

## Unit 14: Logistic and Proportional Hazards Regression

Unit Purpose: To become more familiar with the methods used for investigating the relationship between multiple explanatory variables and a binary or time-to-event response variable.

### Learning Objectives

Use these learning objectives as a checklist during the week. After completing this week, you should be able to:

#### Overall

Given a short research study scenario or abstract, be able to tell:

- ☐ what the scientific research question is;
- ☐ what the primary outcome of interest is and what type of variable it is;
- ☐ what the primary predictor(s) of interest are and what the other covariates of interest are;
- ☐ what regression method(s) would be appropriate to use to address the scientific research question.

#### Logistic Regression

- ☐ describe when logistic regression can be used, and what it is used for.
  - Identify a simpler test that is equivalent to a logistic regression model with only one binary predictor.
- ☐ write down the equation for a (multiple) logistic regression model and recognize what each parameter means.
- ☐ use the fitted logistic model regression coefficients to obtain odds ratios for each variable in the model.
- ☐ interpret the odds ratios for each variable. Recognize what value an odds ratio would have if a variable has no effect, and what values are associated with a variable having a positive or a negative effect on the outcome.
- ☐ make a conclusion from the  $p$ -values or the confidence intervals for the odds ratios.

#### Proportional Hazards Regression

- ☐ describe when proportional hazards regression (Cox regression) can be used, and what it is used for.
  - Identify a simpler test that is equivalent to a proportional hazards model with only one binary predictor.
- ☐ write down the equation for a (multiple) proportional hazards regression model and recognize what each parameter means.
- ☐ use the fitted proportional hazards model regression coefficients to obtain hazard ratios for each variable in the model.

- ❑ interpret the hazard ratios for each variable. Recognize what value a hazard ratio would have if a variable has no effect, and what values are associated with a variable having a positive or a negative effect on the outcome.
- ❑ make a conclusion from the  $p$ -values or the confidence intervals for the hazard ratios.