3. Relative Risk Ratio - a ratio of the incidence rate in the exposed group and the incidence rate in the nonexposed group.
   Example: Relative Risk = Incidence rate in the exposed group / Incidence rate in the nonexposed group

**A relative risk of 1.0 indicates that the risk is equal for both groups, and conversely, a relative risk greater than 1.0 indicates that the risk is greater in the exposed group. A relative risk less than 1.0 indicates that the risk is less in the exposed group.

Rates to Determine Validity and Reliability

1. Sensitivity: the ability of a test to identify correctly people who have the health problem under study

   Example: Sensitivity = true positive results / (true positive results + false negatives)

2. Specificity: the ability of a test to correctly identify people who do not have the health problem

   Example: Specificity = true negative results / (true negative results + false positives)

Calculate the following rates using the information provided. Use the scaling factor of 100,000 for all of the problems.

1. The total death in County Z last year was 6,092. The population of County Z last year was 524,263. What was the crude death rate?

Crude death rate (last year) = $\frac{\#\text{ of death in County Z}}{\text{Total Population of County Z}} \times 100{,}000 = \frac{6092}{524263} \times 100{,}000$

$= 1162.01/100{,}000$

$= 1162/100{,}000$

2. There were 4,953 deaths from neoplasms in City B during the past year. The year end population was 3,495,678. What was the specific cancer death rate for last year?

Cancer death rate for last year in City B:

$\frac{\#\text{ of death for cancer from City B}}{\text{Total population}} \times 100{,}100 = \frac{4953}{3495678} \times 100{,}000 = 141.689252/100{,}000$

$= 141.7/100{,}000$

3. The population of the US in 2000 was 281,421,906. The number of deaths from heart disease in the US in 2000 was 710,760. The total number of deaths in the US in 2000 was 2,403,351.

   a Calculate the percentage (%) of heart disease deaths for the US in 2000.

$\frac{\#\text{ of deaths from heart disease}}{\text{Total deaths in same time period}} \times 100 = \frac{710760}{2403351} \times 100 = 29.57\%$

$= 29.6\%$

   b Calculate the rate of heart disease deaths in the US in 2000 for the US.

$\frac{\#\text{ of deaths from heart disease}}{\text{Total Population}} \times 100 = \frac{710760}{281421906} \times 100{,}000 = 252.56/100{,}000$

$= 252.6/100{,}000$

4. In Illinois in 2000, the population was 12,419,293. The number of Salmonella cases in 2000 was 1,502 in Illinois. Calculate the incidence rate for Salmonella for Illinois in 2000.

$$\frac{\#\text{ New cases of Salmonella in 2000}}{\text{Total population at risk in 2000}} = \frac{1502}{12419293} \times 100{,}000 = 12.09/100{,}000$$

$$= 12.1/100{,}000$$

5. There were 45,238 neonatal deaths out of 5,672,000 live births in City F. Calculate the neonatal mortality (death) rate.

$$\frac{\#\text{ of death of neonatal (in a year?)}}{\#\text{ of live births (in same year)}} \times 1000 = \frac{45238}{5672000} \times 1000 = 7.975\,7/1000$$

$$= 8/1000$$

6. The population in Sangamon county in 2000 was 188,951

a The number of live births in Sangamon County in 2000 was 2,646. Figure the Live Birth rate for Sangamon country for 2000.

$$\frac{\#\text{ of live births in 2000}}{\text{Total population in 2000}} \times 1000 = \frac{2646}{188951} \times 1000 = 14/1000$$

b The number of infant deaths in Sangamon County in 2000 was 18. Figure the infant mortality rate for Sangamon country for 2000.

$$\frac{\#\text{ of deaths of infant in 2000}}{\#\text{ of live births in 2000}} \times 1000 = \frac{18}{2646} \times 1000 = 6.8/1000$$

7. A city has a population of 250,000. Of these, 10,000 have disease X, which is incurable. There are 1,000 new cases and 400 deaths each year from this disease. There are 2,500 deaths per year from all causes. What is the prevalence rate based on a multiplier 100,000.

