Data Analysis and Interpretation

Eleanor Howell, MS

Director

State Center for Health Statistics

Accreditation Standards

- 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

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

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

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

	Crude Rate	Age-Adjusted
United States	8.0	
Alaska	5.1	
Florida	9.2	
North Carolina	8.4	

2007 US Deaths

	Crude Rate	Age-Adjusted
United States	8.0	7.6
Alaska	5.1	7.6
Florida	9.2	6.7
North Carolina	8.4	8.3

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

Statistical Primer 13

STATISTICAL PRIMER

North Carolina Public Health — NCPH

State Center for Health Statistics • 1908 Mail Service Center • Raleigh, NC 27699-1908 • 919/733-4728

www.schs.state.nc.us/SCHS

No. 13

Originally Published August 1998; Revised August 2008

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
  - <u>Solutions</u>:
    - Combine data from several years
    - Use regional instead of county data

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

Statistical Primer 12

STATISTICAL PRIMER

NCPH

North Carolina
Public Health

State Center for Health Statistics • 1908 Mail Service Center • Raleigh, NC 27699-1908 • 919/733-4728
www.schs.state.nc.us/SCHS/

No. 12

Originally Published April 1997; Revised August 2008

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

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 or 3rd 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
  - Neighboring counties
  - State
  - HNC 2020 objectives

- Can report using tables or figures

- See Excel spreadsheet for calculations

Sources of comparison

- HealthStat Peer Counties
  - Last updated in 2012
- CHSI 2015
  - Uses statistical clustering methodology
  - May not include other NC counties
  - http://wwwn.cdc.gov/communityhealth

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. <u>Always</u> state your units
   - Ex: The birth rate for 2014 for our county was 5.6 <u>births per 100,000 population</u>.
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 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

- <u>According to survey respondents</u>:
  - 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: Worksheet 1

**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*.

Strength	Comments

Putting It All Together: Worksheet 2

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).

Strength	Comments

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

Action Plan Calculations

- Total number of persons in the target population specific to this action plan
- Total number of persons in the target population to be reached by this action plan
- Calculate the impact of this action plan:
  - (Total # in B divided by total # in A) X 100% = of the target population reached by the action plan.)
  - Example: 5402 teens 14-18 in county; High School with 1500 students; Impact: 28%

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

- 2011 Events
  - 3844 births occurred in Buncombe County
  - 3053 deaths occurred in Buncombe County
  - 4 births occurred in Yancey County
  - 146 deaths occurred in Yancey County
- Why might this not be the appropriate numerator?

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.