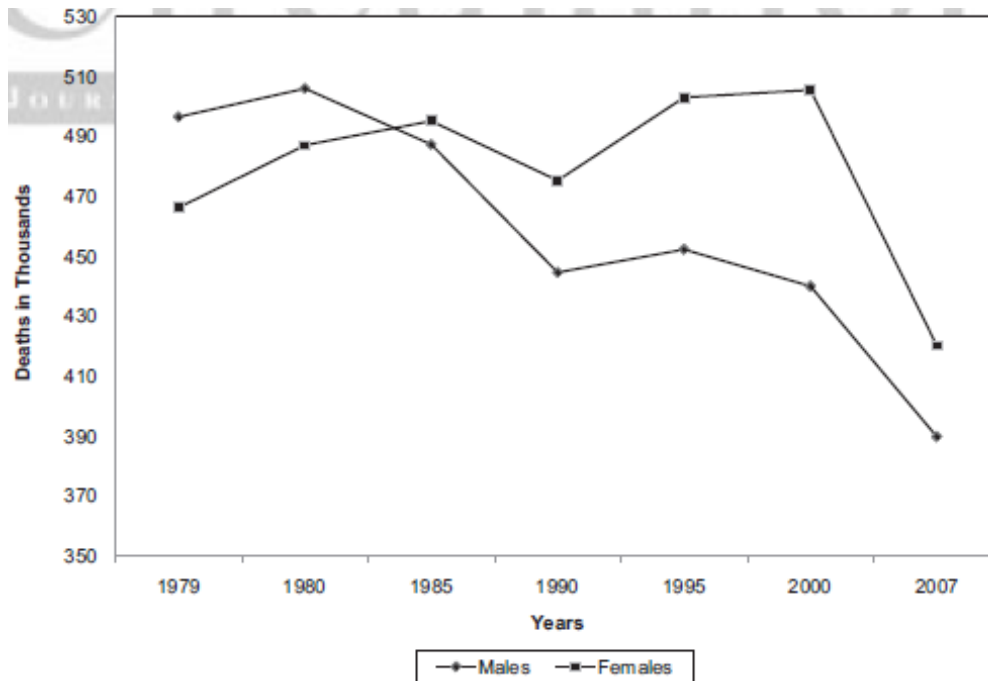


Figure 1. CVD mortality trends for males and females (United States: 1979-2007.) The overall comparability for cardiovascular disease between the ICD 9th revision (1979-1998) and International Classification of Diseases, 10th revision (1999-2007) is 0.9962. No comparability ratios were applied. Source: National Center for Health Statistics.

4. Figure 1 summarizes the number of CVD deaths in males and females in the US. Why would it be better if Figure 1 showed rates of CVD mortality instead of just the number of CVD deaths?
5. In the title of Figure 1, there is a description about the change in the ICD 9th revision to the 10th revision. Does the change in the case definition affect your answer to Question 1? Why or why not?

Stroke Age-Adjusted Death Rates by State



Figure 2. US map of age-adjusted death rates for stroke by state (including the District of Columbia) in 2007.

6. What observations do you have about Figure 2 concerning the death rates of stroke in the US?

Part 3. Risk Factor: Self-reported Obesity in the US (25 minutes)

Table 1. Self-reported prevalence of obesity* among adults, by sex and selected characteristics – Behavioral Risk Factors Surveillance System, US, 2009.

