9. Chapter 8, page 403

a) Observed (expected)

<table>
<thead>
<tr>
<th></th>
<th>Migraine=1</th>
<th>Migraine= 0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>62 (59.2)</td>
<td>58 (60.8)</td>
<td>120</td>
</tr>
<tr>
<td>Standard</td>
<td>86 (88.8)</td>
<td>94 (91.2)</td>
<td>180</td>
</tr>
<tr>
<td>Total</td>
<td>148</td>
<td>152</td>
<td>300</td>
</tr>
</tbody>
</table>

b) \[ RR = \frac{62/120}{86/180} = 1.08 \]

\[ H_0: RR = 1 \]
\[ H_1: RR \neq 1 \quad \alpha = 0.05 \]

Reject if \( \chi^2 > 3.84. \)

All expected frequencies are at least 5.

\[ \chi^2 = 0.44 \]

Do not Reject \( H_0 \) since 0.44 < 3.84. There is no significant evidence, \( \alpha = 0.05 \), that \( RR \neq 1 \).

c) \[ H_0: RR_{MH} = 1 \]
\[ H_1: RR_{MH} \neq 1 \quad \alpha = 0.05 \]

Reject if \( \chi^2 > 3.84. \) \[ RR_{MH} = \frac{\sum a(c + d)}{N} = \frac{100}{100} + \frac{200}{200} = 0.95 \]

\[ \chi^2_{MH} = \frac{\left( \sum \frac{(ad-bc)^2}{N} \right)^2}{\sum \frac{(a+b)(c+d)(a+c)(b+d)}{(N-1)N^2}} = \frac{(30)(40)+(32)(140)}{100} + \frac{(35)(60)+(51)(60)}{200} = 0.23. \]

Do not Reject \( H_0 \) since 0.23 < 3.84. We do not have significant evidence, \( \alpha = 0.05 \), to show that \( RR_{MH} \neq 1 \).

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a) \[ H_0: \mu_1 = \mu_2 = \mu_3 \]
\[ H_1: H_0 \text{ is false.} \]

\[ \alpha = 0.05 \]

\[ F = 43.16, p = 0.0001. \]

Reject Ho because \( p = 0.0001 < 0.05 \).

b) \[ \eta^2 = 839.58/1043.83 = 0.80 \]
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H₀: μ₁ = μ₂ = μ₃
H₁: H₀ is false. \[ \alpha = 0.05 \]

\[ \bar{X} .. = \frac{(21.6+24.8+27.9)}{3} = 24.8 \]

\[ SS_b = \sum n_j (\bar{X}_j - \bar{X} ..)^2 = 100((21.6-24.8)^2 + (24.8-24.8)^2 + (27.9-24.8)^2) = 1985 \]

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1985</td>
<td>2</td>
<td>992.5</td>
<td>320.2</td>
</tr>
<tr>
<td>Within</td>
<td>920.7</td>
<td>297</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2905.7</td>
<td>299</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reject H₀ if \( F \geq F_{0.05} (2, 297) = F_{0.05} (2, 200) = 3.04 \)

Reject H₀ since 320.2 > 3.04. We have significant evidence, \( \alpha = 0.05 \), to show that the means are not all equal.