## Answer on Question \#44255 - Math - Statistics and Probability

Landoldt et al. (J Child Psychol Psychiat. 44:1199-1207) examined rates of posttraumatic stress disorders (PTSD) in mothers and fathers. Parents were interviewed 5 to 6 weeks after an accident or a new diagnosis of cancer or diabetes mellitus for their child. The 2003 survey found that 28 of the 175 fathers interviewed and 43 of the 180 mothers interviewed met the criteria for current PTSD.

## Solution

a. What is $p$-hat, the weighted average of the proportion?

$$
\begin{gathered}
\widehat{p_{1}}=\frac{28}{175}=0.1600, \quad \widehat{p_{2}}=\frac{43}{180}=0.2389 . \\
\bar{p}=\frac{28+43}{175+180}=0.2000 .
\end{gathered}
$$

b. What is the null hypothesis if comparing mothers to fathers?

The null hypothesis states that the population proportion of fathers that develop PTSD is equal the population proportion of mothers that develop PTSD, or

$$
H_{0}: p_{1}=p_{2} .
$$

c. What is the p -value of the two-sided test?

The value of $\sigma_{\widehat{P_{1}}-\widehat{p_{2}}}$ is

$$
\sigma_{\widehat{p_{1}}-\widehat{p_{2}}}=\sqrt{\frac{0.2000 \cdot 0.8000}{175}+\frac{0.2000 \cdot 0.8000}{180}}=0.04246 .
$$

The value of the test statistic $z$ is

$$
z=\frac{0.1600-0.2389}{0.04246}=-1.8582
$$

The p value of this test is

$$
\text { p value }=2 P(Z \geq|z|)=2\{1-\Phi(|z|)\}=2\{1-\Phi(1.8582)\}=0.0632 .
$$

d. At the 0.05 level of significance, can we conclude that fathers and mothers are not equally likely to develop PTSD after stress?

No, we accept null hypothesis that sample proportions are equal (significance level smaller than $p$ value: $0.05<0.0632$ ).