Characteristic	Overall (N = 405,102)		Men (n = 158,455)		Women (n = 246,647)	
	%	(95% CI†)	%	(95% CI)	%	(95% CI)
Total	26.7	(26.4–27.0)	27.4	(26.9–27.8)	26.0	(25.7–26.4)
Age group (yrs)						
18–29	20.3	(19.5–21.2)	20.1	(18.8–21.4)	20.6	(19.5–21.7)
30–39	27.8	(27.1–28.6)	29.4	(28.2–30.7)	26.2	(25.3–27.1)
40–49	29.4	(28.8–30.1)	31.0	(30.0–32.0)	27.8	(27.0–28.6)
50–59	31.1	(30.6–31.7)	31.9	(31.1–32.8)	30.3	(29.6–31.0)
60–69	30.9	(30.3–31.5)	30.4	(29.6–31.3)	31.3	(30.6–32.1)
≥70	20.5	(20.0–21.0)	19.8	(19.0–20.5)	21.0	(20.4–21.6)
Race/Ethnicity						
White, non-Hispanic	25.2	(24.9–25.5)	27.1	(26.6–27.6)	23.3	(23.0–23.7)
Black, non-Hispanic	36.8	(35.7–37.9)	30.9	(29.2–32.8)	41.9	(40.5–43.2)
Hispanic	30.7	(29.5–31.9)	30.6	(28.7–32.5)	30.8	(29.4–32.2)
Other race	16.7	(15.5–18.0)	16.9	(15.2–18.8)	16.5	(15.0–18.1)
Educational level						
Less than high school graduate	32.9	(31.8–34.0)	29.6	(27.9–31.4)	36.4	(35.1–37.8)
High school graduate	29.5	(29.0–30.1)	29.5	(28.6–30.4)	29.5	(28.9–30.2)
Some college	29.1	(28.6–29.7)	30.6	(29.6–31.5)	27.9	(27.2–28.5)
College graduate	20.8	(20.4–21.2)	22.9	(22.2–23.5)	18.6	(18.2–19.1)
Census region [§]						
Northeast	24.3	(23.6–24.9)	25.2	(24.2–26.2)	23.4	(22.6–24.2)
Midwest	28.2	(27.7–28.7)	29.2	(28.4–30.1)	27.2	(26.5–27.9)
South	28.4	(27.9–29.0)	28.8	(28.0–29.7)	28.1	(27.5–28.7)
West	24.4	(23.8–25.0)	25.1	(24.2–26.0)	23.7	(22.9–24.4)

* Body mass index (BMI) ≥ 30.0 ; BMI was calculated from self-reported weight and height (weight [kg] / height [m]²).

† Confidence interval.

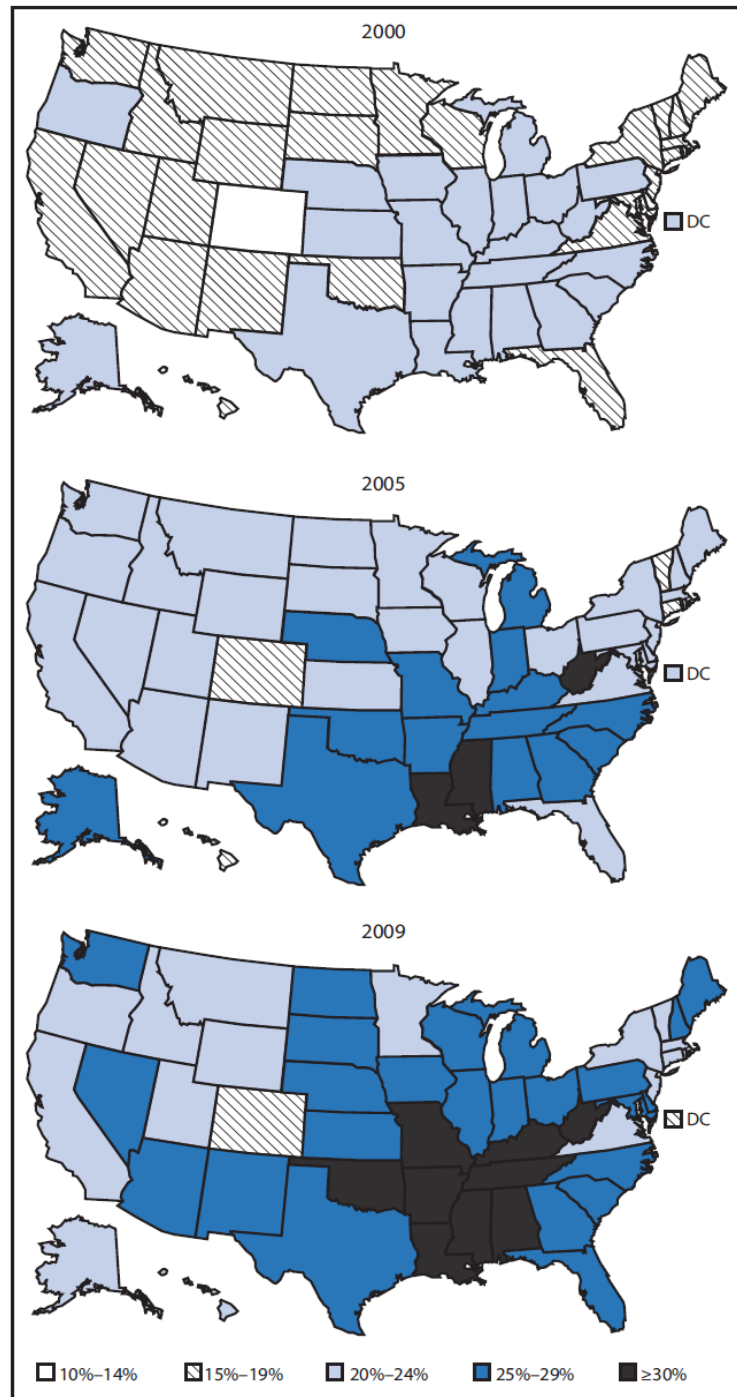
[§] Additional information available at <http://www.census.gov>.

