Week8 writing polished

Background & Aim

An informal survey of students in an introductory statistics course asked students "How many alcoholic drinks did you consume last weekend?". However, some drinkers reported zero drinks because they just did not happen to drink during the past weekend. Thus, the zeros received from the survey were a mixture of responses from non-drinkers and drinkers. The aim of this case study is to address additional research questions: What proportion of students are non-drinkers as well as what factors, such as off-campus living and sex, are related to whether students drink?

Methods

The data provided by a student in an introductory statistics course contains 77 observations. The response of interest is a count, it is natural to consider a Poisson regression model. However, a simple Poisson model will have lack-of-fit because those responding zero drinks are coming from a mixture of non-drinkers and drinkers who abstained the weekend of the survey. Thus, the researchers conducted the study by modelling a zero-inflated Poisson(ZIP) model using covariates sex, first-year status, and off-campus residence. The model consists of two parts: The first part models the association between the number of drinks and the predictors of sex and off-campus residence. The second part uses a predictor for the first-year status to obtain an estimate of the proportion of non-drinkers based on the reported zeros. The first parameter λ is the mean number of drinks in a weekend among those who actually drink. The second parameter α is the true proportion of non-drinker*s* in the population.

Results

The ZIP model reveals that the odds that a first-year student is a non-drinker is 3.12 times the odds that an upper-class student is a non-drinker. The estimated probability that a first-year student is a non-drinker is 0.630 while for non-first-year students, the estimated probability of being a non-drinker is 0.354. For drinkers, the average number of drinks for males is 2.76 times the number for females ($Z = 5.827$, $p < 0.001$) either both on or both off-campus. For drinkers who have the same sex, the mean number of drinks for students living off-campus is 1.52 times that of students living on campus ($Z = 2.021$, $p = 0.0433$)

Conclusions

Among university students in a dry university, sex and off-campus residency are related to whether the student drinks. Males are more inclined to be drinkers than females either both on or both off-campus. Students who live off-campus are more possible to be a drinker than students who live on campus. 63% of the first-year students are non-drinkers while only 35.4% of non-first-year students are non-drinker. One limitation of the data from the survey is that the definition of "Weekend" is not clear enough. Some students might consider Friday or Saturday nights as weekend while others only consider Saturday nights as weekend. Also, the sample size is relatively small which is not appropriate for the ZIP model. Variations of Poisson regression models such as hurdle models and quasi-Poisson are also worth taking while the case study only focuses on the ZIP model.