Chapter 6 - Inference for Categorical Data

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HIV in sub-Saharan Africa. (6.29, p. 228) In July 2008 the US National Institutes of Health announced that it was stopping a clinical study early because of unexpected results. The study population consisted of HIV-infected women in sub-Saharan Africa who had been given single dose Nevaripine (a treatment for HIV) while giving birth, to prevent transmission of HIV to the infant. The study was a randomized comparison of continued treatment of a woman (after successful childbirth) with Nevaripine vs Lopinavir, a second drug used to treat HIV. 240 women participated in the study; 120 were randomized to each of the two treatments. Twenty-four weeks after starting the study treatment, each woman was tested to determine if the HIV infection was becoming worse (an outcome called virologic failure). Twenty-six of the 120 women treated with Nevaripine experienced virologic failure, while 10 of the 120 women treated with the other drug experienced virologic failure.

(a) Create a two-way table presenting the results of this study.

```
hiv <- matrix(c(26,10,36,94,110,204,120,120,240),ncol=3,byrow=TRUE)
colnames(hiv) <- c("Nevaripine", "Other Drug", "Total")
rownames(hiv)<-c("Virologic failure","No Virologic failure", "Total")
hiv<-as.table(hiv)

hiv
```

```
##                       Nevaripine Other Drug Total
## Virologic failure             26         10    36
## No Virologic failure          94        110   204
## Total                        120        120   240
```

(b) State appropriate hypotheses to test for difference in virologic failure rates between treatment groups.

H_0 : There is no difference in the proportion of virologic failures among those who take Nevaripine and those who take the other drug.

H_A : There is a difference in the proportion of virologic failures among those who take Nevaripine and those who take the other drug.

(c) Complete the hypothesis test and state an appropriate conclusion. (Reminder: Verify any necessary conditions for the test.)

```
n<-120
x<-26
n_2<-120
x_2<-10
alpha<-0.05
```

```r
p<-round(x/n,4)
p_2<-round(x_2/n_2,4)
p_3<-round((x+x_2)/(n+n_2),4)

r<-p-p_2
s<-sqrt(p_3-p_3^2)
t<-sqrt((1/n)+(1/n_2))
z<-round(r/(s*t),2)


z
```

```
## [1] 2.89
```

$$P = P(Z < -2.89 or Z > 2.89) = 2P(Z < -2.89) = 2(0.0019) = 0.0038$$

If the P-value is smaller than the significance value, then we can reject the null hypothesis.

There is a difference in the proportion of virologic failures among those who take Nevaripine and those who take the other drug.