7. Look at the different risk factors for obesity in Table 1.

a. Which are modifiable risk factors?

b. Which are non-modifiable risk factors?

8. Using Table 1, describe the prevalence of obesity in the US by person and place. Which groups have the highest prevalence of obesity in the US?



*Body mass index (BMI) ≥ 30.0 ; BMI was calculated from self-reported weight and height (weight [kg] / height [m]²).

Figure 3. Self-reported prevalence of obesity* among adults – Behavioral Risk Factor Surveillance System, US, 2000, 2005, and 2009.

9. Using Figure 3, describe the time trend in obesity prevalence from 2000-2009.

10. BMI was calculated based on self-reported weight and height using the formula:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)} \times \text{Height (m)}}$$

How do you think the prevalence would be affected if survey respondents said they weighed 2 kg less than their true weight?

Part 4. Recommendations for Interventions (20 minutes)

Using the information from Parts 1-3, consult your findings and use them to provide specific recommendations on a national program that will be designed to continue reducing CVD-specific mortality rates in the US by targeting the prevalence of obesity in the US. The recommendations should include priorities for specific geographic areas and subpopulations. For example, for which group should an intervention be targeted? *Note: Assume that height and weight were reported accurately.*

Description of Data Used in this Skill Assessment:

The CVD-related deaths were calculated using data from the National Center for Health Statistics and the United States Census Bureau. Mortality data are based on the underlying cause of death as reported on death certificates filed with the vital statistics office and compiled by the National Center for Health Statistics.

Data on obesity prevalence in the US was obtained through the Behavioral Risk Factor Surveillance System, which is a national telephone survey that collects information on behaviors and health conditions, particularly non-communicable diseases. Body mass index (BMI), used to classify individuals as overweight or obese, was calculated from self-reported weight and height.

References:

CDC Vital Signs: State-Specific Obesity Prevalence Among Adults — United States, 2009. *MMWR Morb and Mort Wkly Rep.* Aug 6, 2011;59(30):951–955.

Roger VL, Go AS, Lloyd-Jones DM, et al. Heart Disease and Stroke Statistics—2011 Update: A Report from the American Heart Association. *Circulation.* (epub) Dec 15 2010.