

Comparing Ratios

Statistical Literacy 2009

Chapter 5 Summary

by

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www.StatLit.org/pdf/...

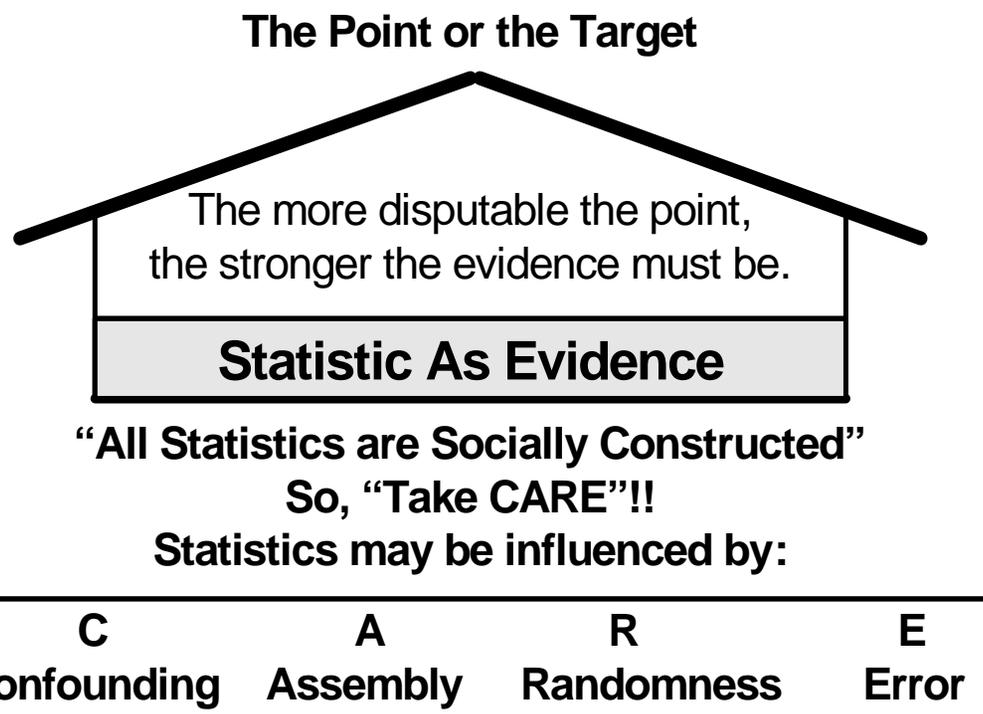
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Ch 1. Review

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:⁵ 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:⁶ 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.

