Confounder Influence on Attributed Cases

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www.StatLit.org/pdf/2008SchieldMathFest6up.pdf

Attributed Cases

Attributed cases are events that are attributable or attributed to an associated factor. These statistical events do not assert a causal relation.

- 438,000 deaths/year **due to** smoke/smoking.
- Deaths **attributed to** overweight/obese:

  2004: 400,000 deaths/year

  2007: 28,500 deaths/year

Percentage of Cases that are Attributable

Suppose these are the death rates for two hospitals:

- 10% for the city research hospital
- 4% for the rural non-research hospital

Based on this data alone, one can say that

- "60% of the deaths at the city research hospital are attributable to that hospital."

The math is simple:

- Excess / Exposed = (10% - 4%)/10% = 60%

Number of Cases that are Attributable

Suppose these are patients at two hospitals:

- 100,000 at the city research hospital
- 10,000 at the rural non-research hospital

The # of deaths (given 10% and 4% death rates):

- 10,000 deaths at the city research hospital
- 400 deaths at the rural non-research hospital.

6,000 (60%) of the 10,000 observed deaths at city hospital are attributable to the hospital.

Decisions Based on Statistical Deaths

With this data, what should we do?

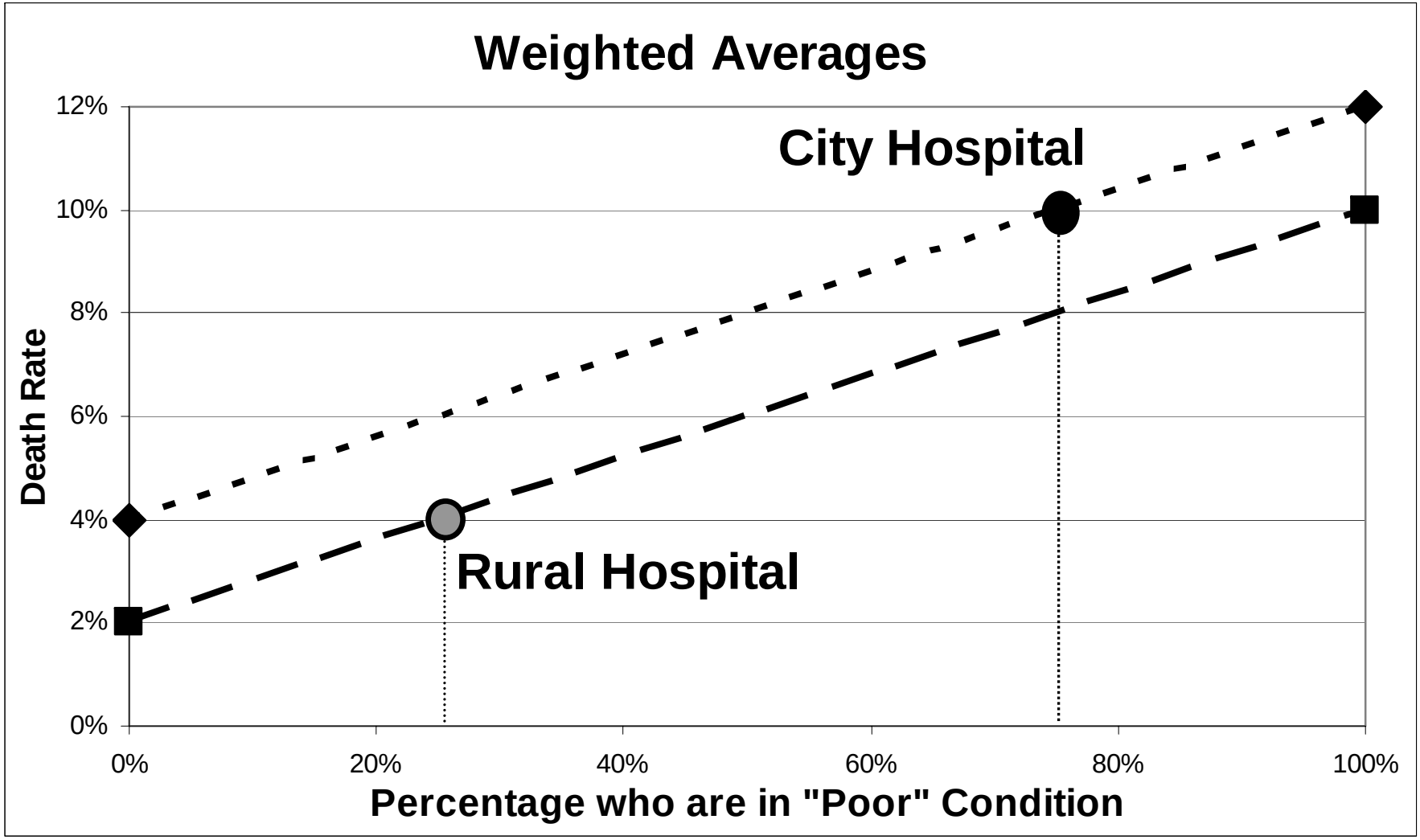
- Fire the managers at this “hospital of death”?
- Retrain the staff
- Recommend that patients avoid this hospital?
- Stop funding under-performing hospitals?
- Close under-performing hospitals?

