

PHP 2610 - HW 1

Due Weds December 12 at 5pm

Objectives

- To use imputation and inverse probability weighting to estimate an average treatment effect
- To use the same methods on sequential longitudinal data

Exercises Please use the dataset CTQ_HW3.csv. It contains the following variables

age	age at baseline
bcesdtot	CESD score at baseline (measures depression)
yrseeduc	years of education completed
income	income category
brate	baseline rate of cigarettes per day
cgh5lbs	concern about a 5 pound weight gain (higher = more concerned)
quitpost	verified quit at end of study (1 = yes, 0 = no)
s06wgt	weight at week 6
s12wgt	weight at week 12
basewt	weight at baseline
Z	treatment group (1=exercise, 0 = control)

1. In the first analysis, the goal is to fit the model

$$\text{logit}\{\pi(X)\} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3,$$

where Y is verified quit status at end of study, $\pi(X) = P(Y = 1 | X)$, and the covariates are $X_1 = \text{brate}$, $X_2 = \text{basewt}$, and $X_3 = \text{s12wgt}$.

- (a) Fit the model to complete cases only.
- (b) Use IPW for handling missingness in X_3 , and bootstrap resampling for standard error estimation.
- (c) Use either regression imputation with bootstrap, or multiple imputation, to handle missingness in X_3 .

Summarize your findings in a table.

2. This analysis asks you to calculate average weight trajectory for each treatment group. What I mean by weight trajectory is mean weight (and standard error) at baseline, week 6, and week 12.
 - (a) Calculate the weight trajectory using complete cases only.
 - (b) Calculate the weight trajectory using IPW, with sequential inverse probability weights. To calculate the weight for the week 6 weight, you can use any of the baseline covariates; for the week 12 weight, you can use any of the baseline covariates, and week 6 weight. Smoking status at week 12 cannot be used to calculate the weights.

- (c) Calculate the weight trajectory using sequential imputation. Use either multiple imputation or regression imputation.

Summarize your findings in a table.