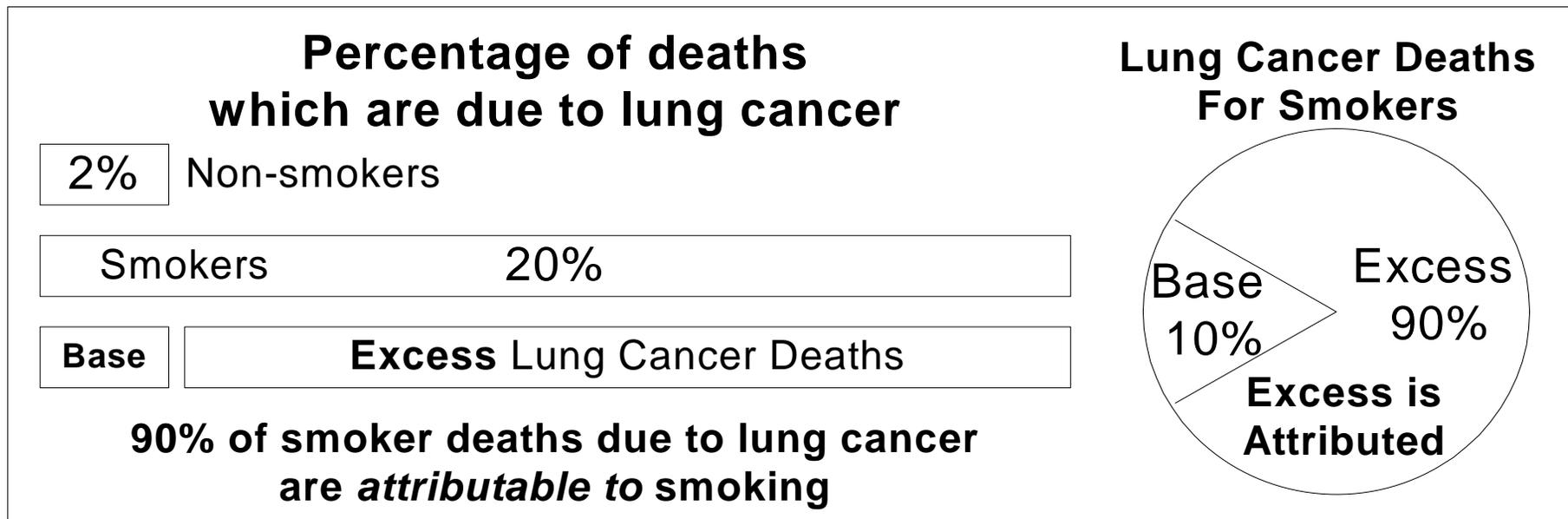
Background: *Confound Those Speculative Statistics*

> www.statlit.org/pdf/2009SchildASA.pdf

Percent Attributable:⁷ 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

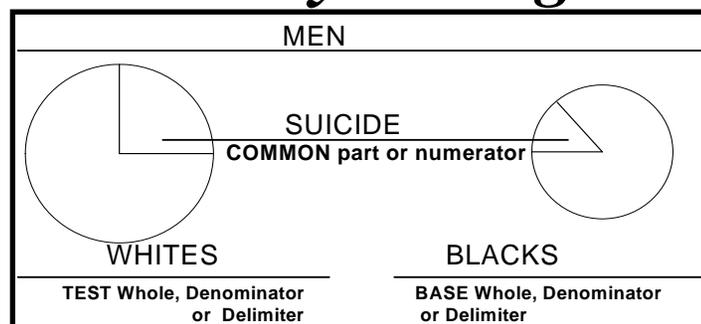
Two kinds of comparisons of part-whole ratios:

- 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 [to steal] a Ford*. The common whole is all cars stolen; the parts are Nissans and Fords.

Comparisons of Ratios

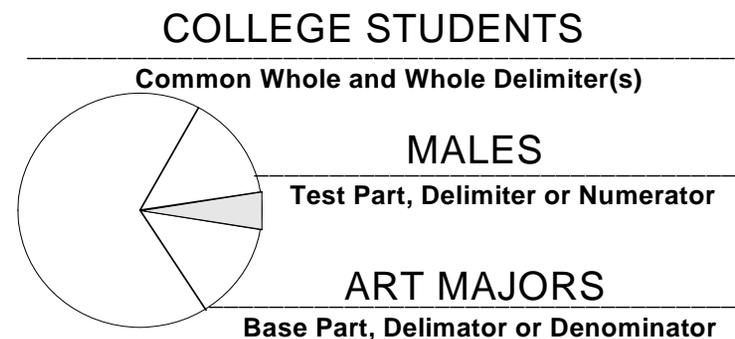
Common-part comparison: controls for size of groups

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.



Comparison of Ratios

Common-part comparison: compare 60% with 20%.

Common part is business majors.

Distinct-parts comparison: Compare 60% with 30%

Common whole is males.

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

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.

Students [W]	-----SEX -[W]-----		
Ⓟ MAJOR	[W] MALE	[W] FEMALE	[W] ALL
Ⓟ Business	↓ 60%	↓ 20%	↓ 40%
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ALL	100%	100%	100%

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.
 ___ 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.

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.