Association is not [always] Causation

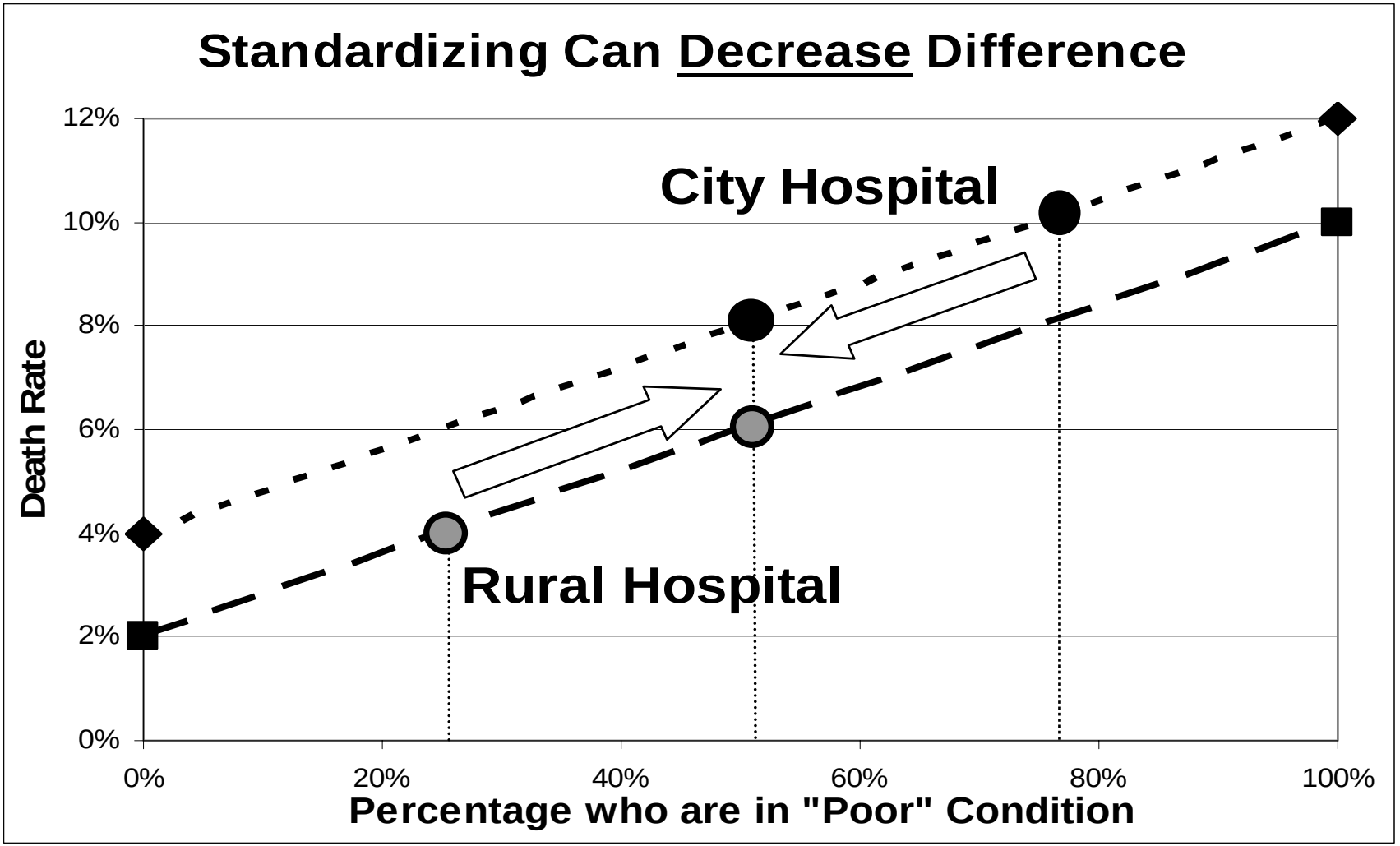
Statistical associations can be due to various influences other than internal causation:

- Confounding – influence of associated factors.
- Assembly – the choice of definitions and groups.
- Randomness – most influential in small samples.
- Error/bias – subject, measurement or sampling bias.

