Comparing Ratios

Statistical Literacy 2009
Chapter 5 Summary

by
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www.StatLit.org/pdf/...
2009StatLitTextOverviewCh5.ppt
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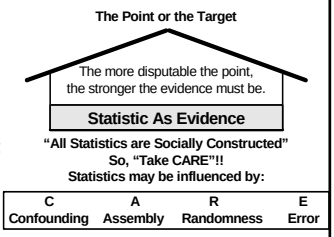
Ch 1. Review

Statistics are generally used as evidence to support an argument.

The influences on a statistic are of four kinds: Context, Assembly, Randomness or Error.



Context and Ratios

Context: Related factors taken into account; the confounders not taken into account.

The easiest way to take into account a related factor are to make a comparison or to form a ratio.

Making a comparison of ratios takes into account two factors: size of a relevant basis for comparison and the sizes of the groups.

The English grammar involved gets very complex.

Three Topics

Percent Attributable: A common almost undetectable, form of comparison. Examples: deaths from second-hand smoke, obesity and radon.

Ratio Comparisons: Distinct Part vs. Common Part
DP: Widows are more likely among suicides than widowers.
CP: Widows are more likely to suicide than widowers.

Comparing ratios using *Likely* grammar

Percent Attributable: The Idea

Speculative statistics: statistics based on a model.

Common statistical model is epidemiological model.

"Attributed" or "attributable" are common signs.
"Attributed to" simply means "associated with"

"Attributed to" is often restated as:
- due to, because of (misleading restatement)
- caused by (incorrect restatement)

Percent Attributable: Examples

38% of the low birth-weight babies born to mothers who smoke are *attributable to* smoking.

33% of all private medical insurance costs, and 20% of Medicare medical costs are *attributed to* smoking.

9% of annual medical spending is *attributable to* being overweight or obese.

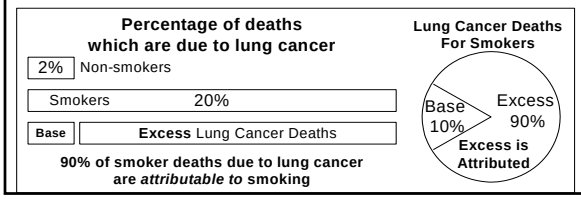
Background: *Confound Those Speculative Statistics*
> www.statlit.org/pdf/2009SchieldASA.pdf

Percent Attributable: Calculation

7

Percentage of the exposure rate that is attributable to the exposure is the excess between the exposure and control group rates as a percentage of the exposure rate

Excess rate: 18%. Percentage attributed: 18% / 20%.



Comparisons of Ratios

8

Two kinds of comparisons of part-whole ratios:

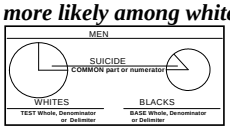
- A **common-part comparison c**ompares ratios having a common part but different wholes, as in *whites are more likely than blacks to commit suicide.* The wholes are blacks and whites; the common part is suicide
- A **distinct-parts comparison** compares ratios having different parts but a common whole, as in *thieves are more likely to steal a Nissan than [to steal] a Ford.* The common whole is all cars stolen; the parts are Nissans and Fords.

Comparisons of Ratios

9

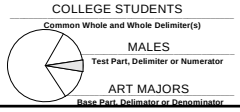
Common-part comparison: controls for size of groups

Among men, suicide is more likely among whites than among blacks



Distinct-parts comparison: single group; no control.

Among college students, males are more likely [to be found] than [are] art majors.



Comparison of Ratios

10

Common-part comparison: compare 60% with 20%. Common part is business majors.

Distinct-parts comparison: Compare 60% with 30% Common whole is males.

Students W	----------SEX - W----------		
Ⓟ MAJOR	W MALE	W FEMALE	W ALL
Ⓟ Business	↓ 60%	↓ 20%	↓ 40%
Ⓟ Economics	↓ 10%	↓ 50%	↓ 30%
Ⓟ MIS	↓ 30%	↓ 30%	↓ 30%
ALL	100%	100%	100%

Likely Grammar: Examples

11

Common-part comparison: *<u>Business majors</u> are more likely among males than among females. Males are more <u>likely to be business majors</u> than [are] females.*

Distinct-parts comparison: *<u>Business majors</u> are more likely among males than [are] <u>MIS majors</u>.*

Students W	----------SEX - W----------		
Ⓟ MAJOR	W MALE	W FEMALE	W ALL
Ⓟ Business	↓ 60%	↓ 20%	↓ 40%
Ⓟ Economics	↓ 10%	↓ 50%	↓ 30%
Ⓟ MIS	↓ 30%	↓ 30%	↓ 30%
ALL	100%	100%	100%

Likely Grammar: Rules

12

1 "among" always indicates a whole

2 "to" indicates a part. (Also, to be, to do, to have, etc.)

3 A part-whole compare must have at least 3 part-whole terms with at least one part and one whole.

4 "as X is" or "than X is" means X is *linked* to the subject. Two linked terms have the same part-whole status.

5 "is likely to" without an object (e.g., *is likely to occur* or *is likely to happen*) indicates the subject is the part.

13

Likely Grammar: Common-part compare

***Likely Among*: Part as subject.** *Among* indicates distinct wholes.
__ is __ <compare> **likely***among** ___ |than/as***|among ____.
{part} # {test-whole} {base-whole}
* *prevalent* can be used in place of *likely.*
** *Other prepositions can be used in place of "among".*

***Likely To*: Test whole as subject:**
_____ is __ <compare> **likely** to ____ | than/as***| is _____.
{Test whole} # {part} {base-whole}
*** The choice of "than" or "as" depends on whether the compare is a difference (simple or relative) or a ratio. Never use both.
Note: the main verb can be either singular (is) or plural (are) and can be replaced by an active verb.

14

Likely Grammar: More Examples

People who put away six cloves of garlic a week are about half as likely to get stomach cancer *as those who rarely touched the pungent bulb.*

Married women using an IUD as their primary form of birth control are 50% more likely to get pregnant for those ages 15-19 than for those 20-24.

In 1991, Catholics were 6 times as likely to own a gun as were Jews

In 1992, voting for President was 83% more prevalent among blacks (64%) than [among] Hispanics (35%).

15

Summary

Context involves what is (not) taken into account.

What is taken into account can influence
- Counts or totals (by forming ratios)
- Averages (by selection or standardizing)

Part-whole ratios are one of the most common ways of taking into account a related factor. Comparisons of part-whole percentages are very powerful. They compare test with base and standardize groups of different sizes.