Homework 3

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2024-02-27

1

```r
# data prep
df_ec = data.frame(
  age = c(25, 25, 35, 35, 45, 45, 55, 55, 65, 65, 75, 75),
  alcohol = c(rep(c("less", "more"), length.out = 12)),
  case = c(0, 1, 5, 4, 21, 25, 24, 42, 36, 19, 8, 5),
  control = c(106, 9, 164, 26, 138, 29, 139, 27, 88, 18, 31, 0)
)

resp = cbind(df_ec$case, df_ec$control)
```

We coded daily alcohol consumption 0-79g as "less", and 80+g as "more".

a

```r
# fit a prospective logit model
logit.prosp = glm(resp ~ df_ec$alcohol + df_ec$age, family = binomial(link = 'logit'))

summary(logit.prosp)
```

```
##
## Call:
## glm(formula = resp ~ df_ec$alcohol + df_ec$age, family = binomial(link = "logit"))
##
## Coefficients:
##                    Estimate Std. Error z value Pr(>|z|)
## (Intercept)       -5.142771   0.432049 -11.903   <2e-16 ***
## df_ec$alcoholmore  1.887764   0.190502   9.909   <2e-16 ***
## df_ec$age          0.061805   0.007485   8.258   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 214.750  on 11  degrees of freedom
## Residual deviance:  29.988  on  9  degrees of freedom
## AIC: 76.03
```

```
##
## Number of Fisher Scoring iterations: 4
```

```
exp(coef(logit.prosp)) # odds ratio estimates
```

```
##     (Intercept) df_ec$alcoholmore        df_ec$age
##      0.005841482      6.604582479       1.063755249
```

In this model, we treat disease status (case vs control) as response and exposures (daily alcohol consumption and age) as predictors.

$logit(\pi_i) = \beta_0 + \beta_1 x_1 + \beta_2 x_2$
x_1 : the indicator of heavier daily alcohol consumption (80+g)
x_2 : the indicator of age (as a continuous variable)

- The odds ratio of having esophageal cancer is 6.605 in heavier daily alcohol consumer (80+g) compared to lighter consumer (0-79g) holding other covariates constant

- As age increases by one year, the odds ratio of having esophageal cancer increases by 1.064 holding other covariates constant

b