PH 250B Week 3, Refresher Practice problems - ANSWERS
Topic: Measures of Disease

Problem 1. (Fall 2017 250B problem set)

a. You want to compare cancer mortality rates in the United States between 1980 and 1940. You know that cancer is associated with age and that the age distribution of the U.S. population has changed between 1940 and 1980. Which rates would be best to compare: crude or age-standardized? Why?
Age-standardized. The percent of people over 65 has increased from 1940 to 1980, so examining the crude rates would make it appear that the cancer mortality rate has increased when the increase in crude rates is really largely attributable to the change in the age distribution in the population. Age-standardized rates would adjust for the difference between the age distributions, making the rates comparable.

b. Calculate the crude mortality rates for populations A and B. Which population appears healthier?

	Population A			**Population B**		
Age (yrs)	**Deaths**	**Population (size)**	**Rate (A)**	**Deaths**	**Population**	**Rate (B)**
0-4	80	22,000		400	100,000	
5-19	97	85,000		340	290,000	
20-44	140	100,000		300	300,000	
45-64	350	70,000		850	170,000	
65+	600	31,000		1,400	80,000	
Total	1,267	308,000	1,267/308,000=0.00411=4.11/1000	3,290	940,000	3,290/940,000=0.00350=3.50/1000

The crude mortality rate for A is 4.11/1,000 and for B is 3.50/1,000. Population B appears healthier, or at least less likely to die, at least on a crude level.

c. Calculate the age-specific mortality rates for populations A and B. How do they compare?

	Population A	**Population B**

Age (yrs)	Deaths	Population (size)	Rate (A)	Deaths	Population	Rate (B)
0-4	80	22,000	80/22,000 =0.004	400	100,000	400/100,000=0.004
5-19	97	85,000	0.001	340	290,000	0.001
20-44	140	100,000	0.001	300	300,000	0.001
45-64	350	70,000	0.005	850	170,000	0.005
65+	600	31,000	0.019	1,400	80,000	0.018
Total	1,267	308,000		3,290	940,000	

The age-specific mortality rates are nearly identical.

d. Determine the expected number of deaths by age group using the U.S. Census Population from 1970 as your standard population

	Population A			Population B	
Age (yrs)	U.S. 1970 Population size	Rate (A)	Expected Deaths	Rate (B)	Expected deaths
0-4	9,500	0.004	0.004*9,500= 38	0.004	0.004*9,500 = 38
5-19	22,000	0.001	22	0.001	22
20-44	41,000	0.001	41	0.001	41
45-64	30,000	0.005	150	0.005	150
65+	10,000	0.019	190	0.018	180
Total	198,000		441		431

The adjusted numbers of deaths are nearly the same.

e. What are the age-adjusted total rates for populations A and B? Which population is healthier?

Population A Age adjusted total rate = 441/198,000 = 0.00223
Population B Age adjusted total rate = 431/198,000 = 0.00218
They have nearly the same adjusted total mortality rates.
*Remember, that Direct Adjustment uses the observed rates, and a standard population.