

## PH 250B Week 4, Refresher Ungraded quiz - ANSWERS

### Topic: Measures of Association

#### Problem 1. (Fall 2017 250B problem set)

A study examined mortality among homeless shelter residents in New York City from 1987 to 1994. There are 15 deaths observed among women aged 25-34, with 728 person-years of observation. Among men aged 25-34, 31 deaths were observed, with 1988 person-years of observation.

- a) **Draw** a contingency table to represent these data.

	Deaths	Person-Time
Women	15	728
Men	31	1988

- b) What **relative** measure of association is appropriate to assess mortality among women aged 25-34 compared to men aged 25-34?

**Incidence density ratio (a.k.a., rate ratio)**

- c) **Calculate** the relative measure of association you identified in 1b. **Interpret** your result.

$$IDR = \frac{ID_{women}}{ID_{men}} = \frac{15/728}{31/1988} = 1.32$$

Among 25-34 years olds residing in New York City homeless shelters, the rate of death among women was 1.32 times that among men.

- d) **Calculate** and **interpret** the absolute measure of association comparing mortality among women aged 25-34 compared to men of the same age.

$$IDD = (ID_{women} - ID_{men}) = \frac{15}{728} - \frac{31}{1988} = 0.0050 \text{ deaths per person year}$$
$$0.0050 * 1000 = 5.0 \text{ deaths per 1,000 person years}$$

Among 25-34 years olds residing in New York City homeless shelters between there were 5 more deaths per 1,000 person years among women compared to men.

#### Problem 2. (Fall 2017 250B problem set)

The following data are from the San Francisco Men's Health Study, a study in 1984 investigating the epidemiology and national history of AIDS. The data below were acquired by surveying existing cases of HIV.

Race	HIV+	HIV-	Total	Relative Measure of Association
White	441	361	802	1.00 (reference group)
Black	36	14	50	1.31
Latino	21	18	39	0.98
Asian	7	10	17	0.75

- a) What **relative** measure of association is appropriate for these data?

Prevalence ratio

- b) Using the White population as the reference group, complete the above table by **calculating** the relative measure you identified in 2a.

$$Prev Ratio_{WW} = \frac{Prev_{White}}{Prev_{White}} \frac{441/802}{441/802} = 1.00(referent)$$

$$Prev Ratio_{BW} = \frac{Prev_{Black}}{Prev_{White}} \frac{36/50}{441/802} = 1.31$$

$$Prev Ratio_{LW} = \frac{Prev_{Latino}}{Prev_{White}} \frac{21/39}{441/802} = 0.98$$

$$Prev Ratio_{AW} = \frac{Prev_{Asian}}{Prev_{White}} \frac{7/17}{441/802} = 0.75$$

- c) **Interpret** the relative measure you calculated for the Asian population.

The prevalence of an HIV+ diagnosis among Asian men is 0.75 times that among White men in 1984. Put differently, the prevalence of HIV among Asian men is 25% lower than among White men.

### Problem 3. (250B problem set)

The San Francisco Men's Health study proceeded to screen additional men and follow the seronegative (HIV-) men enrolled at baseline for 30 months. At the end of 30 months, each man returned to the clinic and was tested again for HIV infection. Of 414 White men seronegative at baseline, 18 tested positive for HIV at the 30-month follow-up. Of the 15 Black men seronegative at baseline, 8 tested positive for HIV at the follow-up.

- a) **Draw** a contingency table to represent these data.

	HIV+	HIV-	Total
White	18	$414 - 18 = 396$	414
Black	8	$15 - 8 = 7$	15
	26	403	429

- b) What specific **absolute** measure of association is appropriate for these data?

Cumulative incidence difference (a.k.a, risk difference)

- c) **Calculate** the absolute measure of association that you identified in 3b. Interpret the estimate.

$$CID = CI_{Black} - CI_{White}$$

$$CID = \frac{8}{15} - \frac{18}{414} = 0.49$$

There were 49 excess cases of HIV per 100 people among Black study participants compared to White study participants over the 30-month follow-up.

- d) What specific **relative** measure of association is appropriate for these data?

Cumulative incidence ratio (a.k.a., risk ratio)  
(Odds ratio is also possible for these data)

- e) **Calculate** the relative measure of association that you identified in 3d. **Interpret** the estimate.

$$CIR = \frac{CI_{Black}}{CI_{White}} = \frac{8/15}{18/414} = 12.27$$

- f) Now **calculate** the relative measure of association as if 6 Black men had seroconverted (as opposed to the 8 black men in 3e). Comparing this new estimate to the estimate from 3e, **what can you conclude about studies with small subgroup sizes?**

3e result:  $CIR = 12.27$

$$CIR = \frac{CI_{Black}}{CI_{White}} = \frac{6/15}{18/414} = 9.20$$

The measure of association calculated from small sample sizes is unstable. As a result, the effect estimates may change significantly with a small absolute change in the cell values.