Math 110

Quiz 1 Sample Solutions

January 25, 2009

Be sure to provide explanations for your answers as indicated.

1. The article "Do We Really Know What Makes Us Healthy?" by Gary Taubes in the New York Times from 7/16/07 concerns pitfalls in observational studies involving drugs. In particular, it discusses the following three confounders. Briefly explain two of the three.

   (a) compliance or adherer effect

   The compliance or adherer effect is that people who carefully follow drug routines are "different" from those that do not. In trials, compliers do better, even on a placebo, and so might generally be healthier. This is difficult to quantify, but if they are healthier and appear to to better, researchers may mistakenly attribute well-being to the drug.

   (b) prescriber effect

   Doctors may not prescribe additional medications for new conditions to people who are ill or if the doctors feel the medication won't make a difference in the long run. This has the effect of prescribing medication more for people who are healthier, exaggerateing the apparent positive outcomes.

   (c) eager patient effect

   Eager patients, knowledgable about health matters, are apt to push for new medications or additional medications. But better educated people are generally healthier, so obtain better outcomes. This again exaggerates the apparent effect of the drug.

2. The following figures show histograms for the age distribution of the entire U.S. population in 2006 and the age distribution of uninsured people in the U.S. in 2006. The class intervals are less than 18 years old, 18 to 24 years old, 24 to 35 years old, 35 to 45 years old, 45 to 65 years old, and 65 to 100 years old. (Data is from the Current Population Survey of the US Census Bureau.)

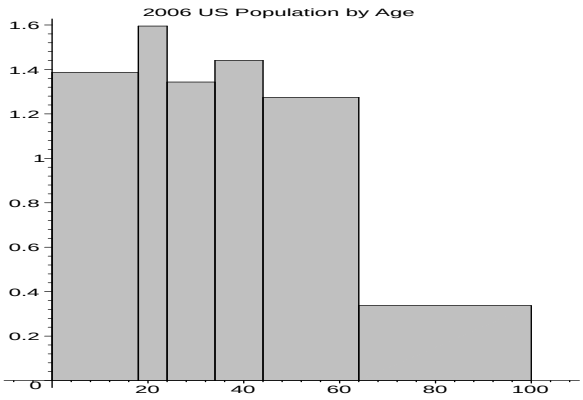

Figure 1: N=296,824,000 (approximately).

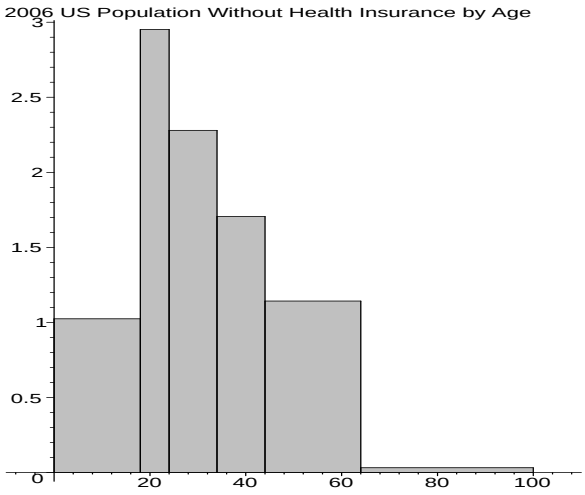

Figure 2: N= 46,915,000 (approximately).

(a) Use the first plot to approximate the number of people less than 18 years old in 2006 and the second plot to approximate the number of uninsured people less than 18 years old in 2006. Using this information, what percentage of people less than 18 years old were uninsured in 2006?

All people: $18 \times 1.4\% \times 296,824,000 = \approx 74.8$ million.
Uninsured: $18 \times 1.05\% \times 46,915,000 = \approx 8.86$

(b) Based on the graphs, but without calculation, in which class interval is the percentage of uninsured people highest? Why might this be the case? (*Hint:* How do people obtain health insurance in this country?)

It appears that in the interval 18 to 24 years old the percentage of uninsured people is greatest. Were we to calculate, the calculation would be

$$\frac{6 \times 3\% \times 46,915,000}{6 \times 1.6\% \times 296,824,000} 100\% \approx 29.6\%.$$

The reason is two fold: certain types of healthinsurance are available to childrent and not to adults (parents health care, Medicaid, or SCHIP (state programs to provide healthcare for children from lower income families)), and young adults tend to have higher unemployment rates (most adults obtain healthinsurance through their employer). In combination, these factors would cause a higher rate of no health insurance among young adults.