

Stata Demo on Measures of Association

1. Objectives

- a. Examine the association between smoking and death
 - i. risk difference
 - ii. risk ratio
 - iii. attributable fraction among the exposed
 - iv. attributable fraction among the total population
 - v. odds ratio
 - vi. rate difference
 - vii. rate ratio
- b. Examine the association between smoking and coronary heart disease (CHD)
 - i. rate difference
 - ii. rate ratio

2. Calculate the association between smoking status at visit 1 (cursmoke1) and the 24-year risk and odds of death (death).

- a. Dropdown:
 - i. Statistics→ Epidemiology and Related→Tables for Epidemiologists→Cohort study risk-ratio etc.
 - ii. Case variable: death
 - iii. Exposed variable: cursmoke1
 - iv. On the options tab, check box for “Report odds ratio”
 - v. Submit
- b. Command Window Syntax: `cs death cursmoke1,or`
- c. Calculation of Results

risk difference	$\text{Risk}_{E+} - \text{Risk}_{E-} = 0.36 - 0.34 = 0.023$
risk ratio	$\frac{\text{Risk}_{E+}}{\text{Risk}_{E-}} = \frac{0.36}{0.34} = 1.07$
attributable fraction among the exposed	$\frac{RR - 1}{RR} = \frac{1.07 - 1}{1.07} = 0.065$
attributable fraction among the total population	$p = \text{prevalence of exposure} = 2181/4434 = 0.49$ $\frac{p(RR - 1)}{1 + p(RR - 1)} = \frac{.49(1.07 - 1)}{1 + .49(1.07 - 1)} = 0.033$
disease odds ratio	$\frac{\text{Odds}_{D+ E+}}{\text{Odds}_{D+ E-}} = \frac{R_{D+ E+}/1 - R_{D+ E+}}{R_{D+ E-}/1 - R_{D+ E-}} = \frac{788/2181}{762/2253} = \frac{788/1393}{762/1491} = \frac{0.566}{0.511} = 1.11$
exposure odds ratio	$\frac{\text{Odds}_{E+ D+}}{\text{Odds}_{E+ D-}} = \frac{R_{E+ D+}/1 - R_{E+ D+}}{R_{E+ D-}/1 - R_{E+ D-}} = \frac{788/1550}{1393/2884} = \frac{788/762}{1393/1491} = \frac{1.03}{0.93} = 1.11$

3. Calculate the association between smoking status at visit 1 (cursmoke1) and the 24-year rate of death (death) over follow-up (timedth).

- a. Dropdown:
 - i. Statistics→ Epidemiology and Related→Tables for Epidemiologists→Incidence rate-ratio etc.
 - ii. Case variable: death
 - iii. Exposed variable: cursmoke1
 - iv. Person-time variable: timedth
 - v. Submit
- b. Command Window Syntax: `ir death cursmoke1 timedth`
- c. Calculation of Results

rate difference	$\text{Rate}_{E+} - \text{Rate}_{E-} = 0.0177 - 0.0163$ $= 0.0014 \text{ cases / person-year}$
rate ratio	$\frac{\text{Rate}_{E+}}{\text{Rate}_{E-}} = \frac{0.0177}{0.0163} = 1.09$

4. Calculate the association between smoking status at visit 1 (cursmoke1) and the 24-year rate of coronary heart disease (anychd) over follow-up (timechd).

- a. Dropdown:
 - i. Statistics→ Epidemiology and Related→Tables for Epidemiologists→Incidence rate-ratio etc.
 - ii. Case variable: anychd
 - iii. Exposed variable: cursmoke1
 - iv. Person-time variable: timechd
 - v. Submit
- b. Command Window Syntax: `ir anychd cursmoke1 timechd`
- c. Calculation of Results

rate difference	$\text{Rate}_{E+} - \text{Rate}_{E-} = 0.016 - 0.015$ $= 0.00048 \text{ cases / person-year}$
rate ratio	$\frac{\text{Rate}_{E+}}{\text{Rate}_{E-}} = \frac{0.016}{0.015} = 1.03$

5. Conclusions for Module 4.1

- a. Measures of disease frequency
 - i. risks
 - ii. odds
 - iii. rates
- b. Measures of association
 - i. difference measures
 - ii. ratio measures
 - iii. attributable fractions
- c. In this study,
 - i. positive association between smoking at visit 1 and risk/odds/rate of death
 - ii. positive association between smoking at visit 1 and rate of CHD