Weighted Averages: Graphical View



"Take into Account" by Standardizing



Percentage of Cases that are Attributable

Consider these confounder-adjusted death rates:

- 8% for the city research hospital
- 6% for the rural non-research hospital

Based on this data alone, one can say that

- "25% of the deaths at the city research hospital are attributable to that hospital."

The math is simple:

- Excess / Exposed = (8% - 6%)/8% = 25%

Number of Cases that are Attributable

Suppose these are patients at two hospitals:

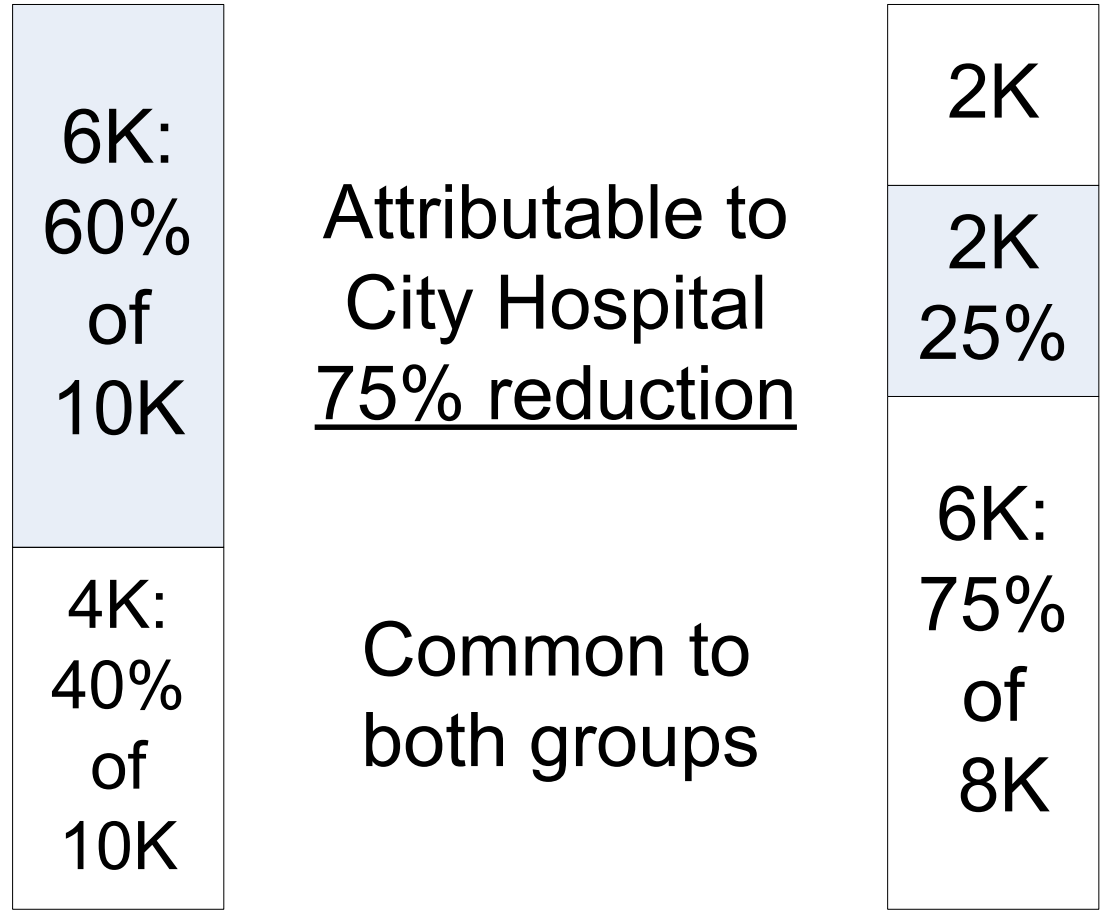
- 100,000 at the city research hospital
- 10,000 at the rural non-research hospital

The # of deaths (given 8% and 6% death rates):

- 8,000 deaths at the city research hospital
- 600 deaths at the rural non-research hospital.

2,000 (25%) of the 8,000 deaths at city hospital are attributable to the hospital.

of Cases Attributable: City Hospital Deaths



Conclusion

To help people analyze numbers in the news, Statistical Literacy must focus on:

- the influence of confounding on associations
- Specifically, the influence of confounding on events attributable to an associated factor.

Students are amazed that “attributed to” or “due to” is totally unrelated to any causal claim.

Students are dismayed to learn that these numbers are so soft – so easily influenced by other factors.