

1/1 Continued

Association - specific values of one variable tend to occur in common with specific values of another.

Simpson's Paradox - association between two variables holds true for several groups yet reverses direction when combined into a single group.

ex

|          | Hospital A          | Hospital B        |                         |                        |
|----------|---------------------|-------------------|-------------------------|------------------------|
| Died     | 63                  | 16                | $\frac{63}{2100} = 3\%$ | $\frac{16}{800} = 2\%$ |
| Survived | $\frac{2037}{2100}$ | $\frac{784}{800}$ | <u>B is better</u>      |                        |

Good Condition

|          | A                 | B                 |
|----------|-------------------|-------------------|
| Died     | 6                 | 8                 |
| Survived | $\frac{594}{600}$ | $\frac{592}{600}$ |

$$\frac{6}{600} = 1\% \quad \frac{8}{600} = 1.3\%$$

A is better

Bad Condition

|          | A                   | B                 |
|----------|---------------------|-------------------|
| Died     | 57                  | 8                 |
| Survived | $\frac{1443}{1500}$ | $\frac{192}{200}$ |

$$\frac{57}{1500} = 3.8\% \quad \frac{8}{200} = 4\%$$

A is better

How does Simpson's Paradox happen?

- concentration levels skewed
- one variable is heavily toward one outcome and the other skewed toward a second outcome

Easy Example

Teaching

4 Women  
1 male

Engineering

4 males  
1 Female

|   |        |         |         |         |         |
|---|--------|---------|---------|---------|---------|
|   | T      | T       | T       | T       | E       |
| w | 50,000 | 50,000  | 50,000  | 50,000  | 110,000 |
| m | 45,000 | 100,000 | 100,000 | 100,000 | 100,000 |

Overall

$M = 100,000$

$W = 50,000$

Injustice  
men paid twice  
as much as women

Teaching

$M = 45,000$

$W = 50,000$

Women paid more

Engineering

$M = 100,000$

$W = 110,000$

Women paid more

Men are concentrated in higher paying field  
Women are concentrated in lower paying field

#1

Ch 1: 2, 11, 19, 21, 34