Data Analysis and Interpretation

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Why do we need data?

- To show **evidence** or support for an idea
- To track **progress** over time
- Use data to **enhance**:  
  - Reporting  
  - Grant writing  
  - Presentations  
  - Research
Essential Public Health Services

- Monitor health status to identify community health problems

Source: Public Health Functions Steering Committee
Accreditation Standards

1.1.b Reflect the demographic profile of the population

1.1.c Describe socioeconomic, educational & environment factors that affect health

1.1.d Assemble/analyze secondary data to describe community health status

1.1.e Collect/analyze primary data to describe community health status
Community Health Assessments should include:

- **Socioeconomic factors**
  - Unemployment
  - Housing

- **Educational factors**
  - Early interventions
  - Drop-out rates
  - SAT scores

- **Environmental factors**
  - Air pollution
  - Tobacco
  - Childhood lead exposure
Accreditation Standards

1.1.f Compile/analyze trend data to describe changes in community health status and factors affecting health

1.1.g Use scientific methods for collecting and analyzing data

1.1.h Identify population groups at risk

1.1.j Compare selected local data with data from other jurisdictions
Accreditation Standards cont.

- Analysis should include:
  - Trends
  - Comparison of local rates to:
    - State rates
    - Other counties
    - Healthy NC 2020 objectives
  - Health priorities selection process
Types of Data

- **Quantitative**
  - Based on counts and measurements
    - Rates
    - Disease events
    - Answers to closed questions

- **Qualitative**
  - Based on information that can not be measured
    - Opinions
    - Perceptions
    - Observations
    - Answers to open questions
Sources of Data

- **Primary**
  - Collected personally by your CHA team
    - Surveys
    - Listening sessions
    - Interviews
    - Observations

- **Secondary**
  - Collected by someone else
    - Birth
    - Mortality
    - Morbidity
Resource Guide for CHA

Sources of Data for Community Profiles:
A Resource Guide for Community Health Assessment in North Carolina

State Center for Health Statistics and Office of Healthy Carolinians  
February 2011

Purpose
For years, the State Center for Health Statistics has prepared the County Health Data Books for Disease Control for the North Carolina Community Health Assessment Initiative. A major goal of this initiative has been to
Descriptive Statistics

- Measurement Scales
  - Nominal scale (identified by name only)
    - sex, marital status
  - Ordinal scale (identified by name and can be ranked)
    - strongly agree – strongly disagree
  - Interval scale
    - age groups
  - Ratio scale (distances can be determined and there is a meaningful zero point)
    - population growth, death rate
Descriptive Statistics

- Count
- Comparison of Variables
  - Percent
  - Mean
  - Rate
Count

- Actual number of health events
  - Cases of a disease
  - Deaths
  - People with risk factor
  - People with health behavior
Example: Count

http://www.epi.state.nc.us/epi/gcdc/flu1011.html
Additional Information to Include

- Include additional information on
  - Time period
  - Geographic area
  - Potential sub-population (e.g. pregnant women, college campus)
Prevalence

- The proportion of people who have a disease/outcome at one point in time
  - New cases + previously diagnosed (living) cases
  - Measures total disease burden on population
- Usually measured in surveys
Incidence

- The rate at which new cases occur in a population “at risk” for getting the outcome
  - Also “incidence rate” or “incidence density”
  - How rapidly is the disease occurring in the population?
- Usually measured in disease registries
Which to use?

- Chronic diseases are generally measured by prevalence
- Acute diseases are generally measured by incidence
- Why might a prevalence rate increase when the incident rate for the same condition is not increasing?
  - Individuals are living longer
Percent

- Also known as proportion

- How big of a portion of the population has the characteristic?

- Example: Percent living below the poverty line
Mean (Average)

- Total of values
  Number of observations

- Examples
  - Age
  - Income
  - BMI
Additional Information to Include

- Time period
- Geographic area
- Range of values
- Example
Rates

- # of events/ unit population or time
  - Birth (natality) rate
  - Death (mortality) rate
  - Infant mortality rate
  - Cause specific death rate
  - Age specific death rate
Crude Rates

- Relative frequency with which some event occurs in a study population
- Standard from such as a number per 100,000
- Simply the number of events divided by the population at risk, often multiplied by some constant so that the result is not a fraction
- Used to study an absolute event, such as mortality or pregnancy
- May not give information needed for decision making
- May not represent accurately the health status of populations
- Do not permit clear comparisons among study populations
## 2007 US Deaths

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<th>Age-Adjusted</th>
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Understanding Age-Adjusted Rates

- **Age-adjustment** controls for differences in age distributions of populations.
- Important when comparing rates between 2 populations with different age distributions:
  - Rates for 2 different counties
  - County vs. state rates
  - State vs. national rates

- See **Statistical Primer 13** for further discussion.
Age-Adjusted Death Rates

by

Paul A. Buescher
Cautions to consider with rates

- Confirm base population is the same for comparisons
- Trends may be seasonable in nature
- Rates based on small numbers are unstable
- Consider notable events that may impact the county
Small Numbers Ahead

- Rates based on **small numbers** (< 20 events) are unreliable
  - May look like a drastic change with only 1 added case
  - Always report the actual number of cases
- **Solutions:**
  - Combine data from several years
  - Use regional instead of county data

- See **Statistical Primer 12** for further discussion
Statistical Primer 12

No. 12

Problems with Rates Based on Small Numbers

by

Paul A. Buescher
Data Reporting
Data Overload: What to report?

