Week 2 – Tuesday Session

Stratified Analysis

EPI202 – Epidemiologic Methods II
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Week 2: Discussion Topics

1. Stratified person-time data
   - Bias vs. efficiency
   - Notation
   - Hypothesis tests
   - Point and interval estimates – weighted averages
   - Assumption of homogeneity
2. Stratified count data
   - Hypothesis tests
   - Point and interval estimates – weighted averages
   - Assumption of homogeneity
3. Effect Measure modification
   - Definition
   - Impact on generalizability
   - Scale dependence
   - The H statistic for difference and ratio measures
   - Relative excess risk due to interaction

Definition of Bias

- The difference between the expected value of an estimation procedure and the true value that the procedure is attempting to estimate. If this difference is zero, the estimate is unbiased.

- For example, given sufficient data, the $\hat{RR}_{MH}$ is an unbiased estimate of the true RR under the assumption of no effect measure modification, no residual confounding, no confounding by unmeasured risk factors, no selection bias and no information bias. Mathematically we write:

$$\text{BIAS} = 0 \quad \text{if} \quad E(\hat{RR}_{MH}) - RR = 0,$$

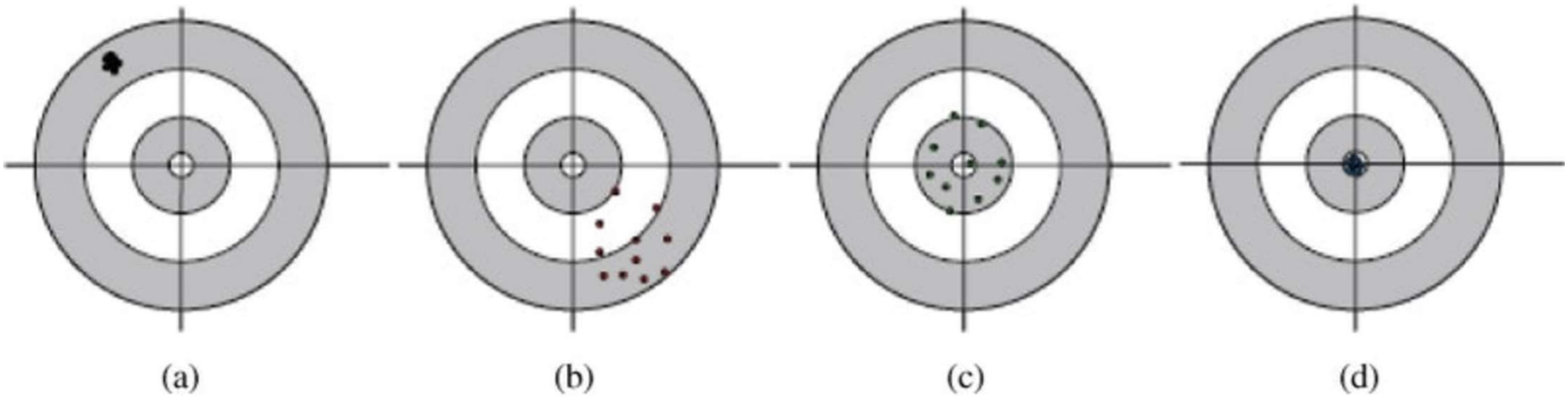
$$\text{where } E(\hat{RR}_{MH}) = \int_{0}^{+\infty} \hat{RR}_{MH} \Pr(\hat{RR}_{MH} \mid \text{data}) \, d\hat{RR}_{MH}$$

Bias Versus Efficiency

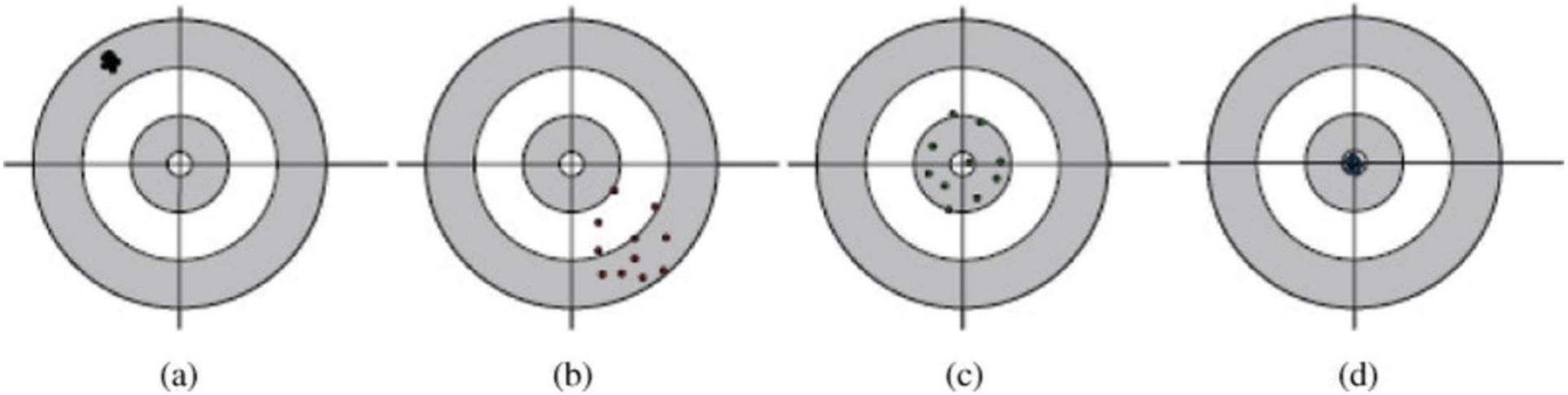
- **Validity**: lack of bias. Only unbiased procedures are *valid*.

- **Efficiency**: the precision of an estimation procedure
  - The smaller the variance of a procedure, the more efficient it is.
  - We may collapse sparse strata, trading a reduction in the validity of our estimate due to residual confounding for an improvement in its efficiency

Click on the panel that is biased and precise



Click on the panel that is unbiased and imprecise



Presice
Bias

Imprecise,
Biased

Imprecise
Unbiased

Precise
Unbiased

Week 2 Data Exercise

HAVE A GOOD WEEK