Stat 301 – Case Study: The Biggest Loser

Dansinger, Griffith, Gleason, et al. (2005) report on a randomized, comparative experiment in which 160 subjects were randomly assigned to one of four diet plans: Atkins, Ornish, Weight Watchers, and Zone (40 subjects per diet). These subjects were recruited through newspaper and television advertisements in the greater Boston area; all were overweight or obese with body mass index values between 27 and 52. The variables measured included:
- Which diet the subject was assigned to
- Whether or not the subject completed the 12-month study (0 = yes)
- The subject's weight loss after 2 months, 6 months, and 12-months (in kilograms, with a negative value indicating weight gain)
- The degree to which the subject adhered to the assigned diet, taken as the average of 12 monthly ratings, each on a 1-10 scale (with 1 indicating complete nonadherence and 10 indicating full adherence).

We will consider only the 80 subjects who were assigned to either the Atkins or Weight Watchers diets. For each of the following research questions,
- Identify and classify the relevant variables
- Indicate which graphical display(s) would be appropriate
- Indicate which numerical summaries would be appropriate
- Specify an appropriate inference procedure to be used
- State the hypotheses to be tested (if appropriate)
- Comment on how to check the technical conditions of that procedure

(a) Did a statistically significant majority of subjects complete the 12 month study?

(b) Estimate the probability of a subject completing the 12-month study based on these data.

(c) Is there a statistically significant difference in the amount of weight lost between the two diets after 2 months?

(d) Is there a statistically significant difference in the completion rate between the two diets?

(e) Is there statistically significant evidence that the weight loss after 6 months tends to be smaller than the weight loss after 2 months?

(f) What if the previous question had been: "Is there evidence that a majority of such dieters in the population would have lost less weight after 6 months than after 2 months?"

(g) Estimate the mean amount of weight loss by all participants who complete such a program after 12 months.

(h) What can you say about generalizability and causation in this study?

(i) Suppose you wanted to determine whether there is a significant difference across all four diets; how would you analyze this research question?