STA4010

Homework 3

Due November 4, 2018 (Sunday)

1. The following table consists of results from a breast cancer study. If the cancer is detected early enough (before it spreads), chances of successful treatment are much better. Do screening programs speed up detection by enough to matter? Subjects were women aged 40-64 years, who were randomized to treatment or control. "Treatment" consisted of invitations to four rounds of annual screening, each of which consisted of a clinical exam and mammography (screening for breast cancer by X-rays). The control group continued to receive usual health care. In the treatment group, about 2/3 of the women accepted the invitation to be screened, and 1/3 refused. Death rates (per 1000 women) in 5 years of follow-up are shown below, so groups of different sizes can be compared.

	Group	Breast Cancer		All other cancers	
	size	N	Rate	N	Rate
Treatment					
Screened	20,200	23	1.1	428	21
Refused	10,800	16	1.5	409	38
Total	31,000	39	1.3	837	27
Control	31,000	63	2.0	879	28

   (a) Which rates show the efficacy of treatment? What are your reasons?
   Note that the investigators decided which subjects would be invited to screening, but it is the subjects themselves who decided whether or not to accept the invitation. It is therefore an observational comparison, even though it occurs in the middle of an experiment.

   (b) What is the evidence confirming that treatment has no effect on death from other causes?

   (c) Is it a good idea to analyze the data by comparing the women accept screening to the controls? Why or why not? Explain briefly.

2. "Association is not causation". To what extent do you agree? Illustrate with an example and discuss briefly using no more than a page.