- It is **NOT** necessary to report all of your data!

- **Report:**
  - Data for which an action plan can be written
  - Important comparisons
  - Areas of progress
  - Important health problems and risks
So what is “important”?

- **Rough guideline** = 15% or greater difference between health indicators
- **Use the 15% rule** to judge:
  - Comparisons between your county and peer or neighboring counties
  - Comparisons between state and your county
  - Areas of great improvement
  - Problem areas
- **See Excel spreadsheet for help**
What analyses should I focus on?

**Trends**
- Report changes in your county’s health indicators over time
- Need data from several points in time
  - If annual rates, look at yearly trends over a 5 or 10 year period
  - If 5 year rates, look at trends over longer periods of time
- Look for improvement, decline, or steady state
- Easiest to illustrate using graphs
- If this is your 2nd CHA cycle, compare results from one CHA to the next!
Percent Change

1. Determine the base statistic
2. Subtract the base from the comparison value
3. Divide by the base value
4. Multiply by 100
5. When reporting, clearly specify the base value
What analyses should I focus on?

- **Comparison** of local statistics to those from:
  - Peer counties (as defined by NC-CATCH)
  - Neighboring counties
  - State
  - HC 2010/2020 objectives

- Can report using tables or figures

- See Excel spreadsheet for calculations
Using Statistics in Your Report

1. Combine your primary and secondary data
2. Review all of your statistics and analyses
3. Decide how you will present these numbers
   - Text
   - Graphs/ charts
   - Tables
4. Ask yourself: “What do these figures show?”
5. Write a “stand alone” explanation of each graph, chart or table
Data Interpretation

- **NEVER** present numbers in any form without giving some explanation!
  1. Summarize findings
  2. Call attention to most important or interesting changes or problems
  3. **Always** state your units
     - Ex: The birth rate for 2007 for our county was 5.6 births per 100,000 population.
  4. Look at qualitative data for the story behind the numbers
Interpreting the Numbers: Important Questions

- What makes your community unique?
- What do these numbers mean for my community’s health?
- How has my community changed lately?
- Do recent changes affect the health of community members? The work of health professionals?
- What gaps in healthcare did you find, if any?
Interpreting the Numbers: Health Problems

- What are my community’s major health risks and problems?
- What are major causes of death?
- Why are these risks or rates so high (or low)?
- Where did these problems come from?
- How has the history of my community’s development affected the health of its members?
Interpreting the Numbers: Notes on Race

- Race itself does not cause poor health status!
- Race is often a surrogate measure for:
  - Socioeconomic factors
  - Stress
  - Racism/discrimination
- Why does SCHS only publish data for 2 groups: white and minority?
  - Small numbers
  - Census data collected only once a decade
- Hispanic/Latino is an ethnic group, rather than a racial group
Interpreting Community Health Opinion Survey data

1. Report your methods
2. Use demographic data to describe your sample population
3. Summarize important findings
4. Report how your sample population compares to your target population
5. Hypothesize about what caused differences
More on Interpreting Survey Data

According to survey respondents:
- What was the general opinion about the quality of life in your community?
- What areas seem to need work in your community?
- What were the biggest health problems?
- What are some of your community’s assets?
Reminders on Primary Data

- Misleading data is worse than no data!
  - If using a convenience sample, interpret the results with caution. Be sure to describe the sampling method used.

- Small group discussion results should be described qualitatively, not quantitatively.
Organizing Your Results

- Most prevalent/serious health problems
  - Based on concerns of community members
  - As evidenced by secondary data
- Results of each instrument used to collect data:
  - Survey data
  - Listening session/focus group results
  - NC-CATCH/Community Health Data Books
- As supported by data:
  - Informed beliefs/opinions of CHA team members
  - Healthy Carolinians Goals
Putting It All Together – Health Statistics

Identify five to ten of your community’s most important **strengths** as indicated by the data in your *County Health Data Book*.

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## Putting It All Together - Community Perceptions

Identify five to ten of your community’s most important **strengths** as indicated by the data gathered in your community (via local data, interviews, listening sessions, surveys, and/or assets mapping).

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Putting It All Together

- Focus on issues that:
  - Affect a lot of people
  - Greatly impact the whole community
  - Have a solution

- Assess whether your community member’s perceptions supported or conflicted with the secondary data

- Assess the accuracy or relevance of the data

- Cite your sources
Special Thanks

- Many of these slides have been borrowed and modified from presentations made by Kim Angelon-Gaetz, MSPH at previous Community Health Assessment Institutes.
Discussion 1
Why the unusual trend?
Discussion 2
Percent Change

- Infant Mortality North Carolina
  - 2008: 8.2 per 1,000 live births
  - 2009: 7.9 per 1,000 live births

- Infant Mortality County A
  - 2008: 3.2 per 1,000 live births
  - 2009: 14.7 per 1,000 live births
  - Numerators were 1 and 4, respectively, so not appropriate to compare
Discussion 3
Residence vs. Occurrence

2009 Events
- 3794 births occurred in Pitt County
- 2018 deaths occurred in Pitt County
- 2 births occurred in Greene County
- 90 deaths occurred in Greene County

- Why might this not be the appropriate numerator?