$$\text{prevalence rate} = \frac{\#\text{ of cases in the year}}{\text{Total population in same year}} \times 100{,}000$$

$$= \frac{10000 + 1000 - 400}{250{,}000} \times 100{,}000$$

$$= 4240/100{,}000$$

心肺發炎指標五分位數

Quintile of CRP Level					
	1	2	3	4	5
	0.49 mg/dL	>0.49-1.08 mg/dL	>1.08-2.09 mg/dL	>2.09-4.19 mg/dL	>4.19 mg/dL
Relative Risk	1.0	1.8	2.3	3.2	4.5
Number of women	6000	6000	6000	6000	6000

8. Based on the relative risk data above, one can conclude:
   a There is no risk of heart attack/stroke for women with CRP levels in the first quintile.
   b Decreasing CRP level appears to increase the risk of heart attack/stroke.
   c Increasing CRP level appears to increase the risk of heart attack/stroke.
   d There appears to be no association between CRP levels and heart attack/stroke.

C

9. In 2020, the population of Illinois is 12.63 million. Total cases of COVID-19 is 900,370. Using 100,000 as a multiplier, what is the period prevalence rate?

$$\frac{\#\text{ of total cases of COVID-19 in 2020}}{\text{Total population in 2020}} \times 100{,}000 = \frac{900{,}370}{12{,}630{,}000} \times 100{,}000$$

$$= 7128.82/100{,}000$$

$$= 7128.8/100{,}000$$

10. In 2020, the population of Illinois is 12.63 million. The total deaths from COVID-19 is 128,000. Using 100,000 as a multiplier, what is the cause-specific mortality rate?

$$\frac{\#\text{ of deaths from COVID-19 in 2020}}{\text{Total population in 2020}} \times 100{,}000 = \frac{128{,}000}{12{,}630{,}000} \times 100{,}000$$

$$= 1013.46/100{,}000$$

$$= 1013.5/100{,}000$$

EPIDEMIOLOGY EXERCISES
INFANT MORTALITY, CHICAGO COMMUNITY AREAS

TABLE 1

	COMMUNITY AREA	# of LIVE BIRTHS	DEATHS UNDER ONE YEAR	
			#	RATE PER 1000 BIRTHS
01.	Rogers Park	1,054	13	12.3
02.	West Ridge	966	5	5.2
03.	Uptown	1,340	26	19.4
04.	Lincoln Square	760	13	17.1 ✓
05.	North Center	610	7	11.5
27.	East Garfield Park	763	19	24.9
28.	Near West Park	1,338	34	25.4
36.	Oakland	295	8	27.1
39.	Grand Boulevard	1,209	24	19.9
40.	Washington Park	735	17	23.1
68.	Englewood	1,303	27	20.7
73.	Washington Heights	507	17	33.5
	CHICAGO	55,216	914	16.6
	UNITED STATES	--	--	12.5

A. Fill in the blank columns in Table 1 using the formula to calculate infant mortality rate. A hand or desk calculator speeds calculations but is not essential.

B. Compare the infant mortality rate you calculated for Lincoln Square with that of East Garfield Park. Are they the same or different?

Lincoln Squre and East Garfield Park have almost the same # of Live births in the year. Whereas, the # of infants of East Garfield Park is larger than Lincoln Square. The difference of infant mortality of the two communities is significant

C. What general trends, if any, are apparent from these data?

The infant mortality of US in the year is 12.5/1000, The infant mortality of Chicago is 16.6/1000 in the same year which is higher than national data. Most of the data in the list, representing chicago communities are higher than national data.

D. Compare the infant mortality rate of the City of Chicago with that of the United States. Are the rates the same of different? What factors may account, between Chicago and the United States, affect these rates?

The infant mortality is higher than that of the US. The factors that affect the data are the # of infant deaths in the year, and the # of live births in the same year