Comparing Ratios

Statistical Literacy 2009
Chapter 5 Summary
by
Milo Schield

www.StatLit.org/pdf/...
2009StatLitTextOverviewCh5.ppt
2009StatLitTextOverviewCh5.pdf

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.

"All Statistics are Socially Constructed"
So, "Take CARE!!!"
Statistics may be influenced by:
Confounding Assembly Randomness Error

The Point or the Target
The more disputable the point, the stronger the evidence must be.

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

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

Two kinds of comparisons of part-whole ratios:

- A common-part comparison compares 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 a Ford. The common whole is all cars stolen; the parts are Nissans and Fords.

Comparisons of Ratios

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.

Likely Grammar: Examples

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

Distinct-parts comparison: Business majors are more likely among males than [are] MIS majors.

Likely Grammar: Rules

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.
### Likely Grammar: Common-part compare

**Likely Among: Part as subject.** *Among* indicates distinct wholes.

```plaintext
___ 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:**

```plaintext
[Test whole] ___ is ___ {compare} likely to ___ [than/as***] is ____.
{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.

### 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%).

### 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.