Journal Article Assignment 2 (20 points)

STAT 301

Due: Thursday, April 6th @ 11:59pm

You may work in pairs to complete your critique. Please answer the following questions regarding the article *Prevalence of most commonly reported tobacco-associated lesions in central Gujarat: A hospital-based cross-sectional study*. This article can be accessed at the following link: [http://www.ijdr.in/article.asp?issn=0970-9290;year=2016;volume=27;issue=4;spage=405;epage=409;aulast=Joshi](http://www.ijdr.in/article.asp?issn=0970-9290;year=2016;volume=27;issue=4;spage=405;epage=409;aulast=Joshi).

1. Identify the inclusion and exclusion criteria for selecting participants for this study. (2 points)

   Individuals who had the habit of using smokeless and smoking form of tobacco and had TAL were included in the study.

   Patients who were unwilling to give complete habit details, with no habits, or with different oral and dental complaints other than TAL were excluded from the study.

2. Refer to the data given in Table 1 which summarizes the type of lesion found and the participant’s gender. Using **ONLY** the OSMF, Smokers palate, Tobacco pouch keratosis, Leukoedema, and Oral lichen planus lesion types, create a mosaic plot of the data and paste your plot below. Based on the mosaic plot, does there appear to be a relationship between the type of lesion found and the participant’s gender? Fully explain your reasoning. (3 points)

   ![Mosaic Plot](image)

   Yes, there appears to be a relationship between type of lesion found and the participant’s gender since the patterns differ across gender. For example, males seem more likely to have smokers palate, while women tend to be more likely to have either tobacco pour keratosis or OSMF.
3. Refer to the data given in Table 1 which summarizes the type of lesion found and the participant’s gender.

a. Using JMP, construct a 99% confidence interval for the difference in the proportion of people with a tobacco pouch keratosis for males and females. Note: You will have to create the necessary JMP table on your own using the data from Table 1. Paste the appropriate JMP output in your solution. (2 points)

\[
0.05 \leq p_{\text{female}} - p_{\text{male}} \leq 0.16
\]

b. Interpret the 99% confidence interval found in part a. (3 points)

99% confident the true proportion of females with a tobacco pouch keratosis is between 0.05 and 0.16 bigger than the true proportion of males with a tobacco pouch keratosis.

c. T F Based on the confidence interval identified in part a, it can be concluded that there is a significant difference in the proportion of people with tobacco pouch keratosis between the two genders. (2 points)

Since the interval DOES NOT contain zero, we can conclude there IS a difference in the proportion with tobacco pouch keratosis for males and females.

4. Refer to the data given in Table 2 which summarizes the type of lesion found and the most common habit of the participant (use only Smokeless tobacco, Smoking tobacco, and Padiki). Using ONLY the OSMF, Smokers palate, Tobacco pouch keratosis, and Leukoedema, carry out a hypothesis test to answer the following research question.

**Research Question** — Is there evidence of a relationship between type of lesion found and the most common habit of the participant? That is, is there evidence that type of lesion found is dependent upon the most common habit of the participant?

Make sure to state your hypotheses, clearly check the assumption(s)/condition(s) (if appropriate), indicate the value of the test statistic (if appropriate), indicate the value of the p-value, and provide the conclusion in context of the research question. Also, paste the appropriate JMP output in your solution below. (8 pts)

\( H_0: \) There is no relationship between the type of lesion found and the most common habit.

Type of lesion is independent of the most common habit.

\( H_a: \) There is a relationship between the type of lesion found and the most common habit.

Type of lesion is not independent of the most common habit.
First, we need to check that the Chi-square test is appropriate by finding the expected counts.

\[
\begin{align*}
\text{% Leukoedema} &= \frac{470}{4535} = 0.10 \\
\text{%OSMF} &= \frac{1047}{4535} = 0.23 \\
\text{%Smokers Palate} &= \frac{1600}{4535} = 0.35 \\
\text{%TPK} &= \frac{1418}{4535} = 0.31
\end{align*}
\]

<table>
<thead>
<tr>
<th>Most Common Habit</th>
<th>Type of Lesion</th>
<th>Leukoedema</th>
<th>OSMF</th>
<th>Smokers Palate</th>
<th>Tobacco Pouch Keratosis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Padiki</td>
<td>Leukoedema</td>
<td>1046(0.10)</td>
<td>1046(0.23)</td>
<td>1046(0.35)</td>
<td>1046(0.31)</td>
<td>1046</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 104.6</td>
<td>= 240.58</td>
<td>= 366.1</td>
<td>= 324.26</td>
<td>1046</td>
</tr>
<tr>
<td>Smokeless Tobacco</td>
<td>OSMF</td>
<td>1771(0.10)</td>
<td>1771(0.23)</td>
<td>1771(0.35)</td>
<td>1771(0.31)</td>
<td>1771</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 177.1</td>
<td>= 407.33</td>
<td>= 619.85</td>
<td>= 549.01</td>
<td>1771</td>
</tr>
<tr>
<td>Smoking Tobacco</td>
<td>Smokers Palate</td>
<td>1718(0.10)</td>
<td>1718(0.23)</td>
<td>1718(0.35)</td>
<td>1718(0.31)</td>
<td>1718</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 171.8</td>
<td>= 395.14</td>
<td>= 601.3</td>
<td>= 532.58</td>
<td>1718</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>470</td>
<td>1047</td>
<td>1600</td>
<td>1418</td>
<td>4535</td>
</tr>
</tbody>
</table>

All the expected counts are greater than or equal to 5, so the Chi-square test is appropriate.

\[ TS = 4058.860 \quad \text{p-value} = 0.0001 \]

There is evidence (since 0.0001 < 0.05) that there is a relationship between the type of lesion found and the most common habit.

There is evidence (since 0.0001 < 0.05) that type of lesion is not independent of the most common habit.